BREEAM Refurbishment and Fit-out Pre-Assessment

20-24 Russell Square

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Report produced by –

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Revision	Notes	Prepared by	Reviewed by	Date
1.0		Elise Kidd	Mary Miller	17/02/2021
1.1	Updated based on RIBA 2 feedback	Elise Kidd	Mary Miller	14/04/2021
1.2	For planning	Elise Kidd	Mary Miller	15/04/2021

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1 Blewburton Limited

Blewburton Limited (BBL) was established in April 2016 and are the follow-on company to The Blewburton Partnership (BBP) which was established in 2008 to provide energy and sustainability consultancy to clients in both the private and public sectors. Staffing has remained the same and have been involved in the project management, assessment and consulting on projects involving renewable and sustainable energy for over fifteen years, both with BBL, BBP and in former employment.

BBL is well placed to analyse and assess the potential for low and zero carbon energy technologies to meet the energy demand for new developments and to determine the most cost effective and technically appropriate means of meeting the sustainable energy requirements relating to planning conditions, in the format often known as the 'Merton Rule' (a required percentage of on-site renewable energy generation or carbon offset). BBL are also licensed Elmhurst SAP, BREEAM & Home Quality Mark assessors.

2 Executive Summary

20-24 Russell Square is a development in Camden including the refurbishment of existing Grade 2 Listed buildings and a new build extension. Policy CC2 of the Camden Local Plan requires non-domestic developments of 500m^2 of floorspace or above to achieve "excellent" in BREEAM assessments.

Having assessed the development against the BREEAM Refurbishment and Fit-out 2014 criteria it has been determined that an Excellent rating is feasible, with a score of 70.68% and all BREEAM Excellent mandatory credits being targeted. A summary of the development's performance is shown in Table 1 and Figure 1.

Section	No. credits available	Indicative no. credits targeted	Section Weighting	Indicative Section Score
Management	21	14	13.63%	9.09%
Health & Wellbeing	20	18	15.48%	13.93%
Energy	25	13	16.34%	8.50%
Transport	7	7	5.30%	5.30%
Water	9	5	6.81%	3.78%
Materials	13	7	14.19%	7.64%
Waste	11	8	7.81%	5.68%
Land Use & Ecology	4	4	9.08%	9.08%
Pollution	13	9	11.35%	7.86%
Innovation	10	0	10.00%	0.00%
Indicative Total Score	**133**	**85**		**70.86%**
			Indicative BREEAM Rating:	**Excellent**
			Minimum Standards Level Targeted:	**Excellent**

Table 1 – BREEAM Score Summary

The development scores highly in the majority of sections, the management, energy and materials sections account for most credits which are not targeted. Many of these credits have not been targeted due to the early stage of the project, full details regarding emissions, materials selection and the proposed university heat network connection are not yet known and so a conservative approach to credit assumptions has been taken. As the development progresses it may be possible to increase the score in these areas, the team will be looking to identify a buffer of credits.

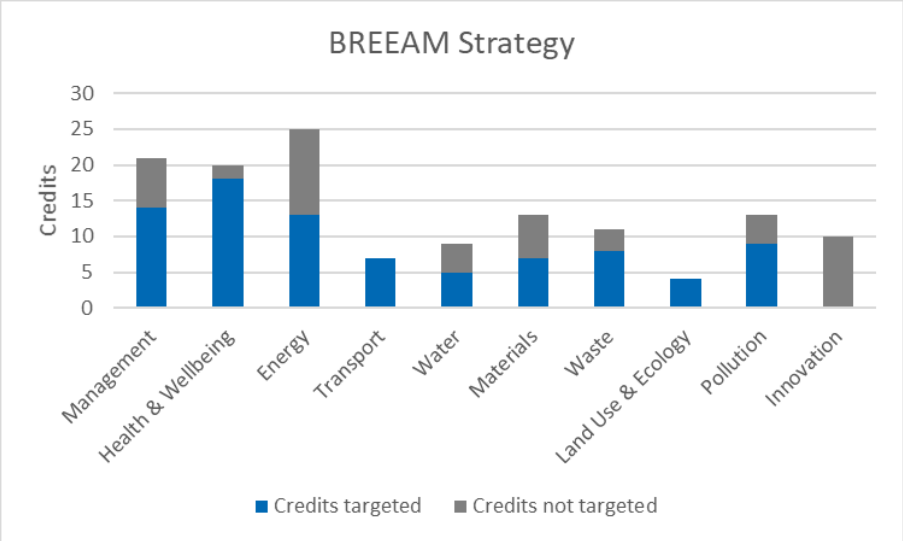

Figure 1 – BREEAM Score Summary

The pre-assessment report demonstrates how this will be achieved showing a breakdown of the various sections. Further detail regarding the BREEAM requirements can be found in the credit details section, although the BREEAM assessor should always be contacted where further clarification and guidance is needed.

This report is not a BREEAM certificate or a guarantee that the BREEAM rating will be achieved. The design team and responsible for implementing the measures and proving the necessary robust evidence for awarding credits.

3 Introduction

3.1 The site

Blewburton Limited (BBL) have appointed as BREEAM assessors and BREEAM Accredited Professionals (AP) for the development at 20-24 Russell Square.

The site currently consists of 4 town houses which are currently vacant, although they have been used for teaching most recently. The proposed use of the site is as a Primary School for students up to year 9 for the École Jeannine Manuel school in London.

A number of proposals are being considered at this stage. The 4 existing Listed town houses will be retained, the retained areas have a combined floor area of approximately 3,200m^2. Some buildings to the rear will be demolished and replaced, these new buildings are expected to have a floor area of approximately 350m^2.

During RIBA stage 1 a BREEAM meeting was held with Robert Freeman and Saba Mahdi (Ellis Williams Architects), Patrick Brinson, Chris Eanor and Gearoid Donnelly (BSP), and Elise Kidd (Blewburton Ltd) on the 18th of January to discuss the most appropriate BREEAM assessment methods, targets and early action credits. A BREEAM pre-assessment meeting was held during RIBA stage 2 on the 10th of February, to start the process of determining a BREEAM credit strategy for achieving an Excellent rating. A meeting was held on the 14th of April where the BREEAM credit strategy was amended slighting

3.2 Planning requirements

Policy CC2 of the Camden Local Plan requires non-domestic developments of 500m^2 of floorspace or above to achieve “excellent” in BREEAM assessments.

3.3 BREEAM registration

It is proposed that the site will be assessed under BREEAM Refurbishment and Fit-out 2014, which is the current version of BREEAM for this sort of project.

3.4 Report Objectives

This report aims to determine which credits can realistically be targeted based on the proposed development.

This study will enable the design team to influence the development moving forward and understand the BREEAM requirements.

This report is also intended to demonstrate to the LPA how BREEAM Excellent will be achieved.

3.5 Methodology

This study will investigate the achievable and appropriate sustainable measures that are to be incorporated into the development.

The approach that has been taken in this study is as follows:

- Discussion with the design team regarding the overall development and the scope of the BREEAM assessment.
- Discussions with the design team in relation to specific credits.
- Preparation of an initial credit strategy.
- Review of the credit strategy and amendments as required.
- Finalisation of the credit strategy.

Results presented are indicative of the potential performance of the assessed buildings. This is not a formal BREEAM assessment for certification.

4 BREEAM Refurbishment and Fit-out 2014

4.1 What is BREEAM?

BREEAM is an environmental performance standard against which buildings can be assessed and compared. The building is assessed against a range of criteria falling into the following categories:

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

Each criterion within these sections has requirements which when met allows credits to be awarded.

4.2 BREEAM Scores and ratings

Weightings are applied to the credits achieved to give a score which is then totalled to give an overall percent. Rating benchmarks are shown in Table 2.

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

Table 2 – BREEAM ratings

All BREEAM certified buildings are going above and beyond Building Regulations, therefore even a Pass rating is an achievement and improves the sustainability of a building.

These ratings broadly represent performance equivalent to:

- Outstanding: less than 1% of new non-domestic buildings in the UK (innovator)
- Excellent: Top 10% of new non-domestic buildings in the UK (best practice)
- Very Good: Top 25% of new non-domestic buildings in the UK (advanced good practice)
- Good: Top 50% of new non-domestic buildings in the UK (intermediate good practice)
- Pass: Top 75% of new non-domestic buildings in the UK (standard good practice)

As the London Borough of Camden requires BREEAM Excellent a score of 70% will be needed, we recommend an additional buffer of at least 10% is identified to ensure compliance post construction.

4.3 Appropriate BREEAM version

To determine how best to assess this project to demonstrate compliance with the planning requirement of BREEAM Excellent we must consider the guidance in BREEAM Refurbishment and Fit-out (RFO) 2014 for assessing projects which are part new-build, part refurbishment.

As the existing building is over 2,500m^2 the new extension must be no greater than 500m^2 to allow the whole project to be assessed under a single BREEAM RFO 2014 assessment. The current proposal meets this criterion meaning a single BREEAM RFO assessment is appropriate.

Within BREEAM RFO 2014 we also need to define the building type and scope of works. BREEAM RFO 2014 has 4 parts:

- Part 1: Fabric and Structure

Applicable where alterations to the building fabric include building façade, roof structure or windows (including secondary glazing)

- Part 2: Core Services

Applicable where at least 2 systems (central air handling unit, heating boiler or distribution, chiller plant or distribution, water services, BMS, community heating, low and zero carbon technologies) are installed or upgraded to a level that requires compliance with Building Regulations.

- Part 3: Local Services

Where at least 2 fixed local building services (light fittings, systems and controls, zone controls, local ventilation, local heating, local cooling, point of use water heaters) are being installed or upgraded.

- Part 4: Interior Design

Applicable where works involve 2 changes to interior space (wall coverings, floor coverings, ceiling coverings, partitions, raised floor systems, furniture and fittings) and either sanitary fittings, equipment and local electrical installations.

At this stage BREEAM Refurbishment and Fit-out 2014 Education Parts 1, 2, 3 and 4 has been assumed. As the project moves forward this can be reviewed, it is possible that a Part 1 assessment will not be applicable.

As the buildings are Listed there are a number of additional notes which will need to be considered within BREEAM RFO 2014.

4.4 Minimum standards

BRE has set a number of minimum standards, which are minimum performance requirements to achieve an overall rating. This must be achieved in addition to the percentage score shown in Table 2. These standards are listed below.

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	**Parts 2 and 3 only: One credit (Seasonal commissioning)**	Parts 2 and 3 only: One credit (Seasonal commissioning)
Ene 01: Reduction of energy use and carbon emissions	None	None	None	**Parts 1, 2, 3 and 4 (full assessments): Six credits, varies for other assessment types**	Parts 1, 2, 3 and 4 (full assessments): Ten credits, varies for other assessment types
Ene 02: Energy monitoring	None	None	Parts 2, 3 and 4: One credit (First sub-metering credit)	**Parts 2, 3 and 4: One credit (First sub-metering credit)**	Parts 2, 3 and 4: One credit (First sub-metering credit)
Wat 01: Water consumption	None	One credit (Where applicable)	One credit (Where applicable)	**One credit (Where applicable)**	Two credits (Where applicable)
Wat 02: Water monitoring	None	Part 2: Criterion 1 only	Part 2: Criterion 1 only	**Part 2: Criterion 1 only**	Part 2: Criterion 1 only
Mat 03: Responsible sourcing of construction products	Criterion 1 only	Criterion 1 only	Criterion 1 only	**Criterion 1 only**	Criterion 1 only
Wst 01: Construction waste management	None	None	None	**None**	One credit
Wst 03: Operational waste	None	None	None	**One credit**	One credit

Table 3 – BREEAM RFO minimum standards

4.5 BREEAM timings

There are a number of BREEAM credits which require actions or reports at specific times or RIBA stages. If these items are missed credits cannot be awarded. BBL were brought on board at RIBA stage 1, and have worked with the team to ensure where possible these deadlines have been met.

5 BREEAM Score Summary

The credit strategy shows that a score of 70.86% is currently considered achievable for the development as shown in Table 4 and Figure 2. This is above the 70% required for BREEAM Excellent and allows a buffer. The strategy and exact score may vary when formally assessed.

Section	No. credits available	Indicative no. credits targeted	Section Weighting	Indicative Section Score
Management	21	14	13.63%	9.09%
Health & Wellbeing	20	18	15.48%	13.93%
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Pollution	13	9	11.35%	7.86%
Innovation	10	0	10.00%	0.00%
Indicative Total Score	**133**	**85**		**70.86%**
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Table 4 – BREEAM Score Summary

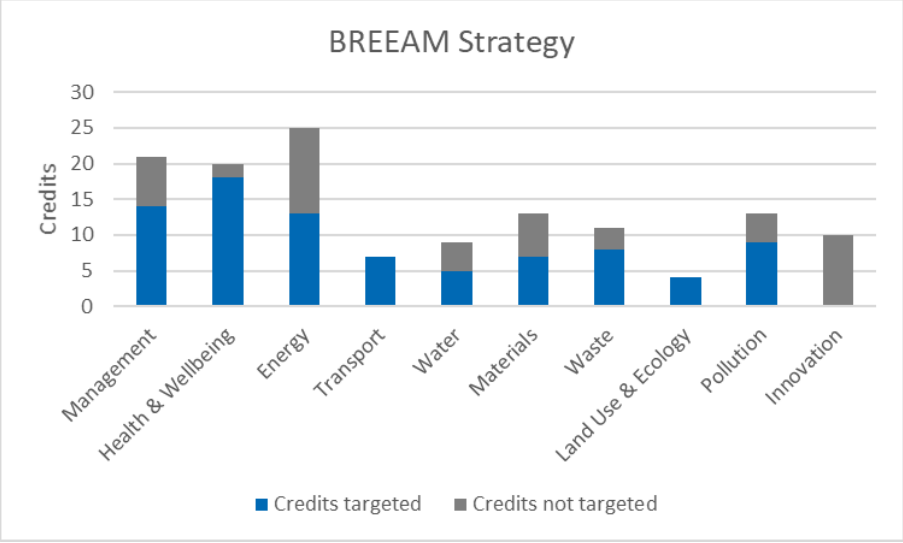

Figure 2 – BREEAM Score Summary

It is best practice to allow a buffer of credits of approximately 10% to ensure a desired target rating can be achieved, this has been allowed for in the strategy.

5.1 Minimum standards

The proposed strategy will ensure high standards of sustainability, with the development achieving all BREEAM Outstanding minimum standards, except for ENE01. This exceeds the minimum standards for BREEAM Excellent. Minimum standards that will be met are shown in blue in the table below.

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	Parts 2 and 3 only: One credit (Seasonal commissioning)	**Parts 2 and 3 only: One credit (Seasonal commissioning)**
Ene 01: Reduction of energy use and carbon emissions	None	None	None	**Parts 1, 2, 3 and 4 (full assessments): Six credits, varies for other assessment types**	Parts 1, 2, 3 and 4 (full assessments): Ten credits, varies for other assessment types
Ene 02: Energy monitoring	None	None	Parts 2, 3 and 4: One credit (First sub-metering credit)	Parts 2, 3 and 4: One credit (First sub-metering credit)	**Parts 2, 3 and 4: One credit (First sub-metering credit)**
Wat 01: Water consumption	None	One credit (Where applicable)	One credit (Where applicable)	One credit (Where applicable)	**Two credits (Where applicable)**
Wat 02: Water monitoring	None	Part 2: Criterion 1 only	Part 2: Criterion 1 only	Part 2: Criterion 1 only	**Part 2: Criterion 1 only**
Mat 03: Responsible sourcing of construction products	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	**Criterion 1 only**
Wst 01: Construction waste management	None	None	None	None	**One credit**
Wst 03: Operational waste	None	None	None	One credit	**One credit**

Table 5 – Targeted BREEAM minimum standards

6 BREEAM Credit Strategy

The follow table breaks down which credits are being targeted. This also highlights minimum standards, where a specialist may be required and where credits are specified as time dependent in the BREEAM guidance.

Section	Issue	Criteria	Available credits	Targeted credits	Minimum standards	Specialist	Time dependent
Management	MAN 01 - Project brief and design	Stakeholder consultation (project delivery)	1	1			Prior to Concept Design and Prior to completion of Concept Design
		Stakeholder consultation (third party)	1	1		Independent third party	Prior to completion of Concept Design and Prior to completion of Detailed Design
		Sustainability Champion (design)	1	1		BREEAM AP	During Preparation and Brief stage and No later than Concept Design
		Sustainability Champion (monitoring progress)	1	1		BREEAM AP	During Concept, Developed and Technical
	MAN 02 - Life cycle cost and services life planning	Elemental life cycle cost (LCC)	2	0		LCC specialist	Concept Design
		Component level LCC option appraisal	1	0		LCC specialist	Technical Design
		Capital cost reporting	1	1			
	Man 03 - Responsible construction practices	Pre-requisite				Contractor	
		Environmental management	1	1		Contractor	
		Sustainability Champion (construction)	1	0		BREEAM AP	Construction, Handover and Close Out
		Considerate construction	2	1	1 credit - Excellent	Contractor	
		Monitoring of refurbishment or fit-out-site impacts	2	2		Contractor	
	Man 04 - Commissioning and handover	Commissioning and testing schedule and responsibilities	1	1		Contractor	
		Commissioning building services	1	1		Commissioning manager	
		Testing and inspecting building fabric	1	0		Thermographic specialist Air leakage specialist	
		Handover	1	1	Building User Guide - Excellent	Contractor	
	Man 05 - Aftercare	Aftercare support	1	1		Contractor	
		Seasonal commissioning	1	1	Excellent	Contractor	
		Post occupancy evaluation	1	0		Independent third party	
	Management total:	Credits	21	14			
		Weighting		13.63			
		Section Score		9.087			
Health and Wellbeing	Hea 01 - Visual comfort	Glare control	1	1			
		Daylighting	3	2			
		View out	2	2			
		Internal and external lighting	1	1			
	Hea 02 - Indoor air quality	Minimising sources of air pollution - Indoor air quality (IAQ) plan	1	1		Indoor air quality expert	
		Minimising sources of air pollution - Ventilation	1	1			
		Minimising sources of air pollution - Volatile organic compound (VOC) emission levels (products)	1	1		Contractor	
		Minimising sources of air pollution - Volatile organic compound (VOC) emission levels (post construction)	1	0		VOC testing expert	Post construction but pre-occupancy

Section	Issue	Criteria	Available credits	Targeted credits	Minimum standards	Specialist	Time dependent
		Adaptability - Potential for natural ventilation	1	1			
	Hea 03 - Safe containment in laboratories	Laboratory containment devices and containment areas	1	1		Laboratory expert	
		Buildings with containment level 2 and 3 laboratory facilities	N/A	N/A			
	Hea 04 - Thermal comfort	Thermal modelling	1	1		Energy assessor	
		Adaptability - for a projected climate change scenario	1	1		Energy assessor	
		Thermal zoning and controls	1	1			
	Hea 05 - Acoustic performance	Sound insulation	1	1		Acoustician	
		Internal indoor ambient noise levels	1	1		Acoustician	
		Reverberation	1	1		Acoustician	
	HEA 06 - Safety and security	Security of site and building	1	1		Security consultant	During or prior to Concept Design
	Health and Wellbeing total:	Credits	20	18			
		Weighting		15.48			
		Section Score		13.93			
Energy	ENE 01 - Reduction of energy use and carbon emissions	Whole building energy model	13	6	6 credits - Excellent	Energy assessor	
		Historic buildings only	2	2		Heritage Conservation Specialist	During Concept Design
	Ene 02 - Energy monitoring	Sub-metering of major energy consuming systems	1	1	Very Good		
	Ene 03 - External lighting	External lighting	1	1			
	ENE 04 - Low carbon design	Passive design analysis	1	1		Energy assessor	Prior to Concept Design
		Free cooling	1	1		Energy assessor	Prior to Concept Design
		Low and zero carbon feasibility study	1	1		Energy assessor	Prior to the completion of Concept Design
	Ene 05 - Energy efficient cold storage	Refrigeration energy consumption	N/A	N/A			
		Greenhouse gas emissions from energy use	N/A	N/A			
	Ene 06 - Energy efficient transportation systems	Energy consumption	1	0		Lift consultant	
		Energy efficient features	2	0		Lift consultant	
	ENE 07 - Energy efficient laboratory systems	Pre-requisite	N/A	N/A			
		Design specification	N/A	N/A			During Preparation and Brief stage
		Best practice energy efficient measures	N/A	N/A			
	Ene 08 - Energy efficient equipment	Energy efficient equipment	2	0			
	Ene 09 - Drying space	Drying space	N/A	N/A			
	Energy total:	Credits	25	13			
		Weighting		16.34			
		Section Score		8.50			
Transport	TRA 01 - Sustainable transport solutions	Accessibility Index	3	3			
		Alternative transport measures	0	0			
	Tra 02 - Proximity to amenities	Proximity to amenities	1	1			
	Tra 03 - Cyclist facilities	Cycle storage	1	1			
		Cyclist facilities	1	1			
	Tra 04 - Maximum car parking capacity	Car parking capacity	N/A	N/A			
	Tra 05 - Travel plan	Travel plan	1	1		Transport consultant	
	Travel total:	Credits	7	7			
		Weighting		5.3			
		Section Score		5.3			

Section	Issue	Criteria	Available credits	Targeted credits	Minimum standards	Specialist	Time dependent
Water	Wat 01 - Water consumption	Water consumption	5	3	1 credit - Good		
	Wat 02 - Water monitoring	Water monitoring	1	1	Criterion 1 - Good		
	Wat 03 - Water leak detection	Leak detection system	1	0			
		Flow control devices	1	0			
	Wat 04 - Water efficient equipment	Water efficient equipment	1	1		Ecologist	
		Credits	9	5			
		Weighting		6.81			
	Water total:	Section Score		3.78			
Materials	Mat 01 - Environmental impact of materials	Project lifecycle assessment study	6	2		LCA specialist	
	Mat 02 - Hard landscaping and boundary protection	Hard landscaping and boundary protection	N/A	N/A			
	Mat 03 - Responsible sourcing of materials	Pre-requisite			Criterion 1 - Pass	Contractor	
		Sustainable procurement plan	1	1		Contractor	
		Responsible sourcing of materials	3	1		Contractor	
	Mat 04 - Insulation	Embodied impact	1	1		Contractor	
	Mat 05 - Designing for durability and resilience	Designing for durability and resilience	1	1			
	MAT 06 Material efficiency	Material efficiency	1	1			All stages
		Credits	13	7			
		Weighting		14.19			
	Materials total:	Section Score		7.64			
Waste	WST 01 - Project waste management	Pre-refurbishment audit	1	1		Competent person	During Concept Design
		Reuse and direct recycling of materials	2	1		Contractor	
		Resource efficiency	3	2		Contractor	
		Diversion of resources from landfill	1	1		Contractor	
	Wst 02 - Recycled aggregates	Recycled aggregates	1	0		Contractor	
	Wst 03 - Operational waste	Operational waste	1	1	Excellent		
	Wst 04 - Speculative finishes	Speculative finishes	N/A	N/A			
	WST 05 - Adaptation to climate change	Structure and fabric resilience	1	1			By the end of Concept Design
	WST 06 - Functional adaptability	Functional adaptability	1	1			By Concept Design
		Credits	11	8			
		Weighting		7.81			
	Waste total:	Section Score		5.68			
Land Use and Ecology	LE 01 - Site selection	Site selection	N/A	N/A			
	LE 02 - Protection of ecological features	Protection of ecological features	1	1		Ecologist	
	LE 03 - Minimising impact on existing site ecology	Minimising impact on existing site ecology	N/A	N/A			
	LE 04 - Enhancing site ecology	Ecologists report and recommendations	1	1		Ecologist	By the end of Preparation and Brief stage
	LE 05 - Long term impact on biodiversity	Long term impact on biodiversity	2	2		Ecologist	
	Land Use and	Credits	4	4			

Section	Issue	Criteria	Available credits	Targeted credits	Minimum standards	Specialist	Time dependent
	Ecology total:	Weighting		9.08			
		Section Score		9.08			
Pollution		Pre-requisite					
	Pol 01 - Impact of refrigerants	Impact of refrigerant	2	1			
		Leak detection	1	1			
	Pol 02 - NOx emissions	NOx emissions	3	0			
	Pol 03 - Flood risk management and reducing surface water run-off	Flood risk management	2	2		Surface water engineer	
		Surface water run-off	2	2		Surface water engineer	
		Minimising water course pollution	1	1		Surface water engineer	
	Pol 04 - Reduction of night time light pollution	Reduction of night time light pollution	1	1			
	Pol 05 - Reduction of noise pollution	Reduction of noise pollution	1	1		Acoustician	
		Credits	13	9			
		Weighting		11.35			
	Pollution total:	Section Score		7.86			

7 BREEEAM Credit Details

This section includes details of the assumptions made and the BREEAM requirements for each issue.

7.1 Management

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

14/21 credits targeted - 0/2 exemplary credits targeted

The development performs well in this area, however there are a number of credits which have not been targeted. Life cycle cost appraisals have not been targeted as there is not a specialist within the design team who can carry out this role. It has been assumed that there will not be a construction stage sustainability champion as this requires someone with a specific BRE qualification to be on site regularly. Maximum credits have not been assumed for considerate construction as this will depend on the contractor. Testing and inspecting building fabric has been left out at this stage due to uncertainty regarding how pressure testing and thermal imaging would work for the refurbished listed buildings.

Man 01 – Project Brief and design – 4/4 credits targeted.

- It has been assumed that project delivery stakeholder consultation will be carried out and it will be demonstrated how this influenced the design.
- It has been assumed that third party stakeholder consultation will be carried out.
- Elise Kidd will act as BREEAM AP and sustainability champion for the design and monitoring progress stages of the project.

Stakeholder consultation (project delivery) – 1/1 credits targeted

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, the project delivery stakeholders 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:
    a. End user requirements
    b. Aims of the design and design strategy
    c. Particular installation and construction requirements/limitations
    d. Design and construction risk assessments e.g. CDM, legionella risk assessment
    e. Legislative requirements e.g. building control notification, heritage requirements
    f. Procurement and supply chain
    g. Identifying and measuring project success in line with project brief objectives

h. Occupier's budget and technical expertise in maintaining any proposed systems
i. Maintainability and adaptability of the proposals
j. Requirements for the production of project and end user documentation
k. 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.

Stakeholder consultation (third party) – 1/1 credits targeted

5. Prior to completion of the Concept Design stage, all relevant third party stakeholders have been consulted by the design team
6. 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.
7. Prior to completion of the detailed design stage, consultation feedback has been given to, and received by, all relevant parties.

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

8. The consultation exercise used a method carried out by an independent party.

The minimum consultation content of the consultation plan is dependent on the building and scope of the project, but typically includes:

1. Functionality, build quality and impact (including aesthetics).
2. Provision of appropriate internal and external facilities (for future building occupants and visitors or users).
3. Management and operational implications.
4. Maintenance resources implications.
5. Impacts on the local community, e.g. local traffic or transportation impact.
6. Opportunities for shared use of facilities and infrastructure with the community or appropriate stakeholders.
7. Compliance with statutory (national or local) consultation requirements.
8. Inclusive and accessible design
9. Where services are taken from outside the refurbishment area that affect the suitability of the services, e.g. domestic water services and legionella prevention.

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

10. How the building or grounds could best be designed to facilitate learning
11. Where the scope of works involves changes to the internal layout and function, how the design can best provide a range of social spaces appropriate to the needs of pupils, students and other users.

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

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

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

1. They have used a party independent of the design process to conduct the necessary consultation exercise, using a compliant method.
2. If the consultation is to be carried out by an organisation involved with the design of the building e.g. the project architect, then they must present the assessor with evidence that robustly demonstrates the independence of the consultation process.

Relevant third parties include:

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

AND the following where relevant:

4. For change of use projects and public buildings, a representative consultation group from the existing community.
5. In educational building types, representatives of local education authorities, board of governors etc.
6. Local or national historic or heritage groups (over and above any requirements relating to statutory consultees).
7. Specialist service and maintenance contractors or representatives where the building function has particular technical requirements in complex environments, e.g. buildings containing laboratories.

Sustainability Champion (design) – 1/1 credits targeted

9. A Sustainability Champion has been appointed to facilitate the setting and achievement of BREEAM performance targets for the project. The design stage Sustainability Champion is appointed to perform this role during the feasibility stage.
10. The defined BREEAM performance target(s) has been formally agreed between the client and design/project team no later than the Concept Design stage.
11. 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.

Sustainability Champion – Members of formal schemes approved by BRE Global Limited in connection with the provision of design advice. At present the following schemes are deemed to satisfy the requirement: BREEAM Accredited Professional (AP) Membership Scheme.

Sustainability Champion (monitoring progress) – 1/1 credits targeted

13. 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, reporting during, and prior to completion of each stage as a minimum.

Sustainability Champion – Members of formal schemes approved by BRE Global Limited in connection with the provision of design advice. At present the following schemes are deemed to satisfy the requirement: BREEAM Accredited Professional (AP) Membership Scheme.

Man 02 – Life cycle cost and service life planning – 1/4 credits targeted.

- It has been assumed that an elemental life cycle cost plan will not be carried out.
- It has been assumed that a component level life cycle cost plan will not be carried out.
- It has been assumed that capital cost will be reported.

Elemental life cycle cost (LCC) – 0/2 credits targeted

1. An outline, entire asset elemental life cycle cost (LCC) plan has been carried out at Concept Design together with any design option appraisals in line with 'Standardised method of life cycle costing for construction procurement' PD 15685:2008
2. The Elemental LCC Plan:
    a. An outline LCC plan has been undertaken for the project based on the building's basic structure and envelope, appraising a range of options and based on the life expectancy of the refurbished building, e.g. 20, 30, 50+years.
    b. The servicing strategy for the project outlining services component over a 15-year period, in the form of an 'elemental LCC Plan'.
    c. A fit-out strategy is developed outlining fit-out options over a 10-year period.

Where there are conservation requirements that set an explicit requirement from a relevant conservation authority (e.g. Local authority conservation officer) regarding the selection of components and materials, the Elemental life cycle cost and component level LCC plan should be based upon the range of materials and components that are allowable within the heritage restrictions in order to identify an option that provides the lowest life cycle cost. Where there are components or materials where only one product type is allowable as a result of heritage requirements, this can be excluded from the study.

The study period should ideally be agreed by the client, in line with the design life expectancy of the building. However, where the life expectancy of the building has not yet been formally agreed, the default design life of 60 years should be used for modelling purposes.

Component level LCC option appraisal – 0/1 credits targeted

3. A component level LCC plan has been developed by the end of Process Stage 4 in line with PD 156865:2008 and includes the following component types (where present):

Applicability	Building components
Part 1 assessments, including components within scope of works.	Envelope, e.g. cladding, windows, and/or roofing
Part 2 & 3 assessments, including newly specified local and core services.	Newly specified local and/or core service equipment, e.g. boiler, air-conditioning, air handling unit, and/or controls etc.
Part 4 assessments, where finishes are within scope of works.	Finishes, e.g. walls, partitions, floors and/or ceilings etc.
Where external spaces are within scope of works.	External spaces, e.g. alternative hard landscaping, boundary protection.

Where carrying out a major refurbishment covering all parts of the scheme, a component level LCC plan shall be developed as above.

4. 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.

Where there are conservation requirements that set an explicit requirement from a relevant conservation authority (e.g. Local authority conservation officer) regarding the selection of components and materials, the Elemental life cycle cost and component level LCC plan should be based upon the range of materials and components that are allowable within the heritage restrictions in order to identify an option that provides the lowest life cycle cost. Where there are

components or materials where only one product type is allowable as a result of heritage requirements, this can be excluded from the study.

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

Capital cost reporting – 1/1 credits targeted

5. Report the capital cost for the refurbishment/fit-out works in pounds per square metre (£k/m2) via the BREEAM Assessment Scoring and Reporting tool.

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

Man 03 – Responsible construction practices – 4/6 credits targeted – 0/1 exemplary credits.

- It has been assumed that timber will be legally harvested and traded.
- It has been assumed that the principal contractor will have an EMS.
- It has been assumed that there will not be a construction stage sustainability champion (BREEAM AP) appointed.
- It has been assumed that the site will be registered with CCS and will achieve compliance.
- It has been assumed that construction energy and water use will be monitored.
- It has been assumed that the transport of construction materials and waste will be monitored.

Pre-requisite

1. All timber and timber-based products used on the project is 'Legally harvested and traded timber'.

Environmental Management – 1/1 credits targeted

3. The principal contractor operates an environmental management system covering their main operations. The EMS must be either:
   a. Third party certified, to ISO 14001/EMAS or equivalent standard; or
   b. 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 1 to 4, as defined in BS 8555:2003.

4. 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.

Sustainability Champion (construction) – 0/1 credits targeted

5. 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.
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 will require action to be taken to address shortcomings in compliance. The Sustainability Champion will monitor site activities with sufficient frequency 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.
6. The defined BREEAM performance target forms a requirement of the principal contractor's contract.
7. 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.

Sustainability Champion – Members of formal schemes approved by BRE Global Limited in connection with the provision of design advice. At present the following schemes are deemed to satisfy the requirement: BREEAM Accredited Professional (AP) Membership Scheme.

Considerate construction – 1/2 credits targeted (1 credit is mandatory for BREEAM Excellent)

9. 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:

a. One credit where the contractor achieves 'compliance' with the criteria of a compliant scheme. CCS score between 25 and 34 and a score of at least 5 in each section.
b. Two credits where the contractor significantly exceeds 'compliance' with the criteria of the scheme. CCS score between 35 and 39 and a score of at least 7 in each section.

Monitoring of refurbishment or fit-out-site impacts

10. 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 refurbishment or fit-out processes (and dedicated off-site monitoring) throughout the refurbishment or fit-out 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.

Utility consumption – 1/1 credits targeted

14. Criterion 10 is achieved
15. Monitor and record data on principal constructor's and subcontractors' potable water consumption (m3) arising from the use of construction plant, equipment (mobile and fixed) and site accommodation.
16. Using the collated data report the total net water consumption (m3), i.e. consumption minus any recycled water use from the construction process via the BREEAM Assessment Scoring and Reporting tool (for the purposes of potential future BREEAM performance benchmarking).

Transport of construction materials and waste – 1/1 credits targeted

17. Criterion 10 is achieved

18. Monitor and record data on transport movements and impacts resulting from delivery of the majority of refurbishment or fit-out materials to site and refurbishment, fit-out and demolition or strip-out waste from site. As a minimum this must cover:
    a. Transport of materials from the factory gate to the building site, including any transport, intermediate storage and distribution.
    b. Scope of this monitoring must cover the following as a minimum:
        I. Where Part 1 is being assessed, materials used in major building elements, including insulation materials
        II. Where Part 2 is being assessed, materials used for core services
        III. Where undertaking a comprehensive refurbishment including fit-out with a combination of Parts 1 - 4, materials used for major building elements, services and interior fit-out
        IV. Where within scope, ground works and landscaping materials
        V. Where undertaking a Parts 3 & 4 only assessment, materials used in the fit-out are included with the exception of small scale and low value refurbishment of fit-out projects where this credit is not applicable.
    c. Transport of construction waste from the construction gate to waste disposal processing or recovery centre gate. Scope of this monitoring must cover the construction waste groups outlined in the project's waste management plan.

19. Using the collated data, report separately for materials and waste, the total fuel consumption (litres) and/or total carbon dioxide emissions (kgCO2 eq), plus total distance travelled (km) via the BREEAM Assessment Scoring and Reporting tool (for the purposes of potential future BREEAM performance benchmarking).

Man 04 – Commissioning and handover – 3/4 credits targeted.

- It has been assumed that a schedule of commissioning and testing will be developed.
- It has been assumed that building services will be commissioned.
- Testing and inspecting of building fabric has not been assumed at this time. It is unclear if the refurbished building will be able to meet any requirements set and if this would be a beneficial process for the project.
- It has been assumed that a Building User Guide and a training schedule will be developed.

Commissioning and testing schedule and responsibilities – 1/1 credits targeted

1. There is a schedule of commissioning and testing that identifies appropriate commissioning required for the scope of works that includes a suitable timescale for commissioning and re-commissioning of all relevant works carried out. Commissioning should be carried out where changes are being made to the following:
    a. Building services (including both complex and non-complex systems)
    b. Building services control systems (including Building Management Systems)
    c. Changes to the building fabric that will affect thermal performance.

2. The schedule will identify the appropriate standards that all commissioning activities will be conducted in accordance with, such as current Building Regulations, BSRIA1and CIBSE2guidelines and/or other appropriate standards, where applicable.

3. 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.

4. 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.

Where a building management system (BMS) is specified, the following commissioning procedures must be carried out:

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

Commissioning building services – 1/1 credits targeted

5. The commissioning and testing schedule and responsibilities credit is achieved.
6. For projects where work is being undertaken to upgrade, renovate or install new building services and systems, an appropriate project team member needs to be appointed to undertake the work.

a. For complex building services and systems, this role must be carried out by a specialist commissioning manager who is appointed during the design stage (by either client or contractor) with responsibility for:
   I. Undertaking design reviews and giving advice on suitability for ease of commissioning
   II. Providing commissioning management input to construction programming and during installation stages
   III. Management of commissioning, performance testing and handover/post handover stages.
b. For simple building services, this role can be carried out by an appropriate project team member, provided they are not involved in the general installation works for the building services system(s).

Testing and inspecting building fabric – 0/1 credits targeted

7. Projects where the fabric of the building is being upgraded, the integrity of the building fabric, including continuity of insulation, avoidance of thermal bridging and air leakage paths is quality assured through completion of a thermographic survey as well as airtightness testing and visual inspection at appropriate times during the refurbishment. The survey/testing is undertaken by a Suitably Qualified Professional in accordance with the appropriate standard, with visual inspection conducted by a representative of the main contractor or by an independent inspector such as a clerk of works.
8. Any defects identified in the site inspection, thermographic survey and 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.

Handover – 1/1 credits targeted (Criterion 9 is mandatory for BREEAM Excellent)

9. A Building User Guide (BUG) is developed or (where present) an existing Building User Guide is updated, prior to handover for distribution to the building occupiers and premises managers, with a draft copy developed and discussed with users first (where the building occupants are known) to ensure the guide is most appropriate and useful to potential users.

10. 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 design intent of refurbishment/fit-out works
   a. The available aftercare provision and aftercare team main contact(s), including any scheduled seasonal commissioning and post occupancy evaluation
   b. Introduction to, and demonstration of, installed systems and key features, particularly building management systems, controls and their interfaces, to ensure they are fully conversant with the detailed operation of the building
   c. 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, log book etc.
   d. Maintenance requirements, including any maintenance contracts and regimes in place.

Man 05 – Aftercare – 2/3 credits targeted.

- It has been assumed that aftercare will be available.
- It has been assumed that seasonal commissioning will be carried out.
- It has been assumed that a Post Occupancy Evaluation exercise will not be carried out by an independent third party.

Aftercare support – 1/1 credits targeted

1. 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.

2. 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.

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

Seasonal commissioning – 1/1 credits targeted (Mandatory for BREEAM Excellent)

3. The following seasonal commissioning activities will be completed over a minimum 12-month period, once the building becomes substantially occupied (except solar photovoltaics):

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.

Post occupancy evaluation – 0/1 credits targeted

4. 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:
   III. Internal environmental conditions (light, noise, temperature, air quality)
   IV. Control, operation and maintenance
   V. Facilities and amenities
   VI. Access and layout
   VII. 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.

7.2 Health and Wellbeing

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

18/20 credits targeted – 0/3 exemplary credits targeted

Again, the development performs well in this area with 18 of the 20 available credits being targeted. The credits which have not been targeted relate to daylight factors and post construction testing of VOC levels.

Hea 01 – Visual comfort – 6/7 credits targeted – 0/1 exemplary credits.

- It has been assumed that the potential for disabling glare will be designed out using a glare control strategy.
- It has been assumed that 60% of occupied spaces will have an average daylight factor of 2% and a uniformity ratio of a least 0.3
- It has been assumed that 95% of the floor area is within 7m of a wall with a window providing a view out.
- It has been assumed that internal and external lighting levels, zoning and controls will be compliant.

Glare control – 1/1 credits targeted

1. 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.
2. 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.

Compliant shading measures for meeting glare control criteria include:

- Building integrated measures (e.g. low eaves)
- Occupant controlled devices such as blinds (where transmittance value is < 0.1 (10%) for visible light). Blackout blinds can be used as all relevant criteria are met.
- Bioclimatic design
- External shading or brise soleil.

Glare control must provide shading from both high level summer and low level winter sun. Where using fixed systems, design studies can be used to demonstrate that sunlight is prevented from reaching building occupants during occupied hours.

Curtains (where used without other forms of shading) do not meet the criteria for the glare control criteria, as they do not provide sufficient control to optimise daylight into the space. Furthermore, the use of curtains to control glare is likely to cause occupants to rely more on artificial lighting. The only exception to this rule is in healthcare buildings in patient occupied spaces, treatment rooms and other high infection risk areas where the use of blinds is not recommended due to known risks relating to infection control.

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

Daylighting – 2/3 credits targeted

3. Up to three credits are awarded on a sliding scale depending on the percentage of relevant building areas that comply with one of the following daylighting criteria:
    a. The relevant building areas meet good practice daylight factor(s) and other criterion as outlined in Table 12 and Table 13 OR
    b. The relevant building areas meet good practice average and minimum point daylight illuminance criteria as outlined in Table 14 .
4. Two credits where daylighting provision, averaged over all relevant spaces, has improved after refurbishment or fit-out by 30% or more and there is a minimum glazing to floor area ratio of either:
    a. 5% glass to floor area ratio for side windows; OR
    b. 2.5% glass to floor area ratio for roof lights;
5. One credit where daylighting provision, averaged over all relevant spaces, has improved after refurbishment or fit-out by 15% or more and there is a minimum glazing to floor area ratio of either:
    a. 5% glass to floor area ratio for side windows; OR
    b. 2.5% glass to floor area ratio for roof lights

Note: The improvement in daylighting provision is calculated using the BREEAM Hea 01 Calculator tool based upon either the increase in glazing area, transmittance, illuminance or percentage daylight factor.

Table 12

Building/area type	Average daylight factor required	Minimum area (m^2) to comply			Other requirements
		1 Credit	2 Credits	3 Credits	
Pre-schools, schools, further education-occupied spaces	2%	40%	60%	80%	EITHER (a) OR {(b) and (c)} in Table 13

Table 13

Ref	Criteria
(a)	A uniformity ratio of at least 0.3 or a minimum point daylight factor of at least 0.3 times the relevant average daylight factor value in Table 12 . Spaces with glazed roofs, such as atria, must achieve a uniformity ratio of at least 0.7 or a minimum point daylight factor of at least 0.7 times the relevant average daylight factor value in Table 12 .
(b)	At least 80% of the room has a view of sky from desk or table top height (0.85m in multi-residential buildings, 0.7m in other buildings).
(c)	The room depth criterion d/w +d/HW < 2/(1-RB) is satisfied. Where: d = room depth w = room width HW = window head height from floor level RB = average reflectance of surfaces in the rear half of the room Note: Table 19 gives maximum room depths in metres for different room widths and window head heights of side-lit rooms.

Table 14

Area type	Minimum area (m^2) to comply			Average daylight illuminance (averaged over entire space)	Minimum daylight illuminance at worst lit point
	1 Credit	2 Credits	3 Credits		
Pre-schools, schools, further education-occupied spaces	40%	60%	80%	At least 300 lux for 2000 hours per year or more	At least 90 lux for 2000 hours per year or more

Where the criteria specify that a percentage of floor area must be adequately illuminated by daylight, this refers to the percentage of the total floor area of all the rooms that must be assessed, i.e. the compliant area. At 80% of the assessed floor area must meet the criterion. See the following calculation:
a. Total area of all applicable rooms (see definitions for daylighting)
b. Total area of rooms comply with the criteria
b/a x 100 = % floor area that complies
If for example, a development has six rooms that must be assessed, each 150 m^2 (total area 900 m^2) then 720 m^2 must comply with the criterion; this is equal to 4.8 rooms. The number of rooms that must comply must always be rounded up; therefore, in this example, five rooms must have an average daylight factor of 2% or more (plus meet the other criteria) in order to achieve the credit(s).

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

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

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

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

To comply with the view of sky criteria (ref (b)) in Table 13 , at least 80% of the room that complies with the average daylight factor requirement must receive direct light from the sky, i.e. it is permissible for up to 20% of the room not to meet the view of sky requirement and still achieve a compliant room.

For the purpose of BREEAM this is defined as areas within the building where good daylighting is considered to be of benefit to the building users (typically those areas occupied continuously for 30 minutes or more). This includes the following (where occupied continuously for 30 minutes or more) specifically stated because they are often omitted;

1. Sports hall exercise spaces

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

However, this excludes the following (where present):

1. Media, arts production, SEN sensory spaces, x-ray rooms and other areas requiring strictly controlled acoustic or lighting conditions
2. Clinical areas with controlled environmental conditions, e.g. operating theatres, delivery rooms or pathology. However, BREEAM strongly advises that the benefits from daylighting and view out are seriously considered when designing areas of critical and intensive care in Healthcare buildings.
3. Holding areas and custody cells where security issues conflict with the BREEAM daylighting requirements
4. Custody cells in courts, where privacy is a functional/operational requirement.

For Education buildings, where the EFA daylighting requirements have been achieved, for all relevant rooms within the building (in accordance with Priority School Building Programme (PSBP) Authority Draft, Facilities Output Specification: Generic Design Brief by the Education Funding Agency, June 2013), it can be assumed that the BREEAM daylighting requirements have also been met and therefore the two credits available for daylighting can be awarded by default. In this instance, evidence would need to be provided to demonstrate that the EFA requirements have been achieved.

View out – 2/2 credits targeted

6. Two credits where 95% or one credit where 80% of the floor area in each relevant building area is within 7m of a wall which has a window or permanent opening that provides an adequate view out.
7. The window/opening must be ≥ 20% of the surrounding wall area. 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.

BREEAM defines an adequate view out as a view of a landscape or buildings (rather than just the sky) at seated eye level (1.2 – 1.3m) within the relevant building areas and should ideally be through an external window. A view into an internal courtyard or atrium will comply provided the distance from the opening to the back wall of the courtyard/atrium is at least 10m (therefore allowing enough distance for the eyes to refocus). The view cannot be an internal view across the room, as this is likely to become obstructed by partitions, filing cabinets etc.

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

1. There are or will be workstations/benches or desks for building users.
2. Close work will be undertaken or visual aids will be used.
3. A view out is deemed to be of benefit to the building occupants, e.g. in spaces where occupants are likely to spend a significant amount of time.

Excluded areas for each of these might include:

5. Nurse bases where they are located centrally in a ward/patient area in order to enable patient observation.

6. Courtrooms and interview rooms where compliance is not possible due to security or privacy criteria.
7. Prison staff areas containing workstations that for security or observational purposes must be located centrally within the building.
8. Any clinical areas where the control of environmental/operational conditions prevents such spaces from providing a view out.
9. Conference rooms, lecture theatres, sports halls, acute SEN and also any spaces where the exclusion or limitation of natural light is a functional requirement e.g. laboratories, media spaces, etc.

Internal and external lighting levels, zoning and control – 1/1 credits targeted

9. All internal fluorescent and compact fluorescent lamps are fitted with high frequency ballasts.
10. 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.
11. For areas where computer screens are regularly used, the lighting design complies with CIBSE Lighting Guide 7 sections 2.4, 2.20 and 6.10 to 6.20. 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 uplighting, the recommendations refer to the luminance of the lit ceiling rather than the luminaire; a design team calculation is usually required to demonstrate this.
c. Recommendations for direct lighting, ceiling illuminance, and average wall illuminance.

12. 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 work places - Part 2: Outdoor work places.

13. Internal lighting is zoned to allow for occupant control 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
h. Dining, restaurant, café areas: separate zoning of servery and seating/dining areas
i. Retail: separate zoning of display and counter areas
j. Bar areas: separate zoning of bar and seating areas
k. Wards or bedded areas: zoned lighting control for individual bed spaces and control for staff over groups of bed spaces
l. Treatment areas, dayrooms, waiting areas: zoning of seating and activity areas and circulation space with controls accessible to staff.

14. Areas used for teaching, seminar or lecture purposes have lighting controls provided in accordance with CIBSE Lighting Guide 5
15. Manual lighting controls are easily accessible for the teacher while teaching and on entering/leaving the teaching space.

Relevant industry standard for lighting design: Pre-schools, schools and sixth form colleges: Building Bulletin 90: 'Lighting Design for Schools'.

Where occupancy or workstation layout is not known, lighting control can be zoned on the basis of 40 m2 grids, i.e. an assumption of 1 person/workspace per 10 m^2.

Buildings consisting entirely of small rooms/spaces (less than 40 m^2) which do not require any subdivision of lighting zones/control will meet the zoning criteria by default.

The limit of four workspaces is indicative of the required standard but is not a fixed requirement. Where there is justification for this to be increased to fit with the adopted lighting strategy, this may be accepted provided that the assessor is satisfied that the aim of this criterion is upheld, i.e. that there is suitable zoning/control of lighting to enable a reasonable degree of occupant control over lighting in their personal work area. The relevant design team member, e.g. lighting consultant, should set out how this is to be achieved in such an instance.

Where child care and/or acute SEN spaces are included within the scope of the assessment, controls should be provided for the teacher/member of staff, i.e. it is not a necessity for the controls to be accessible to the children.

In some cases (e.g. grade 1 or grade 2* listed buildings) an explicit requirement from the relevant conservation authority (e.g. local authority conservation officer) may require the retention of existing listed lighting features which prevents zoning of lighting in accordance with criterion 13. In such cases, evidence should be provided from the conservation officer and measures should be considered to ensure that adequate control is provided for existing retained lighting zones and measures adopted for the provision of task lighting as relevant for the function type and as is feasible within the constraints as applied by the conservation officer.

Hea 02 – Indoor air quality – 4/5 credits targeted – 0/2 exemplary credits.

- It has been assumed that an indoor air quality plan will be produced and implemented.
- It has been assumed that measures will be included to minimise the concentration and recirculation pf pollutants in the building.
- It has been assumed that products will be selected to meet BREEAM criteria in relation to VOCs
- Post construction VOC testing has not been assumed at this stage.
- It has been assumed that the ventilation strategy will be flexible and adaptable and the natural ventilation strategy will be capable of providing 2 levels of user-control.

Minimising sources of air pollution

Indoor air quality (IAQ) plan – 1/1 credits targeted

1. 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.

Ventilation – 1/1 credits targeted

Refurbishment and fit-out works include measures to minimise the concentration and recirculation of pollutants in the building as follows:
2. Provide fresh air into the building in accordance with the criteria of the relevant standard for ventilation.
3. 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; OR
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 CEN/TR 16798-4:2017 Sections 8.8.1 to 8.8.4.
b. In naturally ventilated buildings/spaces: openable windows/ventilators are over 10m from sources of external pollution.
4. Where present, HVAC systems must incorporate suitable filtration to minimise external air pollution, as defined in EN 16798-3:2017 Section B4.2.
5. 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.

The distance requirement for air intakes and extracts does not necessarily mean the plan distance, but the three-dimensional distance around and over objects, e.g. on plan the air intakes may be less than 20m from a source of external pollution, but the intake may be on the roof of a 10-storey building and therefore over 20m from the source of pollution.

Sources of external pollution includes but is not limited to the following:
1. Highways and the main access roads on the assessed site
2. Car parks and delivery/vehicle waiting bays
3. Other building exhausts, including from building services plant industrial/agricultural processes

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

Volatile organic compound (VOC) emissions levels (products) – 1/1 credits targeted

6. All decorative paints and varnishes specified meet the criteria in Table 20

7. 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 the table).

Table 20

Ref	Product	Requirements
A	Paints and varnishes	
	Performance requirements	VOC content limit
	Compliant performance standard	EU Directive 2004/42/CE ('Paints Directive')
	Compliant testing standard	BS EN ISO 11890-2:2013 – Paints and varnishes – Determination of VOC content, Part 2 – Gas Chromatographic method OR ASTM D2369 - 10(2015) Standard Test Method for Volatile Content of Coatings (only where reactive diluents are present) OR Manufacturers' calculations of VOC content (based on the constituent ingredients)
	Manufacturer also to confirm	Paint to be fungal and algal resistant in wet areas e.g. bathrooms, kitchens, utility rooms
B	Wood panels (including particle board, fibreboard including MDF, OSB, cement bonded particle board, plywood, solid wood panel and acoustic board)	
	Option 1	
	Performance requirements	Formaldehyde E1 class
	Compliant performance standard	BS EN 13986:2004+A1:2015 Wood-based panels for use in construction - Characteristics evaluation of conformity and marking
	Compliant testing standard(s)	In accordance with Annex B of BS EN 13986:2004 A1:2015
	Manufacturer also to confirm	The absence of prohibited wood preservatives.
	Option 2	
	Performance requirements	Formaldehyde concentration in indoor air of 0.1mg/m^3
	Compliant testing standard(s)	1. BS EN ISO 16000-9:2006 Indoor air - Part 9: Determination of the emission of volatile organic compounds from building products and furnishing - Emission test chamber method. OR 2. Californian Department for Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2 (Emission testing method for California Specification 01350), 2017. Note: For either method the resultant emission rate obtained from the chamber test method must be extrapolated to predict what the emissions would be in a theoretical model room (as detailed in the standard) and this extrapolated emission rate compared with the required formaldehyde concentration of 0.1mg/m^3.

	Manufacturer also to confirm	The absence of prohibited wood preservatives.
C	Timber structures (e.g. glue laminated timber)	
	Option 1	
	Performance requirements	Formaldehyde E1 Class
	Compliant performance standards	BS EN 14080:2013 Timber structures - Glued laminated timber and glued solid timber - Requirements
	Compliant testing standards	In accordance with Annex A of BS EN 14080:2013
	Option 2	
	Performance requirements	As category B Option 2.
	Compliant testing standards	As category B Option 2.
D	Wood flooring (e.g. parquet)	
	Option 1	
	Performance requirements	Formaldehyde E1 Class
	Compliant performance standards	BS EN 14342:2013+A1:2008 Wood flooring - Characteristics, evaluation of conformity and marking
	Compliant testing standards	In accordance with Annex A of BS EN 14342:2013
	Option 2	
	Performance requirements	As category B Option 2.
	Compliant testing standards	As category B Option 2.
E	Resilient textile and laminated floor coverings (e.g. vinyl, linoleum, cork, rubber, carpet, laminated wood flooring)	
	Option 1	
	Performance requirements	Formaldehyde E1 Class
	Compliant performance standards	BS EN 14041:2018 Resilient, textile, laminate and modular multilayer floor coverings - Essential characteristics
	Compliant testing standards	In accordance with Section 4.3.3 of BS EN 14041:2018
	Option 2	
	Performance requirements	As category B Option 2.
	Compliant testing standards	As category B Option 2.
F	Suspended ceiling tiles	
	Option 1	
	Performance requirements	Formaldehyde E1 Class

	Compliant performance standards	BS EN 13964:2014 Suspended ceilings - Requirements and test methods
	Compliant testing standards	In accordance with Annex E of BS EN 13964:2014
	Option 2	
	Performance requirements	As category B Option 2.
	Compliant testing standards	As category B Option 2.
G	Flooring adhesives	
	Performance requirements	Carcinogenic or sensitising volatile substances are substantially absent
	Compliant performance standards	BS EN 13999-1:2013 Adhesives - Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application - Part 1: General procedure
	Compliant testing standards	1. BS EN 13999-1:2013 Adhesives - Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application - Part 1: General procedure 2. BS EN 13999-2:2013 Adhesives - Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application - Part 2: Determination of volatile organic compounds 3. BS EN 13999-3:2007+A1:2009 Adhesives - Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application - Part 3: Determination of volatile aldehydes 4. BS EN 13999-4:2007+A1:2009 Adhesives - Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application - Part 4: Determination of volatile diisocyanates
H	Wall coverings	
	Performance requirements	• Vinyl chloride monomer (VCM) content • Formaldehyde level • Migration of heavy metals
	Compliant performance standards	1. BS EN 233:2016 Wallcoverings in roll form - Specification for finished wallpapers, wall vinyls and plastics wall coverings 2. BS EN 15102:2019 Decorative wallcoverings - Roll form 3. BS EN 259-1:2001 Wallcoverings in roll form - Heavy duty wallcoverings - Part 1: Specifications
	Compliant testing standards	BS EN 12149:1998 – Wall coverings in roll form - Determination of migration of heavy metals and certain other elements, of vinyl chloride monomer and of formaldehyde release

For some floor coverings and wood-based panels, the requirement for formaldehyde testing (referred to in the above criteria) does not apply to 'floor coverings to which no formaldehyde

containing materials were added during production or post-production processing', or in the case of EN 13986:2004, wood-based panels.
As such, if a product manufacturer confirms that they have made a declaration of formaldehyde class E1 without testing (in writing or via a company product fact sheet or literature) then the product in question meets the BREEAM requirement relevant to formaldehyde testing. A declaration of E1 without testing is effectively confirmation from the manufacturer that formaldehyde emissions comply with the emission level requirements of the relevant standard(s) and therefore, evidence confirming the actual emission level(s) via testing will not be required by the assessor to demonstrate compliance with that particular requirement.

The scope of the VOC credits include furnishings and fittings. In addition to focusing on the key internal finishes and fittings integral to the building it also includes such items as partitions, shelving, desks and chairs and other finishes and fittings that contain products listed in Table 20 .

An exemption is provided for historic buildings where there is an explicit requirement from the Local Authority conservation officer or the national conservation body (i.e. English Heritage, Historic Scotland, CADW in Wales and NIEA:HBU in Northern Ireland) to use specific paints and varnishes that may contain a high level of VOCs and come under the Volatile Organic Compounds in Paints, Vanishes and Vehicle Refinishing Products Regulations 2012. This is allowable for grade I and II* listed buildings in England and Wales and grade A and B+ listed buildings in Scotland and Northern Ireland. In all cases procedures should be in place to ensure the building is flushed out for a sufficient period prior to occupation and ventilated adequately in order to reduce risks with VOCs in accordance with criteria 1 and 2.

Volatile organic compound (VOC) emissions levels (post construction) – 0/1 credits targeted

8. 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).
9. 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.
10. 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'.
11. The testing and measurement of the above pollutants are in accordance with the following standards where relevant:

a. BS ISO 16000-4: 2011 Diffusive sampling of formaldehyde in air
b. BS ISO 16000-6: 2011 VOCs in air by active sampling
c. BS EN ISO 16017-2: 2003 VOCs - Indoor, ambient and workplace air by diffusive sampling
d. BS ISO 16000-3: 2011 Formaldehyde and other carbonyls in air by active sampling

12. The measured concentration levels of formaldehyde (µg/m^3) and TVOC (µg/m^3) are reported, via the BREEAM Assessment Scoring and Reporting Tool.

Adaptability – Potential for natural ventilation – 1/1 credits targeted

13. 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:

a. 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:

I. Room depths are designed in accordance with CIBSE AM10 (section 2.4) to ensure effectiveness of any natural ventilation system. The openable window area in each occupied space is equivalent to 5% of the gross internal floor area of that room/floor plate; OR

II. The design demonstrates that the natural ventilation strategy provides adequate cross flow of air to maintain the required thermal comfort conditions and ventilation rates. This is demonstrated using ventilation design tool types that meet the requirements of CIBSE AM10 (or for education buildings by using the ClassVent tool).

b. For fit-out projects (Part 3 assessments), local services are designed to provide fresh air via a natural ventilation strategy and are appropriately designed according to the room depth in accordance with CIBSE AM10.

14. The natural ventilation strategy is capable of providing at least two levels of user-control on the supply of fresh air to the occupied space.

The two levels of ventilation must be able to achieve the following:

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

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

Buildings that employ a mechanically ventilated/cooled strategy are still able to achieve this credit provided it can be demonstrated that the features required by the criteria can be made easily available to the building user, e.g. windows fixed shut for an air conditioned strategy can be modified to be opening windows. The aim of the potential for natural ventilation criteria is to ensure that a building is capable of providing fresh air using a natural ventilation strategy.

Where the building is predominantly naturally ventilated, but mechanical ventilation is necessary to boost ventilation during peak conditions, (i.e. maximum occupancy and/or peak temperature conditions) due to the function/specific usage patterns of the building, the potential for the natural ventilation credit can still be awarded provided calculations/modelling demonstrate that the mechanical ventilation system will be required for ≤ 5% of the annual occupied hours in the occupied space(s) for the adopted building design/layout.

Occupied space: A room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user.

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

1. Ancillary building areas, e.g. WCs, corridors, stairwells, store rooms, plant rooms
2. Swimming/hydrotherapy pools
3. Catering and small staff kitchens
4. Washrooms or changing areas
5. Laboratory or other areas where strictly controlled environmental conditions are a functional requirement of the space
6. Custody cells and holding areas in law courts
7. Operational, shop floors or ancillary areas in industrial buildings and retail buildings
8. Healthcare buildings: rooms or departments where control of ventilation is required for prevention of cross infection and/or controlled environmental conditions

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

Hea 03 – Safe containment in laboratories – 1/1 credits targeted.

- It has been assumed that a risk assessment of the laboratory facilities will be carried out and the necessary standards will be met.

Laboratory containment devices and containment areas – 1/1 credits targeted.

1. An objective risk assessment of the proposed/existing laboratory facilities has been carried out prior to completion of the design to ensure potential risks are considered in the design/refurbishment of the laboratory.
2. Where containment devices such as fume cupboards are specified/present, their manufacture and installation meet best practice safety and performance requirements and objectives, demonstrated through compliance with the following standards:
    a. General purpose fume cupboards: BS EN 14175 Parts 1-7 (as appropriate)
    b. Recirculatory filtration fume cupboards: BS 7989:2001
    c. Microbiological safety cabinets: BS EN 12469:2000 for manufacture) and BS 5726:2005 (for installation).
    d. Clean air hoods, glove boxes, isolators and mini-environments: BS EN ISO 14644-7:2004
    e. Articulated extension arms: PD CEN/TR 16589

Or, for Schools, Sixth Form Colleges and Further Education buildings with laboratories and fume cupboards for subjects up to and including A-Level (or equivalent):

    f. G9 Fume cupboards in schools (Building Bulletin 88, Fume cupboards in schools) can be used for Assessments in Northern Ireland.

3. Where laboratory containment devices that are ducted to discharge externally are specified, the guidance in the National Annex of BS EN 14175-2 must be followed to ensure an appropriate discharge velocity is achieved.

For fume cupboards specified/installed for up to and including A-Level subjects, confirmation of the specification and installation in accordance with G9 Fume Cupboards in Schools (Building Bulletin 88 can be used for assessments in Northern Ireland) will be acceptable for BREEAM compliance. BS 7989 and parts of BS 14175 may be relevant to some installations; in such cases the person or organisation responsible for producing or installing the laboratory equipment should be able to confirm if they are relevant given the type of fume cupboard installation.

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

1. Schools, Sixth Form Colleges and Further Education building assessments can refer to CLEAPSS (www.cleapss.org.uk) for further advice.

Hea 04 – Thermal comfort – 3/3 credits targeted.

- It has been assumed that thermal modelling will be carried out.
- It has been assumed that the thermal modelling will include a projected climate change scenario.
- It has been assumed that the thermal modelling will inform the temperature control strategy and zones and controls will be complaint.

Thermal modelling – 1/1 credits targeted

1. Thermal modelling has been carried out using software in accordance with CIBSE AM11 Building Energy and Environmental Modelling.
2. The software used to carry out the simulation at the detailed design stage provides full dynamic thermal analysis. For smaller and more basic building designs with less complex heating or cooling systems, an alternative less complex means of analysis may be appropriate (such methodologies must still be in accordance with CIBSE AM11).
3. The modelling demonstrates that:
    a. For air conditioned buildings, summer and winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design, Table 1.5; or other appropriate industry standard (where this sets a higher or more appropriate requirement/level for the building type).
    b. For naturally ventilated/free running buildings:
        I. Winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design, Table 1.5; or other appropriate industry standard (where this sets a higher or more appropriate requirement/level for the building type).
        II. The building is designed to limit the risk of overheating, in accordance with the adaptive comfort methodology outlined in CIBSE TM52: The limits of thermal comfort: avoiding overheating in European buildings.
4. Where undertaking a Part 4 assessment a competent person (e.g. chartered building services engineer) must assess the suitability of existing building services and controls to identify any changes that may be required as a result of fit-out works (e.g. as a result of changes to internal layout, occupant density, additional equipment that may increase cooling loads etc.).
5. 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.

In historic buildings, the thermal comfort requirements must still be in accordance with criteria 1-5 in order to demonstrate compliance (e.g. meeting the performance requirements specified in CIBSE Guide A), except where alternative performance standards are required by a local or national conservation body, e.g. English Heritage, Historic Scotland, or the Local Authority conservation officer as relevant. Heating systems should be modelled for continuous heating rather than intermittent.

An appropriate industry standard for schools is Building Bulletin 101, Ventilation of school buildings (April 2014).
For schools with a straightforward servicing strategy, ClassCool is considered a suitable alternative to an AM11 full dynamic model.

Occupied space: A room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user. For the purpose of BREEAM issue Hea 04 the definition excludes the following;

1. Atria or concourses
2. Entrance halls or reception areas
3. Ancillary space e.g. circulation areas, storerooms and plant rooms.

Adaptability – for a projected climate change scenario – 1/1 credits targeted

6. Criteria 1 to 4 are achieved.
7. The thermal modelling demonstrates that the relevant requirements set out in criterion 3 are achieved for a projected climate change environment.
8. 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 the future using passive design solutions in order to subsequently meet the requirements under criterion 7.
9. For air conditioned buildings, the PMV and PPD indices based on the above modelling are reported via the BREEAM assessment scoring and reporting tool.

Thermal zoning and controls – 1/1 credits targeted

10. Criteria 1 to 4 are achieved.
11. The thermal modelling analysis (undertaken for compliance with criteria 1 to 4) has informed the temperature control strategy for the building and its users.
12. 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. For example consider the different requirements for the central core of a building compared with the external perimeter adjacent to the windows.
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 (e.g. conflicts between two separate cooling systems, conflicts between core heating and locally provided cooling systems).
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), e.g. are they likely to open windows, access thermostatic radiator valves (TRV) on radiators, change air-conditioning settings etc.
    IV. The user expectations (this may differ in the summer and winter) and degree of individual control (i.e. obtaining the balance between occupant preferences, for example some occupants like fresh air and others dislike draughts).
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 – 3/3 credits targeted.

- It has been assumed that targets will be met for sound insulation, indoor ambient noise level and reverberation times.

Acoustic performance – 3/3 credits targeted

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.

Table 21

Education Buildings	
First credit – Sound insulation	
Criteria	Achieve the performance standards set out in Section 1 of the Building bulletin 93: Acoustic design of schools: performance standards, February 2015 relating to airborne sound insulation between spaces and impact sound insulation of floors.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the BB93 requirements and the ANC Good Practice Guide, Acoustic testing of Schools.
Second credit - Internal indoor ambient noise levels	
Criteria	Achieve the indoor ambient noise level standards set out within Section 1 of BB93 for all room types. For lightweight roofs and roof glazing calculations using laboratory data with 'heavy' rain noise excitation as defined in BS EN ISO 140-18 are required (in accordance with the guidance in BB93) for teaching/learning spaces to demonstrate that the reverberant sound pressure level in these rooms are not more than 25 dB above the appropriate limits presented within Section 1 of BB93, table 1.
Testing requirement	Indoor ambient noise levels (excluding rain noise): A programme of acoustic measurements is carried out by a compliant test body in accordance with the ANC Good Practice Guide, Acoustic testing of Schools. Rain noise: installation of a specification compliant with the BB93 criteria demonstrates compliance, reference is also made to the notes below.
Notes	For heavy weight roofs, or parts of the roof that are heavyweight, with a mass per unit area greater than 150kg/m2 (including those with sedum planting) that do not have any glazing or rooflights, calculations are not required, as such the credit can be awarded on a default basis of compliance.
Third credit - Reverberation	
Criteria	Acoustic environment (Control of reverberation, sound absorption and speech transmission index (STI)): Teaching and study spaces: achieve the requirements relating to reverberation time for teaching and study spaces set out within table 6 in Section 1 of BB93. Open plan teaching spaces: achieve the performance requirements relating to

	speech transmission index (STI) set out within Section 1.8 of BB93. Corridor and stairwells: for those that give direct access to teaching and study spaces, achieve the performance requirements relating to sound absorption.
Testing requirement	Teaching and study spaces: A programme of acoustic measurements is carried out by a compliant test body in accordance with the ANC Good Practice Guide, Acoustic testing of Schools. Open plan teaching spaces: STI Measurements of the STI should be taken in at least one in ten typical student listening positions in the open plan spaces in accordance with the ANC Good Practice Guide, Acoustic testing of Schools. Corridors and stairwells: Installation of a specification compliant with the BB93 criteria demonstrates compliance. Where this refers to the use of Building Regulations, the country-specific Building Regulations or standards can be applied.

Where a programme of pre-completion testing identifies that spaces do not meet the standards, remedial works must be carried out prior to handover and occupation and the spaces re-tested to ensure compliance. Remedial works must be carried out to all affected and potentially affected areas, including rooms or spaces previously untested of a similar construction and performance requirement. The test report, or covering correspondence, should include a clear statement that the testing is in accordance with the required standard (where specified) or the BREEAM criteria, and include the relevant pass/fail criteria.
If written confirmation is provided by the Suitably Qualified Acoustician that there are no acoustically sensitive rooms or rooms used for speech, the credits can only be awarded based on achieving all the remaining, applicable credit(s).
Where compliance with criteria for this issue cannot be demonstrated due to the nature of the development, the credits are not awarded by default, but by demonstrating that the acoustic performance has been addressed by meeting the available criteria.

It is not acceptable to undertake a shorter test programme due to site readiness on the day of testing. If this issue arises additional testing should be scheduled. It may be that testing at less than the typical regime identified would be acceptable in some instances, for example in small healthcare facilities. Where this is the case, clear reasoning must be provided by the compliant test body prior to awarding the credit(s).

For Historic buildings, full credits available can still be achieved where full compliance has not been met where confirmation is provided from a SQA that the design has improved the acoustic performance as much as possible taking into account the restrictions as detailed in a report from a conservation officer.

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of a BREEAM assessment:

1. Holds a degree, PhD or equivalent qualification in acoustics/sound testing.

2. Has a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. An individual who holds a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acoustics in the UK is the Institute of Acoustics.

Where a suitably qualified acoustician is verifying the acoustic measurements/calculations carried out by another acoustician who does not meet the SQA requirements, they must, as a minimum, have read and reviewed the report and confirm in writing that they have found it to:

1. Represent sound industry practice
2. Be appropriate given the building being assessed and scope of works proposed
3. Avoid invalid, biased and exaggerated recommendations.

Additionally, written confirmation from the third party verifier that they comply with the definition of a Suitably Qualified Acoustician is required.

Hea 06 – Safety and Security – 1/1 credits targeted.

- It has been assumed a security specialist will conduct a security needs assessment and their recommendations will be implemented.

Security of site and building – 1/1 credits targeted

1. A Suitably Qualified Security Specialist (SQSS) conducts an evidence based Security Needs Assessment (SNA) during or prior to Concept Design (RIBA Stage 2 or equivalent).
2. The 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.
3. The recommendations or solutions proposed by the SQSS are implemented. Any deviation from those recommendations or solutions will need to be justified, documented and agreed in advance with a suitably qualified security specialist.

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, DOCO, 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.

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), Designing Out Crime Officer (DOCO), 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.

7.3 Energy

This category encourages the specification and design of energy efficient building solutions, systems and equipment that support the sustainable use and management of energy during the building's operation. Issues in this section assess measures to improve the inherent energy efficiency of the building, encourage the reduction of carbon emissions and support efficient management throughout the operational phase of the building's life.

13/25 credits targeted – 0/5 exemplary credits targeted

The development performs well in terms of energy. At the moment it has been assumed that the development will not exceed the mandatory Ene01 target, as the design progresses and SBEM calculations are provided it may be possible to increase this. Credits related to the proposed lift have not been targeted at this time as a lift consultant isn't currently appointed. The credits for energy efficient equipment have not been targeted as details of equipment are currently unknown.

Ene 01 – Reduction of energy use and carbon emissions – 8/15 credits targeted – 0/5 exemplary credits.

- It has been assumed that improvements to the developments building fabric and services modelled in SBEM calculations will show at least 6 credits can be awarded. Both existing building energy performance and refurbished building energy performance will need to be modelled.
- It has been assumed that a specialist study will be undertaken by a Suitably Qualified Heritage Conservation Specialist to investigate the implications of improving building fabric and services performance

Whole building energy model – 6/13 credits targeted (6 credits are mandatory for BREEAM Excellent)

1. Calculate the Energy Performance Ratio for Non Domestic Refurbishment (EPR_{NDR}) ≥0.36 is required for 6 credits.

Historic buildings only – 2/2 credits targeted

Two additional credits are available for Historic buildings, up to a maximum of fifteen where the whole building energy model approach is taken.

3. A specialist study has been undertaken by a Suitably Qualified Heritage Conservation Specialist at the Concept Design stage (equivalent to RIBA Stage 2), to investigate the implications of improving building fabric and services performance while minimising the potential negative impacts of both the historic character of the building, the condition of the building fabric and indoor air quality.
4. The study includes looking at the potential for improving ventilation, air tightness and moisture control within the building, ensuring that these are considered in balance with that of the welfare of the historic building fabric. This includes considering materials specified, impacts on breathability of the building, paying attention to additional ventilation that may be required e.g. roof, wall and floor voids.
5. The report makes recommendations for potential improvements to the building fabric in accordance with best practice guidance including:
    a. Energy Efficiency and Historic Buildings: Application of Part L of the Building Regulations to historic and traditionally constructed buildings, English Heritage

b. Guide for practitioners 6, conversion of traditional buildings parts 1 and 2, application of the Scottish building standards, Historic Scotland
c. The Sustainable Traditional Buildings Alliance (STBA) Responsible Retrofit Guidance Tools (www.responsible-retrofit.org).

6. Each of the following (as a minimum) must be considered and recommendations for improvement made:

a. Roof
b. External/sheltered walls
c. Ground floor
d. Upper floors
e. Windows and external doors

7. Where improvement cannot be made to any of the above (e.g. due to conservation or building performance issues), justification should be provided including the alternative measures that have been considered and reasons these measures could not be adopted (e.g. glazing options considered etc.).

Where the refurbishment project also includes a newly constructed extension with new thermal elements, the modelled performance of the baseline for new thermal elements should be based upon compliance with the appropriate Building Regulations for new thermal elements as defined for the notional building.
Where the new extension uses existing building services, the modelled baseline performance of the new extension and existing building should be based upon performance of the existing common building services plant. The baseline for any new building services plant servicing the extension only should be modelled based upon compliance with the appropriate Building Regulations as defined for the notional building and the Building Regulations Compliance Guide.
Where included as part of the project, the installation of low or zero carbon (LZC) technologies can be used to off-set CO2 emissions arising from regulated emissions, where the project has been assessed against Option 1, (whole building energy model). The LZC technology can be installed on-site or near-site where a private wire arrangement is in place.
The baseline model should be identical to the proposed building in size, layout, use and occupancy. Where new building elements (e.g. new wall or window) are specified, they are only included in the proposed building model, not in the existing model.

Ene 02 – Energy monitoring – 1/1 credits targeted.

- It has been assumed that energy sub-meters will be installed as required.

Sub-metering of major energy consuming systems – 1/1 credits targeted (mandatory for BREEAM Excellent)

1. 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.
2. 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.
4. The end energy consuming uses are identifiable to the building users, for example through labelling or data outputs.

Only the services within the scope of the project works need to be sub-metered, so where energy consuming systems are not to be affected by the works, they can be excluded from the requirement. For example, if only lighting is to be changed, then only lighting needs sub-metering.

Where the refurbishment project includes an extension, with building services plant and systems that will be common to both the new extension and existing building, the energy services supplying energy consuming systems in the existing building shall, as a minimum, be metered. Where the scope of the assessment includes the new build extension energy metering must cover energy consuming systems for the entire building.

Ene 03 – External lighting – 1/1 credits targeted.

- It has been assumed that external lighting will be compliant.

External lighting – 1/1 credits targeted

2. The average initial luminous efficacy of the external light fittings within the construction zone is not less than 60 luminaire lumens per circuit Watt.
3. All external light fittings are automatically controlled to prevent operation during daylight hours and have presence detection in areas of intermittent pedestrian traffic.

Temporary lighting such as theatrical, stage or local display installations, where specified, can be excluded from assessment under this issue. Decorative lighting and floodlighting must however not be exempt from the assessment criteria.

Ene 04 – Low carbon design – 3/3 credits targeted.

- It has been assumed that a passive design analysis will be carried out and measures implemented.
- It has been assumed that active cooling will not be present.
- A low and zero carbon technology feasibility study and implementation have been assumed.

Passive design analysis – 1/1 credits targeted.

1. The first credit within issue Hea 04 Thermal comfort has been achieved to demonstrate the building design can deliver appropriate thermal comfort levels in occupied spaces.
2. The project team carries out an analysis of the existing building fabric, form, site location and outline scheme design to influence decisions made during the Concept Design stage (RIBA Stage 2 or equivalent) and identifies opportunities for the implementation of passive design solutions and retrofit measures that reduce demands for energy consuming building services.
3. 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.

As a minimum, the passive design analysis should cover:

1. Site location
2. Site weather
3. Microclimate
4. Building layout
5. Building orientation
6. Building form
7. Building fabric

8. Thermal mass or other fabric thermal storage
9. Building occupancy type
10. Daylighting strategy
11. Ventilation strategy
12. Adaptation to climate change.

The amount of energy or CO_2 emissions reduction is not specified in the criteria in this issue. However, it should not be a trivial amount. As a guide, the installation should contribute at least 5% of overall building energy demand and/or CO_2 emissions.

Free cooling – 1/1 credits targeted.

1. The passive design analysis credit is achieved.
2. 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.
3. The building is naturally ventilated or uses any combination of the free cooling strategies listed.

The free cooling analysis should demonstrate consideration of appropriate technologies from the following:

1. Night time cooling (which could include the use of a high exposed thermal mass)
2. Ground coupled air cooling
3. Displacement ventilation (not linked to any active cooling system)
4. Ground water cooling
5. Surface water cooling
6. Evaporative cooling, direct or indirect
7. Desiccant dehumidification and evaporative cooling, using waste heat
8. Absorption cooling, using waste heat
9. The building does not require any significant form of active cooling or mechanical ventilation (i.e. naturally ventilated).

The free cooling should apply to all occupied spaces in the building. Small IT rooms and lift motor rooms are excluded. Mechanical ventilation may only be used for small areas, e.g. for kitchenettes and toilets.

With respect to the free cooling credit, it is possible for ICT classrooms to be designed to avoid the use of active cooling. Hence, they are not exempt from the requirements of this issue, i.e. if active cooling were used to treat these spaces, it would not be possible to achieve the free cooling credit within this BREEAM issue.

Low and zero carbon feasibility study – 1/1 credits targeted.

7. 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 and zero carbon (LZC) energy source(s) for the building/development.
8. 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.

The LZC study should cover as a minimum:

1. Energy generated from LZC energy source per year
2. Carbon dioxide savings from LZC energy source per year
3. Life cycle cost of the potential specification, accounting for payback

4. Local planning criteria, including land use and noise
5. Feasibility of exporting heat/electricity from the system
6. Any available grants
7. All technologies appropriate to the site and energy demand of the development.
8. Reasons for excluding other technologies
9. Where appropriate to the building type, connecting the proposed building to an existing local community CHP system or source of waste heat or power OR specifying a building/site CHP system or source of waste heat or power with the potential to export excess heat or power via a local community energy scheme.

'Local' does not have to mean on-site; community schemes (near-site) can be used as a means of demonstrating compliance, as this BREEAM issue seeks to encourage the installation of on-site and near-site LZC technologies.

The amount of energy or CO_2 emissions reduction is not specified in the criteria in this issue. However, it should not be a trivial amount. As a guide, the installation should contribute at least 5% of overall building energy demand and/or CO_2 emissions.

Under some circumstances an LZC feasibility study may be undertaken however due to listed building consent and/or planning conditions in a conservation area, there may be no recommendations that can be implemented. In this situation, this is still compliant provided it can be demonstrated that a wide range of options have been considered with consultation input from the local authority conservation officer, e.g. locating LZCs out of public view, use of screens etc. and the report contains evidence to support these findings.

Ene 06 – Energy efficiency transport systems – 0/3 credits targeted.

- A lift has been proposed. It has not been assumed that an analysis of transportation demand and usage patterns will be carried out.
- It has not been assumed that energy consumption will be estimated for at least 2 types of system and the one with the lowest energy consumption will be specified.
- It has not been assumed that energy efficient features will be specified.

Energy consumption – 0/1 credits targeted

1. Where new lifts, escalators and/or moving walks (transportation types) are specified within refurbishment works:
    a. 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.
    b. The energy consumption has been estimated 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 of escalators and moving walks, for one of the following:
        I. At least two types of system (for each transportation type required); OR
        II. An arrangement of systems (e.g. for lifts, hydraulic, traction, machine room-less lift (MRL)); OR
        III. A system strategy which is 'fit for purpose'.
    c. The use of regenerative drives should be considered

d. The transportation system with the lowest energy consumption is specified (when demonstrating compliance through either b.i. or b.ii.).

The transport analysis can be in the form of a written statement justifying the lift selection for the following conditions: where a single lift is provided in a low rise building for the purpose of providing disabled access only; or where a goods lift is selected based on the size of the goods it is intended to carry.

A regenerative drive should only be considered where it produces an energy saving greater than the additional standby energy used to support the drives. Regenerative drives will typically be appropriate for lifts with high travel and high intensity use.

A newly specified lift, escalator and/or moving walks includes the installation of transport systems where none existed before and also the replacement of an existing transportation system (for lifts this would include where undergoing major works to existing lifts such as moderations to the capacity of the lift).

Energy efficient features – 0/2 credits targeted.

2. Criterion 1 is achieved for newly specified lifts.
3. For each newly specified lift, the following three energy efficient features are specified and for existing lifts within the project scope of influence, at least two of the following energy efficient features are specified:
    a. 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.
    b. The lift car lighting and display lighting provides an average lamp efficacy, (across all fittings in the car) of > 55 lamp lumens/circuit Watt.
    c. The lift uses a drive controller capable of variable speed, variable-voltage, and variable-frequency (VVVF) control of the drive motor.
4. Where the use of regenerative drives is demonstrated to save energy, they are specified.

The criteria relating to lifts do not apply to lifting platforms, wheelchair platform stairlift(s) or other similar facilities to aid persons with impaired mobility. However, any lifting device with a rated speed greater than 0.15m/s must be assessed, inclusive of goods, vehicle and passenger lifts. An excluded transportation type that demonstrates compliance with the BREEAM criteria would be considered best practice for an energy efficient system (despite not being required for the purpose of awarding the available credits).

A regenerative drive should only be considered where it produces an energy saving greater than the additional standby energy used to support the drives. Regenerative drives will typically be appropriate for lifts with high travel and high intensity use.

A newly specified lift, escalator and/or moving walks includes the installation of transport systems where none existed before and also the replacement of an existing transportation system (for lifts this would include where undergoing major works to existing lifts such as moderations to the capacity of the lift).

Ene 08 – Energy efficiency equipment – 0/2 credits targeted.

- It has been assumed that the only unregulated energy consuming load will be small power, plug-in equipment and domestic scale white goods. A data centre may also be present.
- A meaningful reduction in the total annual unregulated energy consumption of the building has not been assumed.

Energy efficient equipment – 0/2 credits targeted

1. Identify the building's unregulated energy consuming loads and estimate their contribution to the total annual unregulated energy consumption of the building, assuming a typical/standard specification.
2. Identify the systems and/or processes that use a significant proportion of the total annual unregulated energy consumption of the development and its operation.
3. Demonstrate a meaningful reduction in the total annual unregulated energy consumption of the building.

The following equipment has been awarded an Energy Star rating OR has been procured in accordance with the Government Buying Standards:

1. Office equipment
2. Other small powered equipment
3. Supplementary electric heating.

Domestic scale appliances have the following ratings (or better) under the EU Energy Efficiency Labelling Scheme, where provided:

1. Fridges, fridge-freezers: A+ rating
2. Washing machines: A++ rating
3. Dishwashers: A+ rating
4. Washer-dryers and tumble dryers: A rating
5. If any of the appliances will be purchased during occupation by the tenant/owner, information on the EU Energy Efficiency Labelling Scheme of efficient white goods must be provided to the residential areas of the building.

Any white goods available to purchase from the developer must be compliant with criteria 1 to 4 above.
If criterion 5 was chosen to demonstrate compliance, only one of the two available credits could be awarded.

Data centres

1. Design is in accordance with the 'Best practices for the EU Code of Conduct on Data Centres' principles with the data centre achieving at least the 'Expected minimum practice' level (as defined in the Code of Conduct).
2. Temperature set points are not less than 24°C, as measured at the inlet of the equipment in the rack.

BREEAM does not specify a level or percentage that defines a meaningful reduction in unregulated energy demand. The project team must justify how they have determined or judged a meaningful reduction from the unregulated energy demand and the assessor must be satisfied that this is an appropriate justification.

This issue does not apply to laboratory ducted fume cupboards.

Data centre: For the purpose of this BREEAM issue, the term ‘data centres’ includes all buildings, facilities and rooms which contain enterprise servers, server communication equipment, cooling equipment and power equipment, and may provide some form of data service (e.g. large-scale mission critical facilities all the way down to small server rooms located in office buildings).

7.4 Transport

This category encourages better access to sustainable means of transport for building users. Issues in this section focus on reviewing the accessibility of public transport and other alternative transport solutions (cyclist facilities, provision of amenities local to a building) that support reductions in car journeys and, therefore, congestion and CO_2 emissions over the life of the building.

7/7 credits targeted

The development is well located and this is reflected in the transport score in relation to public transport and amenities.

Tra 01 – Sustainable transport solutions – 3/3 credits targeted.

- It has been assumed that the site will have an accessibility index of ≥ 8.

Accessibility Index – 2/2 credits targeted.

1. The public transport Accessibility Index (AI) for the assessed building is calculated and BREEAM credits awarded according to the building type.

≥ 2 = 1 credit
≥ 4 = 2 credits
≥ 8 = 3 credits

Tra 02 – Proximity to amenities – 1/1 credits targeted.

- It has been assumed that amenities are within 500m of the site.

Proximity to amenities – 1/1 credits targeted.

1. Where a building is located within close proximity of, and accessible to, local amenities which are likely to be frequently required and used by building occupants.

2 of the following within 500m:

- Appropriate food outlet
- Access to cash
- Access to a recreation/leisure facility for fitness/sport

Amenities (as listed) that are within the required proximity (distance in metres) of the building and accessible via safe pedestrian routes, e.g. pavements/paths and safe crossing points or, where provided, dedicated pedestrian crossing points. The distance should not be measured in a straight line, 'as the crow flies'.

Tra 03 – Cyclist facilities – 2/2 credits targeted.

- It has been assumed that cycle storage will be provided. 2 classes per year = 10 spaces. This can be reduced by 50% to 5 due to the high accessibility index of the building.
- It has been assumed that cyclist facilities will be provided

Cycle storage – 1/1 credits targeted

1. Compliant cycle storage spaces that meet the minimum levels are installed.

Primary school:
5 spaces per form or class in year group

For sites where at least 50% of the available BREEAM credits for the Accessibility Index under the Sustainable transport solutions (Tra 01) criteria 1 and 2 have been awarded (rounded to the nearest whole credit), the number of compliant cycle spaces required can be reduced by 50%. This reduction will also reduce the requirement for compliant showers or lockers by the same margin for most building types by default, since the calculation is based on the number of cycle storage spaces. Building types where the number of required showers/lockers is not based on cycle storage provision can reduce the actual requirement for compliant showers/lockers by 50%.

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 or overlooked from either an occupied building or a main access to a building. In the scenario where cycle storage spaces are within the building, prominent signage should be provided to advertise their location to building users and cyclists.
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.

Cyclist facilities – 1/1 credits targeted

2. Criterion 1 has been achieved.
3. 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

For sites where at least 50% of the available BREEAM credits for the Accessibility Index under the Sustainable transport solutions (Tra 01) criteria 1 and 2 have been awarded (rounded to the nearest whole credit), the number of compliant cycle spaces required can be reduced by 50%. This reduction will also reduce the requirement for compliant showers or lockers by the same margin for most building types by default, since the calculation is based on the number of cycle storage spaces. Building types where the number of required showers/lockers is not based on cycle storage provision can reduce the actual requirement for compliant showers/lockers by 50%.

In the case of a pre-school or primary school, shower provision is for staff only and set at a rate of one shower for every 10 cycle storage spaces provided (subject to a minimum of one shower being

provided). For example, where a primary school has been designed to accommodate three classes per year, a total of 15 compliant spaces are required to meet the BREEAM criteria for cycle storage, and therefore two showers for staff use would be required for compliance with the cycle facilities criterion.

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 are defined as those that meet the following:

1. Appropriately sized for the likely or 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. Account for privacy to allow cyclists of either gender to change in private.
3. Changing areas must include adequate space and facilities to hang or store clothing and equipment while changing or showering, e.g. bench seat or hooks.
4. Toilet or shower cubicles cannot be counted as changing facilities.

Compliant 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.

A compliant drying space is defined as a space that is specifically designed and designated for this purpose. it should be provided with suitable finishes, adequate heating and ventilation and the facility to hang wet clothes with sufficient air movement around them to dry effectively.
Examples of non-compliant spaces:

- Plant rooms: these are not specifically designed for the purpose and their use as a drying space may create a health and safety hazard.
- Coat hooks in cloakrooms or staff changing areas: these are not specifically designed and are unlikely to provide adequate ventilation or allow sufficient air movement to dry clothing effectively.

Tra 05 – Travel plan – 1/1 credits targeted.

- It has been assumed that a travel plan will be developed and implemented.

Travel plan – 1/1 credits targeted

1. A travel plan has been developed as part of the feasibility and design stages.
2. A site specific travel assessment/statement has been undertaken to ensure the travel plan is structured to meet the needs of the particular 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.

3. 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.
4. 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 refurbishment or fit-out and be supported by the building's management in operation.

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.

7.5 Water

This category encourages sustainable water use in the operation of the building and its site. Issues in this section focus on identifying means of reducing potable water consumption (internal and external) over the lifetime of the building and minimising losses through leakage.

5/9 credits targeted – 0/1 exemplary credits targeted

The building performs well in this area, with the only credits not targeted being those relating to the use of greywater or rainwater, leak detection and flow control devices to each sanitary area. These technologies have not been incorporated due to the existing buildings WC's facilities being widely distributed across the site.

Wat 01 – Water consumption – 3/5 credits targeted – 0/1 exemplary credits.

- It has been assumed that a 40% improvement over baseline building water consumption will be achieved. An example of how this could be achieved is:
  - WC's – effective flush volume of 4L
  - Hand basin taps – 4L/min
  - Showers – 6L/min
  - Kitchenette taps – 5L/min
  - Dishwasher – 12L/cycle

It has been assumed that there will be no urinals, baths, student showers, washing machines, waste disposal units, food preparation areas or student common rooms.

Water consumption – 3/5 credits targeted – 0/1 exemplary credit (1 credit is mandatory for BREEAM Excellent)

1. An assessment of the efficiency of newly specified domestic water-consuming components and (where relevant) measures specified to retrofit existing devices is undertaken using the BREEAM Wat 01 calculator, including all fittings applicable to the project type.
2. The water consumption (litres/person/day) for the assessed building is compared against a baseline performance and BREEAM credits awarded.
3. The efficiency of the following 'domestic scale' water-consuming components must be included in the assessment:
   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 or industrial sized)

The BREEAM Wat 01 calculator defines the building types and activity areas for which the above components must be assessed.
4. Where a greywater and/or rainwater system is specified, its yield (l/person/day) is used to off-set non-potable water demand from components that would otherwise be supplied using potable water.
5. Any greywater systems must be specified and installed in compliance with BS 8525-1:2010 Greywater Systems - Part 1 Code of Practice. Any rainwater systems must be specified and installed

in compliance with BS EN 16941-1:2018 On-site non-potable water systems. Systems for the use of rainwater.

Where existing water-consuming components are to be retained, compliance can be achieved through retrofitting existing components with water saving devices. In all cases, advice from an engineer will be required to determine the suitability of the device for fitting being modified. Examples include:

- Urinals: controls, timers or cistern displacement devices as applicable
- Taps: aerated or spay tap inserts or flow regulators
- Shower: low flow shower heads or flow regulators
- WCs: dual flush mechanisms or cistern displacement devices.

Wat 02 – Water monitoring – 1/1 credits targeted.

- It has been assumed that a compliant water meter will be fitted to the mains water supply.
- It has been assumed that compliant sub-meters will be installed as required.

Water monitoring – 1/1 credits targeted (criterion 1 is mandatory for BREEAM Excellent)

1. The specification of a water meter on the mains water supply to each building; this includes instances where water is supplied via a borehole or other private source.
2. Water-consuming plant or building areas, consuming 10% or more of the building's total water demand, are either fitted with easily accessible sub-meters or have water monitoring equipment integral to the plant or area. This applies to recycled water, such as rainwater, greywater or process water, as well as mains water.
3. Each meter (main and sub) has a pulsed or other open protocol communication output to enable connection to an appropriate utility monitoring and management system, e.g. a building management system (BMS), for the monitoring of water consumption.
4. If the refurbishment zone is within a site that has an existing BMS, managed by the same occupier/owner (as the space undergoing refurbishment or fit-out), the pulsed/digital water meter(s) for the refurbishment or fit-out zone must be connected to the existing BMS
5. If the refurbishment or fit-out zone is within a building that is leasehold, the pulsed/digital water meter(s) for the refurbishment or fit-out zone must be connected to the incoming water supply for water using equipment in tenanted areas.

Water-consuming plant or building area. As a minimum, this includes the following (where present):

1. Buildings with a swimming pool and its associated changing facilities (toilets, showers etc.).
2. On sites with multiple units or buildings, e.g. shopping centres, industrial units, retail parks etc. separate sub meters are fitted on the water supply to the following areas (where present):
    - Each individual unit supplied with water
    - Common areas (covering the supply to toilet blocks)
    - Service areas (covering the supply to outlets within storage, delivery, waste disposal areas etc.)
    - Ancillary/separate buildings to the main development with water supply.
3. Laboratory: in any building with a laboratory or containing laboratories, a separate water meter is fitted on the water supply to any process or cooling loop for 'plumbed-in' laboratory process equipment.

The sub-meter requirement does not necessarily apply in the following cases, where the assessor confirms there will be no additional monitoring benefit resulting from their installation:

1. Where a building has only one or two small sources of water demand (e.g. an office with sanitary fittings and a small kitchen)
2. Where the building has two sources of water demand, one significantly larger than the other, and the water consumption for the larger demand is likely to mask the smaller demand.

Wat 03 – Water leak detection – 0/2 credits targeted.

- It has not been assumed that a leak detection system will be installed on the mains water supply.
- Flow control devices have not been assumed at this time as the building is likely to have a large number of small WC areas.

Leak detection system – 0/1 credits targeted

1. 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 inbuilt 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.

This issue does not specify what the high and low level leakage rates should be, however the leak detection equipment installed must have the flexibility to distinguish between different flow rates to enable it to be programmed to suit the building type and owner/occupier's usage patterns.

It is anticipated that the leak detection credit will usually be achieved by installing a system which detects higher than normal flow rates at meters and/or sub-meters. It does not necessarily require a system that directly detects water leakage along part or the whole length of the water supply system.

Where there is a water utilities meter at the site/building boundary, it may be necessary to install a separate flow meter (or alternative measurement system) just after the utility meter to detect leaks; however, if the water utility company agrees to some form of leak detection being installed on their meter, this would also be acceptable.

Leak detection systems integrated or added to BMSs can allow the Leak detection credit to be awarded, provided they can demonstrate they meet the criteria.

Flow control devices – 0/1 credits targeted

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 fitting networks).

The following could be considered as types of flow control devices:

- A time controller, i.e. an automatic time switch device to switch off the water supply after a predetermined interval
- A programmed time controller, i.e. an automatic time switch device to switch water on and/or off at predetermined times.
- A volume controller, i.e. an automatic control device to turn off the water supply once the maximum pre-set volume is reached
- A presence detector and controller, i.e. an automatic device detecting occupancy or movement in an area to switch water on and turn it off when the presence is removed
- A central control unit, i.e. a dedicated computer-based control unit for an overall managed water control system, utilising some or all of the types of control elements listed above.

Flow control systems may control combined WC areas, such as male and female toilets within a core; they are not required for each individual sanitary appliance. The criteria are set to encourage the isolation of the water supply to each WC block when it is not being used.

The flow control criteria for this issue do apply to facilities which have only a single WC. In these instances shut-off could be provided via the same switch that controls the lighting (whether proximity detection or a manual switch).

Wat 04 – Water efficient equipment – 1/1 credits targeted.

- It has been assumed that irrigation will be the only unregulated water use and this will be designed out due to drought resistant planting.

Water efficient equipment – 1/1 credits targeted

1. The design team has identified all unregulated water demands that could be realistically mitigated or reduced.
2. 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.

BREEAM does not prescriptively define all potential means or solutions for reducing unregulated water consumption. The design team needs to demonstrate to the assessor that they have identified key areas of water consumption in the building and that a reduction in unregulated water consumption has been achieved using existing 'tried and tested' solutions or new innovative solutions relevant to the building and its functional requirements. The following are some examples of solutions deemed to satisfy compliance for a number of different building types or functions (where the unregulated water demand for 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, i.e. greywater collection from building functions or processes that use potable water, e.g. vehicle wash, training water in fire stations, sanitary facilities, irrigation etc. This should take into account the Government Buying Standards1 where 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 to do so in those conditions likely as a result of climate change, i.e. typically warmer and drier condition

Where there are soft landscaped areas however no irrigation systems are specified, and therefore there are no unregulated water demands for the building, the credit available under this assessment issue can be awarded by default.

7.6 Materials

This category encourages decisions which reduce the environmental and social impact of construction products used on a project. It takes a 'whole life cycle' approach to construction product impacts, encouraging consideration of impacts during manufacture, design, procurement, installation, in-use and end-of-life. The issue focuses on construction product efficiency, environmental impact, responsible sourcing and product durability.

7/13 credits targeted – 0/2 exemplary credits targeted

Currently the materials section is one of the worst performing area for the development, however a good number of credits have been targeted. This is due to the uncertain nature of these credits and the conservative approach take. It is expected that the development will increase credits in this area once additional details relating to specific materials are known.

Mat 01 – Life cycle impacts – 2/6 credits targeted – 0/1 exemplary credits.

- It has been assumed that a project lifecycle assessment study will be carried out. 2/6 credits have currently been assumed.

Project lifecycle assessment study – 2/6 credits targeted – 0/1 exemplary credits.

1. 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.
2. The LCA covers new materials as relevant to the assessment parts listed and indicated in the 'Materials assessment scope' section of the BREEAM Refurbishment and Fit-out Mat 01 calculator (Part B of the tool).
3. 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.
4. 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 (left side of the tool) and the scope of the assessment in terms of the materials specified that have been considered (right side of the tool)
5. Where the design team can demonstrate how the LCA has benefited the building in terms of measuring and reducing its environmental impact.
6. Where the design team submit the LCA tool output (e.g. Building Information Model (BIM)) for assessing the building to BRE Global Limited (via the project's appointed BREEAM assessor) to inform future potential LCA benchmarking for BREEAM
7. Credits are awarded in accordance with Table 46 .

Relevant elements:

1. Part 1 includes elements of the fabric and structure including:
    a. External walls (envelope, structure and finishes)
    b. External windows and roof lights
    c. Structural frame
    d. Basements/retaining walls (including excavations)
    e. Upper floors (including horizontal structure)
    f. Roof (including coverings)
    g. Stairs

   h. External solar shading devices, access structures etc.
   i. Ground/lowest floor
2. 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
3. Part 4 includes interior fit-out elements including:
   a. Internal floor finishes (including access floors)
   b. Internal ceiling finishes (including suspended/accecss ceilings)
   c. Internal walls and partitions
   d. Internal wall finishes
   e. Internal windows
   f. Internal doors
   g. Furniture (desks, chairs, display cabinets, shelving)
   h. Fittings (shop fittings, railings, screens, gutters, vents, air grilles)
4. Hard landscaping and boundary protection are included where within scope of works

In most projects, not all elements listed will be present. This does not affect the credits available as this issue is assessed based upon the percentage of available points that have been achieved. The percentage of available points is adjusted in the Mat 01 Calculator tool in order to reflect the number of elements present.

Demonstrating benefit: This should take the form of a short qualitative statement from the design team providing comments on the following:

1. How and at what stages of the design the tool was utilised.
2. How the tool helped (or did not help) steer the design process to optimise cost and mitigate environmental impacts, giving examples of specific changes to the building design/specification that resulted.

Table 46

Percent of BREEAM Mat 01 calculator points achieved	Credits
10	1
30	2
50	3
65	4
75	5
80	6
85	6 + 1 exemplary

Mat 03 – Responsible sourcing – 2/4 credits targeted – 0/1 exemplary credits.

- It has been assumed that all timber and timber-based products will be legally harvested and traded.
- A compliant sustainable procurement plan has been assumed.
- It has been assumed that materials will be responsibly sourced and the necessary certifications will be available. 1/3 credits have currently been assumed; it may be possible to improve on this.

Pre-requisite (mandatory for BREEAM Excellent)

1. All timber and timber-based products used on the project is Legally harvested and traded timber.

Sustainable procurement plan – 1/1 credits targeted

2. The principal contractor sources materials for the project in accordance with a documented 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 ISO 20400:2017 Sustainable procurement or BS 8903:2010 Principles and framework for procuring sustainably - 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.

Responsible sourcing of materials – 1/3 credits targeted – 0/1 exemplary credits

3. One credit can be awarded where at least three of the material types listed in 'Material categories' has been responsibly sourced from one of the responsible sourcing schemes recognised by BREEAM.
4. Up to three of the available RSM credits can be awarded where the applicable building materials are responsibly sourced in accordance with the BREEAM methodology.

Material categories:

1. Timber/timber-based products (TBP)
2. Concrete/cementitious (plaster, mortar, screed etc.)
3. Metal
4. Stone/aggregate
5. Clay-based (pavers, blocks, bricks)
6. Gypsum
7. Glass
8. Plastic, polymer, resin, paint, chemicals and bituminous
9. Animal fibre/skin, cellulose fibre
10. Other

Mat 04 – Insulation – 1/1 credits targeted.

- It has been assumed that insulation will be selected to achieve an insulation index of 2.5 or more.

Embodied impact – 1/1 credits targeted

1. 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.
2. The Insulation Index for the building fabric and services insulation is the same as or greater than 2.5.

If the insulation is incorporated as a component of an element that has been manufactured off-site (in order to maximise material optimisation), e.g. a wall or roof, and that element has been assessed as part of Mat 01, then for the purpose of assessing the insulation for this BREEAM issue, a Green Guide rating of A+ should be used. The same rule applies to insulation that has a significant additional function, such as providing supporting structure, e.g. structural insulated panels (SIPS). In the Green Guide, the actual insulation will be listed within the element title, rather than under the generic insulation category.

Where no new insulation is specified, this issue is not assessed and is filtered out from the assessment.

Mat 05 – Designing for durability and resilience – 1/1 credits targeted.

- It has been assumed that vulnerable parts of the building will be protected from damage and exposed parts of the building will be protected from material degradation.

Designing for durability and resilience – 1/1 credits targeted

Protecting vulnerable parts of the building from damage

1. 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 building façade for all car parking areas and within 2m for all delivery areas.

Protecting exposed parts of the building from material degradation
2. Environmental factors have been identified that are relevant to the site location
3. Existing applicable building elements that are exposed to any relevant environmental factors have been identified
4. Existing applicable building elements have been surveyed have been assessed to identify impacts of material degradation effects including an assessment to grade the severity of any degradation effects. Design and specification measures have been developed to repair and protect existing elements according to the severity of any degradation affects, to limit degradation. Where it is not feasible to implement measures to limit material degradation for existing elements, justification should be provided.
5. Newly specified materials or newly constructed elements (e.g. a new external wall) within the scope of refurbishment or fit-out works incorporate appropriate design and specification measures to limit material degradation due to environmental factors.

Applicable building elements
1. Foundation/substructure/lowest floor/retaining walls
2. External walls
3. Roof/balconies
4. Glazing: windows, skylight
5. External doors
6. Railings/balusters (where exposed to external environment)
7. Cladding (where exposed to external environment)
8. Staircase/ramps (where exposed to external environment)
9. Hard landscaping

Environmental factors
1. Environmental agents, including:
    a. Solar radiation
    b. Temperature variation
    c. Water/moisture
    d. Wind
    e. Precipitation, e.g. rain and snow
    f. Extreme weather conditions: high wind speeds, flooding, driving rain, snow
2. Biological agents, including:
    a. Vegetation
    b. Pests, insects
3. Pollutants, including:
    a. Air contaminants
    b. Ground contaminants

Material degradation effects (includes, but not necessarily limited to the following)

1. Corrosion
2. Dimensional change, e.g. swelling or shrinkage
3. Fading/discolouration
4. Rotting
5. Leaching
6. Blistering
7. Melting
8. Salt crystallisation
9. Abrasion

For listed buildings and buildings in a conservation area, measures to protect vulnerable parts of the building from damage (criterion 1) and to limit material degradation (criteria 2 and 3) should be based on the measures that are feasible within the scope of any heritage requirements that may be explicitly required by the relevant conservation authority (e.g. the local authority heritage office). This should consider the range of options that may be feasible in order to demonstrate compliance with justification provided, including reference to documentary evidence to verify any restrictions that are in place that prevent compliance with any durability measures.

Suitable durability and protection measures to vulnerable parts of the building can include:

1. Bollards/barriers/raised kerbs to delivery and vehicle drop-off areas
2. Robust external wall construction, up to 2m high
3. Corridor walls specified to Severe Duty (SD) as per BS 5234-21and, for Healthcare buildings, Health Technical Memorandum 56 - Partitions2.
4. Protection rails to walls of corridors
5. Kick plates/impact protection (from trolleys etc.) on doors
6. Hard-wearing and easily washable floor finishes in heavily used circulation areas (i.e. main entrance, corridors, public areas etc.)
7. Designing out the risk without the need for additional materials specification to protect vulnerable areas.

Any vehicle impact protection measures specified must be positioned at an adequate distance from the building to protect the fabric from impact from any vehicle with a measurable overhang of the body from the wheel track, in particular for any goods delivery areas.
In vehicle movement areas only; where the specification of external robust wall construction is specified to comply with the credit, additional protection must be provided to ensure against potential damage to the robust façade from vehicle movement, i.e. specifying bollards or protection rails.

The specification or design measures chosen should reflect the need to balance the additional specification of materials with the need to protect building elements to minimise their replacement, insuring against excessive material use and promoting materials optimisation.

Consideration should be given to materials specification in public/common areas (especially public waiting areas and toilet areas) to provide protection against potential malicious or physical abuse, as far as possible.

Mat 06 – Material efficiency – 1/1 credits targeted.

- It has been assumed that opportunities will be identified, investigated and implemented to optimise the use of materials.

Material efficiency – 1/1 credits targeted

1. Opportunities have been identified, and appropriate measures investigated and implemented within the scope of refurbishment or fit-out works, to optimise the use of materials through building design, procurement, refurbishment, maintenance and end of life.
2. The above is carried out by the design/construction team in consultation with the relevant parties at each of the following RIBA stages:
    a. Preparation and Brief
    b. Concept Design
    c. Developed Design
    d. Technical Design
    e. Construction.

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.

7.7 Waste

This category encourages the sustainable management (and reuse where feasible) of construction and operational waste through future maintenance and repairs associated with the building structure and interiors. By encouraging good design and construction practices, issues in this section aim to optimise material reuse, reduce the waste arising from the refurbishment and fit-out as well as through operation of the building, encouraging its diversion from landfill. It includes recognition of measures to reduce future waste as a result of the need to alter the building in the light of future changes to climate.

8/11 credits targeted – 0/3 exemplary credits targeted

Waste is another high scoring area for the development. Three credits have not been targeted. The first is for the reuse and recycling of materials, due to the early stage of the project 1 of the 2 available credits has been assumed. The second relates to the amount of waste generated on site which is currently difficult to accurately estimate, the pre-assessment has therefore taken a conservative approach and targeted 2 out of 3 credits in this area. The third credit relates to the use of recycled aggregates, whilst the team intend to use recycled aggregates it is currently unclear if the necessary targets will be met.

Wst 01 – Project waste management – 5/7 credits targeted – 0/1 exemplary credits.

- It has been assumed that a pre-refurbishment audit will be carried out.
- It has been assumed that materials will be reused, it may be possible to increase the credits targeted here once more information is known.
- It has been assumed that less than 4.5 m3 (1.2 tonnes) of waste will be generated per 100m^2 gross internal floor area. It may be possible to increase credits in this area.
- It has been assumed that 85% by volume (90% by tonnage) of refurbishment/fit-out waste will be diverted from landfill.
- It has been assumed that 90% by volume (95% by tonnage) of demolition waste will be diverted from landfill.

Pre-refurbishment audit – 1/1 credits targeted

1. 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 who 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 (RMP) and cover:

d. Identification and quantification of the key materials where present on the project
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 reprocessors 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.

Where the strip-out has already taken place under a separate contract prior to appointment of the contractor and design team, criterion 1 (pre-refurbishment audit) cannot be achieved.

Reuse and direct recycling of materials – 1/2 credits targeted

2. Where, from the waste generated by the refurbishment and fit-out works, waste material types are either directly re-used on-site or off-site or are sent back to the manufacturer for closed loop recycling
3. One credit is achieved where 50% of the total available points for the waste material types that are present on the project have been achieved (using the Wst 01 calculator tool).
4. Two credits are achieved where 75% of the total available points for the waste material types that are present on the project have been achieved (using the Wst 01 calculator tool).

Resource efficiency – 2/3 credits targeted

5. Develop and implement a compliant Resource Management Plan covering the waste arisings from the refurbishment or fit-out project with the aim of minimising waste, recording and reporting accurate data on waste arisings, excluding strip-out works waste.
6. 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 62 .

Table 62

Credits	Amount of construction waste generated per 100m2 (gross internal floor area)	
	m^3	tonnes
1	≤9.4	≤3.5
2	≤4.5	≤1.2
3	≤2.1	≤0.4
Exemplary level	≤1.4	≤0.3

Note - Volume (m^3) is actual volume of waste (not bulk volume).

The RMP aims to promote resource efficiency and to prevent illegal waste activities. Resource efficiency includes minimising waste at source and ensuring that clients, designers and principal contractors assess the use, reuse and recycling of materials and products on and off the site. A compliant plan is one that defines:

1. A target benchmark for resource efficiency, i.e. m3 of non-hazardous waste per 100m2 or tonnes of non-hazardous waste per 100m2
2. Procedures and commitments for minimising non-hazardous waste in line with the target benchmark
3. Procedures for minimising hazardous waste
4. Procedure for the principle contractor and all subcontractors for monitoring waste, managing and diverting demolition waste from landfill.
5. A waste minimisation target and details of waste minimisation actions to be undertaken
6. Procedures for estimating, monitoring, measuring and reporting hazardous and non-hazardous site waste covering the principle contractor and all subcontractors. If waste data are obtained from licensed external waste contractors, the data needs to be reliable and verifiable, e.g. by using data from EA/SEPA/EA Wales/NIEA Waste Return Forms. All construction waste data should be reported on a monthly basis throughout the project and

checked against what would be expected based upon the stage of the project, invoices etc. to validate completeness of waste reporting data.

7. Procedures for sorting, reusing and recycling construction waste into defined waste groups, either on-site or through a licensed external contractor
8. Procedures for reviewing and updating the plan
9. The name or job title of the individual responsible for implementing the above.

Diversion of resources from landfill – 1/1 credits targeted

7. The following percentages of non-hazardous construction and demolition waste (where applicable) generated have been diverted from landfill:

Table 64

Credits	Source of waste	Volume	Tonnage
1	Refurbishment/fit-out	85%	90%
	Demolition	90%	95%
Exemplary level	Refurbishment/fit-out	95%	97%
	Demolition	95%	97%

Where space on-site is too limited to allow materials to be segregated, a waste contractor may be used to separate and process recyclable materials off-site at a Material Recovery Facility (MRF). Similarly, manufacturers' take-back schemes could also be used. Where this is the case, sufficient documentary evidence must be produced which demonstrates that segregation of materials is carried out to the agreed levels and that materials are reused/recycled as appropriate. Evidence shall be EA/SEPA/EA Wales/NIEA Waste Return Forms.

Wst 02 – Recycled aggregates – 0/1 credits targeted – 0/1 exemplary credits.

- No credits have been assumed for the use of sustainable aggregates, the WST02 calculator tool will need to be completed to confirm if any credits could be targeted.

Recycled aggregates – 0/1 credits targeted – 0/1 exemplary credits.

1. 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 Table 68 .

2.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 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.

3. 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

Table 68

Application	Min % - 1 credit	Min % - Exemplary credit
Bound		
Structural frame, including floor slabs	15%	30%
Bitumen or hydraulically bound base, binder, and surface courses for paved areas and roads	30%	75%
Building foundations	20%	35%
Concrete road surfaces	15%	45%
Unbound		
Pipe bedding	100%	100%
Granular fill and capping	100%	100%

Where off-site recycled aggregates from construction, demolition and excavation waste are used, they should be produced according to the relevant Quality Protocol or comply with the relevant BS/EN standards for aggregates.

Where any of the listed applications have been manufactured off-site, the aggregate present in these applications should be included in the assessment of this issue.

Where no high grade aggregates will be used in a refurbishment scheme project, this credit is not applicable and will be filtered out of the assessment. In the Refurbishment and Fit-out scheme, existing structural elements are generally retained, therefore it would not be appropriate to account for the aggregate within these.

When existing elements are recycled (i.e. crushed and recycled as aggregate) on site, they can contribute to awarding the credit as recycled aggregates.

Wst 03 – Operational waste – 1/1 credits targeted (mandatory for BREEAM Excellent)

- It is a mandatory requirement of BREEAM Excellent that a dedicated space for the segregation and storage of operational recyclable waste will be provided, this shall be labelled, accessible and of an appropriate size. Storage of organic waste shall also be provided and a water outlet provided.

Operational waste – 1/1 credits targeted (mandatory for BREEAM Excellent)

1. 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
    b. Accessible to building occupants or 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.
2. Where the consistent generation in volume of the appropriate operational waste streams is likely to exist, e.g. large amounts of packaging or compostable waste generated by the building's use and operation, the following facilities are provided:
    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.

The design team demonstrates that the provision of waste management facilities for the assessed building is adequate given the building type, occupier (if known), operational function and likely waste streams and volumes to be generated.
Where it is not possible to determine what provision should be made, the following guide for minimum storage space provision should be used:

1. At least $2m^2$ per $1000m^2$ of net floor area for buildings < $5000m^2$
2. A minimum of $10m^2$ for buildings ≥ $5000m^2$
3. An additional $2m^2$ per $1000m^2$ of net floor area where catering is provided (with an additional minimum of $10m^2$ for buildings ≥ $5000m^2$).

The net floor area should be rounded up to the nearest $1000m^2$.

Where the facilities are situated internally, vehicular gate heights/widths and manoeuvring and loading space must be sized to ensure ease of access for vehicles collecting recyclable materials.

The area for storage of recyclable materials must be provided in addition to areas and facilities provided for dealing with general waste and other waste management facilities, e.g. compactors, balers and composters.

Wst 05 – Adaptation to climate change – 1/1 credits targeted – 0/1 exemplary credits.

- It has been assumed that a climate change adaptation strategy will be carried out.

Structural and fabric resilience – 1/1 credits targeted – 0/1 exemplary credits

1. 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.

Wst 06 – Functional adaptability – 1/1 credits targeted.

- It has been assumed that a functional adaptation strategy will be carried out and measures will be implemented.

Functional adaptability – 1/1 credits targeted.

1. 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.
2. Functional adaptation measures have been adopted in the design by Technical Design stage (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.

7.8 Land use and ecology

This category encourages habitat protection and creation, and improvement of long term biodiversity for the building's site and surrounding land. Issues in this section relate to the protection of ecology during refurbishment, enhancement of ecology and long term biodiversity management.

4/4 credits targeted

The development performs well in relation to ecology. An ecologist has been appointed to assess the development and has provided BREEAM specific advice. All credits are being targeted at this stage.

LE 02 – Protection of ecological features – 1/1 credits targeted.

- It has been assumed that an ecologist will be appointed and all existing ecological features will be protected.

Protection of ecological features – 1/1 credits targeted.

1. 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.
2. 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).

Where a Suitably Qualified Ecologist confirms that there are no features of ecological value within landscaped areas, the credit is filtered out.

If a Suitably Qualified Ecologist has confirmed that a feature present on the site has little or no ecological value, that feature may be exempt from the 'protection of ecological features' requirement of this issue.

Where a tree is deemed to create a significant danger to the public or occupant, by a statutory body or qualified arboriculturalist, that feature may be exempt from the 'protection of ecological features' requirement of this issue.

If features of ecological value have been removed as part of the site clearance activities then the development cannot achieve the credits, even if they are to be replaced as part of a new soft landscape strategy.

Features requiring protection during site clearance and refurbishment or fit-out in accordance with BS 42020: 2013 to maintain their presence and ecological value, which include as a minimum:

1. Trees determined to be of value using one of the following measures:

    a. More than 10 years old (or where age is unknown where the trunk diameter is over 100mm).
    b. Tree of significant ecological value (as defined by BS 5837: 2012 and confirmed by the Suitably Qualified Ecologist or qualified arboriculturalist).

2. Hedges and natural areas requiring protection.

3. Watercourses and wetland areas.
4. Nesting or roosting opportunities for birds or bats within the building

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of compliance with BREEAM:

1. Holds a degree or equivalent qualification (e.g. N/SVQ level 5) in ecology or a related subject.
2. Is a practising ecologist, with a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting ecology in relation to construction and the built environment including; acting in an advisory capacity to provide recommendations for ecological protection, enhancement and mitigation measures. Examples of relevant experience are: ecological impact assessments; Preliminary Ecological Appraisals (PEA); Phase 2 habitat and fauna surveys; and habitat creation.
3. Is covered by a professional code of conduct and subject to peer review. Full members of the following organisations, who meet the above criteria, are deemed Suitably Qualified Ecologists for the purposes of BREEAM:

    a. Chartered Institution of Water and Environmental Management (CIWEM)
    b. Chartered Institute of Ecology and Environmental Management (CIEEM)
    c. Institute of Environmental Management and Assessment (IEMA)
    d. Landscape Institute (LI)
    e. The Institution of Environmental Sciences (IES)
    f. Royal Society of Biology
    g. Institute of Environmental Sciences

Where requirements 1 and 2 are met, full members of the named organisations can be considered as a SQE for BREEAM on the basis of their membership.
Those who meet requirements 1 and 2 who are not full members may be considered, however the assessor must ensure, and be able to demonstrate, that the ecologist is covered by a professional code of conduct, subject to peer review and that their expertise and experience is appropriate for the assessed project.

LE 04 –Enhancing site ecology – 1/1 credits targeted.

- It has been assumed that an ecologist will provide a report making recommendations and their recommendations will be implemented.

Ecologists report and recommendations – 1/1 credits targeted.
1. 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 advise on enhancing the ecology of the site at an early stage.
2. 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.
3. The early stage advice and recommendations of the Ecology Report for the enhancement of site ecology have been, or will be, implemented in the refurbishment or fit-out.

The role of the SQE during the Preparation and Brief stage (RIBA Stage 1 or equivalent) will be to advise on early stage site layout decisions so that opportunities to enhance site ecology are maximised. SQE involvement at the Concept Design stage (RIBA Stage 2 or equivalent) will be necessary to provide more detailed ecological recommendations based on the outline design.

The suitably qualified ecologist must carry out site surveys of existing site ecology, on which their report is based (or to provide verification where the report is prepared by others) at the Concept Design stage (RIBA Stage 2 or equivalent) in order to facilitate and maximise potential ecological enhancement.

Appropriate recommendations for enhancing the ecological value of the site are to include, and go beyond, compliance criteria for all current EU and UK legislation relating to protected species and habitats.

Ecological recommendations are defined as measures adopted to enhance the ecology of the site. These are measures that the ecologist expects can be feasibly implemented, taking into account building or site constraints. Measures may include but are not limited to:

1. The planting of locally appropriate native species or non-native species with a known attraction or benefit to local wildlife.
2. The adoption of horticultural good practice (e.g. no, or low, use of residual pesticides).
3. The installation of bird, bat and/or insect boxes at appropriate locations on the site.
4. Development of a full Biodiversity Management Plan including avoiding clearance/works at key times of the year (e.g. breeding seasons).
5. The proper integration, design and maintenance of Sustainable Drainage systems (SuDS) (such as rain gardens), green roofs, green walls, community orchards, community allotments etc.

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of compliance with BREEAM:

1. Holds a degree or equivalent qualification (e.g. N/SVQ level 5) in ecology or a related subject.
2. Is a practising ecologist, with a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting ecology in relation to construction and the built environment including; acting in an advisory capacity to provide recommendations for ecological protection, enhancement and mitigation measures. Examples of relevant experience are: ecological impact assessments; Preliminary Ecological Appraisals (PEA); Phase 2 habitat and fauna surveys; and habitat creation.
3. Is covered by a professional code of conduct and subject to peer review. Full members of the following organisations, who meet the above criteria, are deemed Suitably Qualified Ecologists for the purposes of BREEAM:

    a. Chartered Institution of Water and Environmental Management (CIWEM)
    b. Chartered Institute of Ecology and Environmental Management (CIEEM)
    c. Institute of Environmental Management and Assessment (IEMA)
    d. Landscape Institute (LI)
    e. The Institution of Environmental Sciences (IES)
    f. Royal Society of Biology

g. Institute of Environmental Sciences

Where requirements 1 and 2 are met, full members of the named organisations can be considered as a SQE for BREEAM on the basis of their membership.
Those who meet requirements 1 and 2 who are not full members may be considered, however the assessor must ensure, and be able to demonstrate, that the ecologist is covered by a professional code of conduct, subject to peer review and that their expertise and experience is appropriate for the assessed project.

LE 05 – Long term impact on biodiversity – 2/2 credits targeted.

- It has been assumed that an ecologist will be appointed and that all work will comply with the relevant legislation.
- It has been assumed that a landscape and habitat management plan will be produced.
- It has been assumed that additional measures will be adopted.

Long term impact on biodiversity – 2/2 credits targeted.

1. 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 refurbishment or fit-out process.
2. 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 42020:20131 Section 11.1. This is to be handed over to the building owner/occupants for use by the grounds maintenance staff.
3. Where additional measures to improve the assessed site's long term biodiversity are adopted (2 additional measures – 1 credit, 4 additional measures – 2 credits), according to Table 70 .

Table 70

Ref	Additional measure
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 refurbishment or fit-out 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, 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.
5	Where flora and/or fauna habitats exist on-site, the contractor programmes site works to minimise disturbance to wildlife. For example, site preparation, ground works, and soft landscape works 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.
6	A partnership has been set up by the design team with a local group that has wildlife expertise (e.g. local Wildlife Trust or similar local body) and the group has: a. Provided advice early in the design process regarding protecting and/or providing habitat for species of local importance on the site. b. Provided advice to ensure the design is in keeping with the local environment. In particular this should draw on their local knowledge of any features or species of ecological interest on or near the site. c. Provided, or will continue to provide, ongoing support and advice to the educational establishment to help them manage, maintain and develop the outdoor space in the longer term. A suitable starting point for discussion with the local wildlife group would be to ask for advice on how to take account of the Local Biodiversity Action Plan (LBAP) in the school/college landscape design.

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of compliance with BREEAM:

1. Holds a degree or equivalent qualification (e.g. N/SVQ level 5) in ecology or a related subject.
2. Is a practising ecologist, with a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting ecology in relation to construction and the built environment including; acting in an advisory capacity to provide recommendations for ecological protection, enhancement and mitigation measures. Examples of relevant experience are: ecological impact assessments; Preliminary Ecological Appraisals (PEA); Phase 2 habitat and fauna surveys; and habitat creation.
3. Is covered by a professional code of conduct and subject to peer review. Full members of the following organisations, who meet the above criteria, are deemed Suitably Qualified Ecologists for the purposes of BREEAM:

    a. Chartered Institution of Water and Environmental Management (CIWEM)
    b. Chartered Institute of Ecology and Environmental Management (CIEEM)
    c. Institute of Environmental Management and Assessment (IEMA)
    d. Landscape Institute (LI)
    e. The Institution of Environmental Sciences (IES)
    f. Royal Society of Biology
    g. Institute of Environmental Sciences

Where requirements 1 and 2 are met, full members of the named organisations can be considered as a SQE for BREEAM on the basis of their membership.
Those who meet requirements 1 and 2 who are not full members may be considered, however the assessor must ensure, and be able to demonstrate, that the ecologist is covered by a professional code of conduct, subject to peer review and that their expertise and experience is appropriate for the assessed project.

7.9 Pollution

This category addresses the prevention and control of pollution and surface water run-off associated with the building's location and use. Issues in this section aim to reduce the building's impact on surrounding communities and environments arising from light pollution, noise, flooding and emissions to air, land and water.

9/13 credits targeted – 0/1 exemplary credits targeted

A good number of credits are targeted under this section, however due to some unknown areas 4 credits are not currently targeted, this could change once more details are known. One of the credits which has not been targeted related to refrigerants, as details are not currently known a conservative approach has been taken. The other 3 credits which haven't been targeted relate to NO_x emissions, as the site is hoping to connect to the university heat network the NO_x emissions will be linked to this, until more details are know no credits have been assumed.

Pol 01 – Impacts of refrigerants – 2/3 credits targeted.

- It is expected that refrigerants will be required. At the moment 2 credits have been assumed but it may be possible to increase this once details are known.

Pre-requisite

2. All systems (with electric compressors) must comply with the requirements of EN 378:2016 and EN 378-2:2016 and where refrigeration systems containing ammonia are installed, the Institute of Refrigeration Ammonia Refrigeration Systems Code of Practice.

Impact of refrigerant – 1/2 credits targeted.

2 credits

Where the systems using refrigerants have Direct Effect Life Cycle CO_2 equivalent emissions (DELC CO_{2e}) of ≤ 100 $kgCO_{2e}$/kW cooling/heating capacity.

OR

4. Where air-conditioning or refrigeration systems are installed the refrigerants used have a Global Warming Potential (GWP) ≤ 10.

1 credit

Where the systems using refrigerants have Direct Effect Life Cycle CO_2 equivalent emissions (DELC CO_{2e}) of ≤ 1000 $kgCO_{2e}$/kW cooling/heating capacity.

Leak detection – 1/1 credits targeted.

6. Where systems using refrigerants have a permanent automated refrigerant leak detection system installed; OR where an inbuilt 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

For installations of small multiple hermetic systems only where the refrigerant charge in each unit is less than 6kg, the credit for leak detection and containment can be awarded by default. This is on the basis that the risk of a large refrigerant leak due to system failure is minimised, as individual leaks from each system will be small where leakage occurs, and therefore there is little life cycle benefit of requiring leak detection equipment on each small system.

Note: solutions such as this may be less energy efficient and as such may impact on the achievement of credits under Ene 01.

Pol 02 – NO_x emissions – 0/3 credits targeted.

- The development hopes to connect to the existing university het network, until further details are known no credits have been assumed.

NO_x emissions – 0/3 credits targeted.

1. Where the plant installed to meet the building's delivered heating and hot water demand has, under normal operating conditions, a NO_x emission level (measured on a dry basis at 0% excessO_2) as follows:

NO_x Emission levels for heating and hot water (mg/kWh)	Credits
≤ 100 mg/kWh	**1**
≤ 70 mg/kWh	**2**
≤ 40 mg/kWh	**3**

Where the water heating can be demonstrated to be less than 10% of the building's total regulated operational energy demand, these credits can be awarded based solely on the NOx emissions from space heating.

Pol 03 – Flood risk management and reducing surface water run-off – 5/5 credits targeted – 0/1 exemplary credit

- It has been assumed that the site has a low flood risk.
- It has been assumed that a surface water engineer will be appointed and run-off targets will be met.
- It has been assumed that pollution prevention measures will be implemented.

Flood risk management – 2/2 credits targeted

Low flood risk

1. Where flood maps from the appropriate statutory body confirm the refurbishment or fit-out is situated in a flood zone that is defined as having a low annual probability of flooding; OR
2. The project meets the requirements for avoidance of flooding in accordance with Checklist 1, 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.

OR

Medium/high flood risk

3. Where criterion 4 and either criterion 5 or 6 have been met
4. 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 Flood Risk Assessment (FRA) has been undertaken. The FRA must take all current and future sources of flooding into consideration in accordance with compliance note.
5. 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

OR

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 1.

6. 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:

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.

The FRA must detail the risk of flooding from the following sources:

1. Fluvial (rivers)
2. Tidal
3. Surface water: sheet run-off from adjacent land (urban or rural)
4. Groundwater: most common in low-lying areas underlain by permeable rock (aquifers)
5. Sewers: combined, foul or surface water sewers
6. Reservoirs, canals and other artificial sources.

The content of the FRA should be based on historic trends, but should also account for predicted changes to the climate which may impact on the flood risk to the site in the future.

For refurbishment or fit-out projects of less than 10,000 m^2, the level of detail required in an acceptable FRA will depend on the size of the refurbishment or fit-out and level of flood risk. This will range from a brief report for small developments, to a more detailed assessment for a larger development of 2000–10,000 m^2.

Flood resilience strategy
This should be a full report carried out by a ‘Suitably Qualified Building Professional’ (see Relevant definitions) detailing appropriate solutions for the site and making clear recommendations on appropriate flood resilience actions/specifications. This should also include the preparation of a flood emergency plan in accordance with 'Would your business stay afloat? A Guide to preparing your business for flooding', Environment Agency, 2011
All recommendations made by the consultant must be implemented in order for the refurbishment to comply.

The report must have considered as a minimum:

- Appropriate method of protection depending on flood level, i.e. water exclusion or water entry strategy
- Structure
- Floors
- Walls
- Electrics
- Fixed furniture
- Doors and windows
- Removal of debris

Third party defences
There are many landscape feature defences, owned by third parties, which due to their location act as a flood defence by default, e.g. motorway, railway embankments, walls etc. It can be assumed that such embankments will remain in place for the lifetime of the site, unless the assessor or project team have reason to believe otherwise. For walls, assurance must be sought that the wall is likely to remain for the design life of the building.

Pre existing flood defences
In an area protected by existing flood defences (designed to withstand a certain magnitude of flooding) the appropriate number of flood risk credits can be awarded where the defences reduce the risk to 'low' or 'medium' and the following conditions are met:

1. The site is not located in an area where new flood defences have to be, or have been, constructed to minimise the risk of flooding to the site and its locality purely for the purpose of the site and/or its wider master plan.
2. The relevant agency confirms that, as a result of such defences, the risk of a flood event occurring is reduced to low or medium risk. If firm confirmation is not provided then the credit cannot be awarded.

A statutory body's local/regional office may be able to provide more information on existing defences in the area in which the assessed site is located.

Surface water run-off – 2/2 credits targeted

One credit – neutral impact on surface water
7. There is no increase in the impermeable surfaces as a result of the refurbishment works; OR
8. 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.

OR

Two credits – reducing run-off
9. An Appropriate Consultant has been used to design an appropriate drainage strategy for the site.
10. Either of the following criteria are met:

a. There is a decrease in the impermeable area by 50% or more, from the pre-existing impermeable hard surfaces; OR
b. 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.

Drainage designs for sites must take into account legislation relating to contaminated sites; however in many circumstances even on contaminated sites there may be opportunities for the installation of some SuDS techniques.

Minimising water course pollution – 1/1 credits targeted

11. 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).
12. Where suitable pollution prevention measures are put in place (or already exist) for the different sources of pollution present on the assessed site.
13. A comprehensive and up to date drainage plan of the site will be made available for the building/site occupiers.
14. Relevant agreements for the ownership, long term operation and maintenance of all installed Sustainable Drainage Systems (SuDS) are in place, or for speculative projects, made available for the future occupier.

Pol 04 – Reduction of night time light pollution – 1/1 credits targeted.

- It has been assumed that external lighting will be required and will be designed to meet the BREEAM criteria.

Reduction of night time light pollution – 1/1 credits targeted.

1. Where external lighting pollution has been eliminated through effective design that removes the need for external lighting without adversely affecting the safety and security of the site and its users. OR alternatively, where the building does have external lighting, one credit can be awarded as follows:
2. The external lighting strategy has been designed in compliance with Table 2 (and its accompanying notes) of the ILP Guidance notes for the reduction of obtrusive light, 2011. Buildings located in Scotland must comply with the light pollution criteria in the guidance note 'Controlling Light Pollution and Reducing Lighting Energy Consumption'. This can be demonstrated via completion of the checklists in Annexes B and C of the guidance note by a relevant member of the design team.
3. All external lighting (except for safety and security lighting) can be automatically switched off between 23:00 and 07:00.

4. If safety or security lighting is provided and will be used between 23:00 and 07:00, this part of the lighting system complies with the lower levels of lighting recommended during these hours in Table 2 of the ILP's Guidance notes.
5. Illuminated advertisements, where specified, must be designed in compliance with ILP PLG 05 – The Brightness of Illuminated Advertisements.

Pol 05 – Noise attenuation – 1/1 credits targeted.

- It has been assumed that a noise impact assessment will be carried out and any necessary attenuation will be installed.

Reduction of noise pollution – 1/1 credits targeted

1. Where there are, or will be, no noise-sensitive areas or buildings within 800m radius of the assessed site.
OR
2. Alternatively, where the building does have noise-sensitive areas or buildings within 800m radius of the site, one credit can be awarded as follows:
    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. The existing background noise levels shall not include existing plant associated with the assessed building.
        II. The rating noise level resulting from the new noise source.

3. 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.
4. 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.
5. 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.

Landscapes or buildings where the occupiers are likely to be sensitive to noise created by the new plant installed in the assessed building, including:

1. Residential areas
2. Hospitals, health centres, care homes, doctor's surgeries etc.
3. Schools, colleges and other teaching establishments
4. Libraries
5. Places of worship
6. Wildlife areas, historic landscapes, parks and gardens
7. Located in an Area of Outstanding Natural Beauty (AONB) or near a Site of Special Scientific Interest (SSSI)
8. Any other development that can be considered noise-sensitive.

Suitably qualified acoustician
An individual who holds a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acousticians in the UK is the Institute of Acoustics.