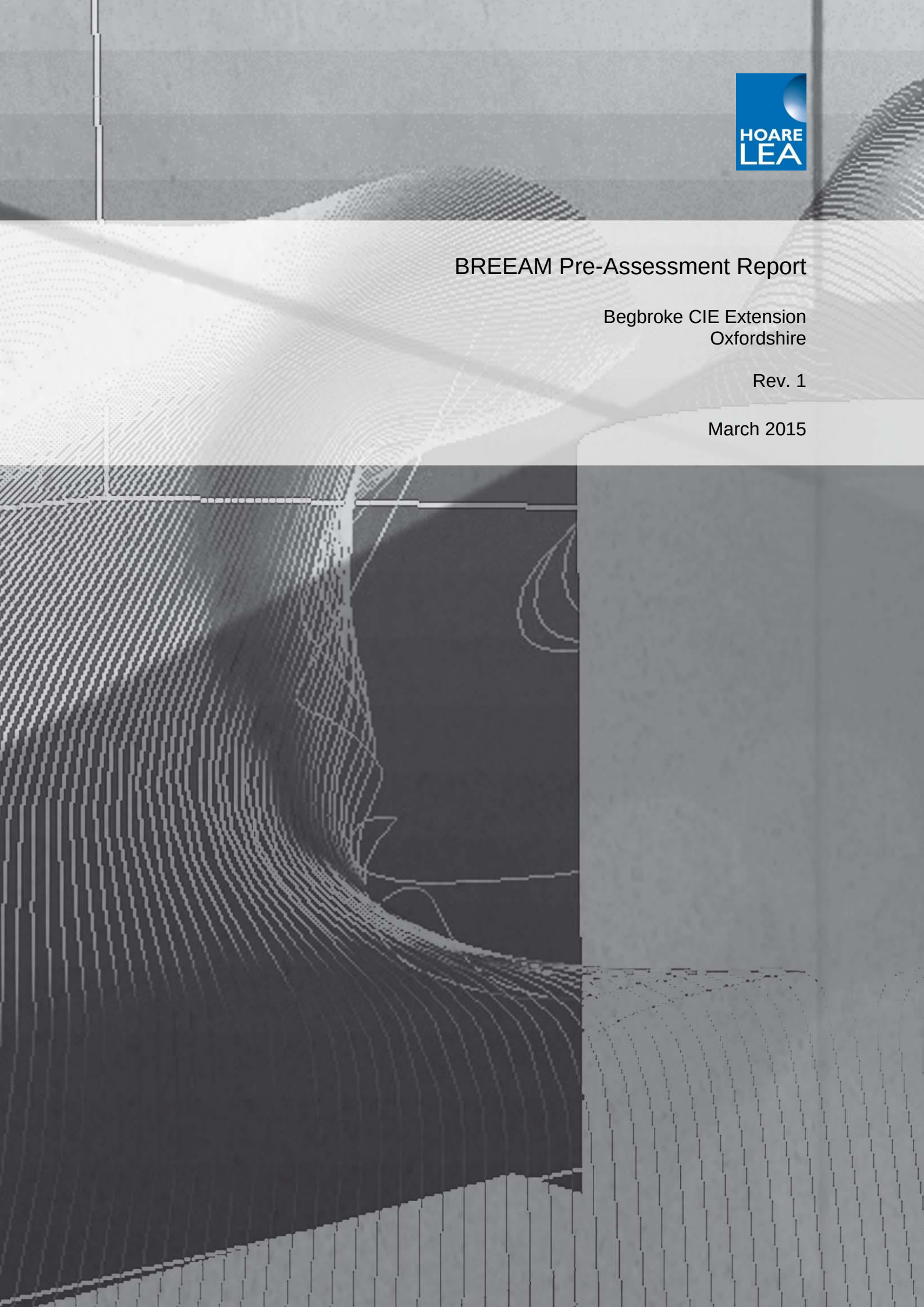

BREEAM Pre-Assessment Report

Begbroke CIE Extension
Oxfordshire

Rev. 1

March 2015

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Audit Sheet

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Document Control

Project Name	Begbroke CIE Extension
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Project No.	15/20483
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BREEAM Version	BREEAM 2014 New Construction (SD5076 Version 3.0)
Building Type and Sub-group	Office Fit Out with research and development areas
BREEAM Reference no.	TBC
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CONTENTS

1.0 Executive Summary

The Begbroke CIE building, located in Begbroke Science Park, is an existing laboratory building owned by the University of Oxford. An extension to this building is being planned comprising predominantly of flexible laboratory and office spaces.

The project has an aspiration to achieve a BREEAM *Excellent* rating in line with the University's sustainability policy for new buildings. This document reviews the potential of the project to achieve credits under the 2014 BREEAM New Construction assessment methodology.

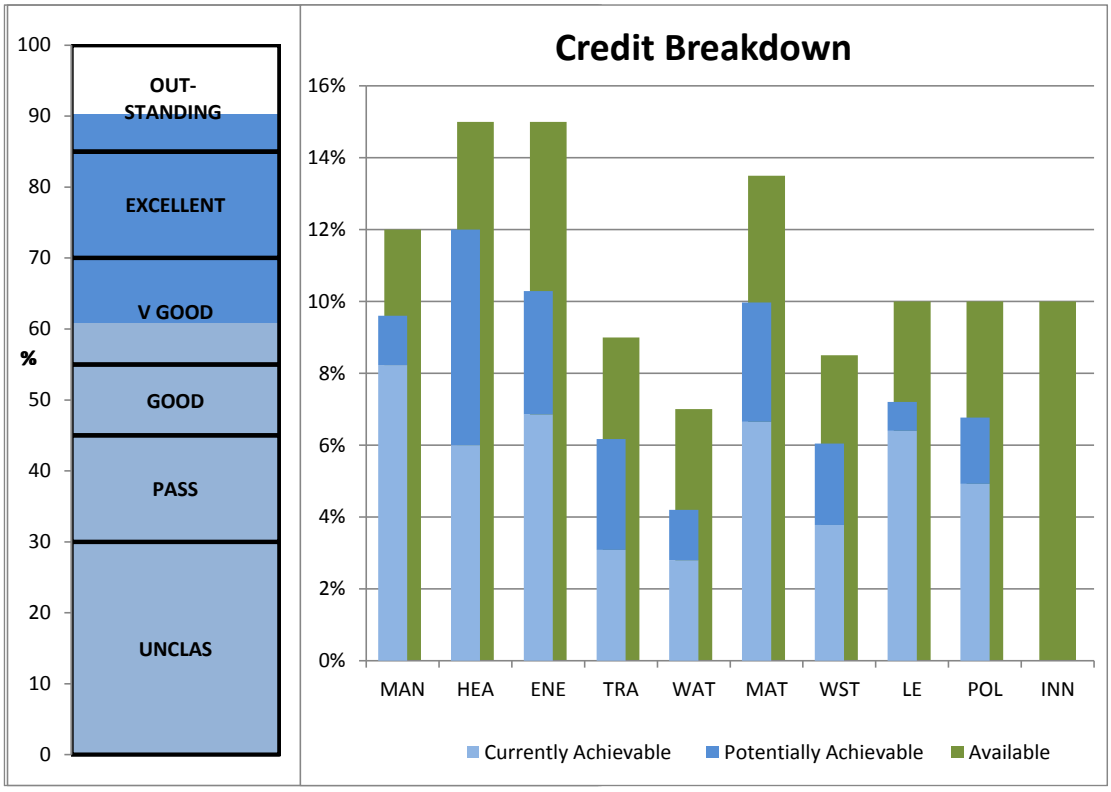


Figure 1. The scoring matrix is shown above and general conclusions from the body of the report are listed below.

- The baseline score of **60.90%** exceeds a **Very Good** rating by 5.90% but is 9.10% below the **Excellent** rating bench mark.
- 36 further credits have been identified as opportunities that could be targeted, the equivalent of 29.40%, which would uplift the overall score to a maximum potential score of **90.30%.**
- During Stage D of the design process, the chosen opportunity credits to exceed the 70% target of a BREEAM Excellent rating shall be confirmed.
- The mandatory criteria for an Excellent rating must be met in order for the building to achieve the desired rating, regardless of the overall percentage score.

2.0 BREEAM Background

BREEAM (Building Research Establishment's Environmental Assessment Method) is a holistic measure of sustainability of both new and refurbished non-domestic buildings. BREEAM is the world's leading and most widely used environmental assessment method for buildings, with over 115,000 buildings certified and nearly 700,000 registered. It sets the standard for best practice in sustainable design and has become the de facto measure used to describe a building's environmental performance. The operation of BREEAM is overseen by an independent Sustainability Board, representing a wide cross-section of construction industry stakeholders.

Aims of BREEAM:

- To mitigate the impacts of buildings on the environment
- To enable buildings to be recognised according to their environmental benefits
- To provide a credible, environmental label for buildings
- To stimulate demand for sustainable buildings

Objectives of BREEAM:

- To provide market recognition to low environmental impact buildings
- To ensure best environmental practice is incorporated in buildings
- To set criteria and standards surpassing those required by regulations and challenges the market to provide innovative solutions that minimise the environmental impact of buildings
- To raise the awareness of owners, occupants, designers and operators of the benefits of buildings with a reduced impact on the environment
- To allow organisations to demonstrate progress towards corporate environmental objectives

BREEAM Assessment Methodology

BREEAM covers ten categories of sustainability. Each category is detailed in this Scheme Document and consists of a number of issues (table 1). Each issue seeks to mitigate the impact of a new or refurbished building on the environment by defining a performance target and assessment criteria that must be met to confirm the target has been achieved.

Table 1. Summary of BREEAM Sections

Management • Commissioning • Construction site impacts • Security	**Waste** • Construction waste • Recycled aggregates • Recycling facilities
Health and Wellbeing • Daylight • Occupant thermal comfort • Acoustics • Indoor air and water quality • Lighting	**Pollution** • Refrigerant use and leakage • Flood risk • NO_x emissions • Watercourse pollution • External light and noise pollution
Energy • CO_2 emissions • Low or zero carbon technologies • Energy sub metering • Energy efficient building systems	**Land Use and Ecology** • Site selection • Protection of ecological features • Mitigation/enhancement of ecological value
Transport • Public transport network connectivity • Pedestrian and Cyclist facilities • Access to amenities • Travel plans and information	**Materials** • Embodied life cycle impact of materials • Materials re-use • Responsible sourcing • Robustness
Water • Water consumption • Leak detection • Water re-use and recycling	**Innovation** • Exemplary performance levels • Use of BREEAM Accredited Professionals • New technologies and building processes

Credits are awarded in ten categories according to performance. These credits are then added together to produce a single overall score on a scale of Pass, Good, Very Good, Excellent and Outstanding.

The performance targets go beyond the minimum standard needed to satisfy Building Regulation or other legislation. The targets represent good or best practice in the field of sustainable design and procurement.

3.0 Mandatory Credits

The final classification of a project is based not only on the overall percentage scored but also achieving numerous mandatory credits and completing reports/surveys for some credits before key project milestones. For example, a project cannot achieve a classification of Excellent without achieving the credits in the highlighted column below, regardless of the percentage score achieved. The table and list below details these requirements;

Table 2: List of mandatory criteria to achieve Very Good and Excellent BREEAM ratings

Mandatory Credit Requirements		
BREEAM issue	***VERY GOOD***	***EXCELLENT***
MAN 03: Responsible Construction Practices	None	One credit
MAN 04: Commissioning & Handover	Criterion 9 only	Criterion 9 only
MAN 05: Aftercare	None	One credit
ENE 01: Reduction of energy use & CO_2 emissions	None	Five credits
ENE 02: Energy monitoring	One credit	One credit
WAT 01: Water consumption	One credit	One credit
WAT 02: Water monitoring	Criterion 1 only	Criterion 1 only
MAT 03: Responsible sourcing of materials	Criterion 3 only	Criterion 3 only
WST 03: Operational waste	None	One credit
LE 03: Minimising impact on existing site ecology	One credit	One credit

Currently, the Begbroke CIE Extension scheme is targeting all mandatory credits to achieve an Excellent rating whilst also meeting the energy performance of an Outstanding-rated building, i.e. 8 credits under ENE01. This credit does not refer to the building's EPC score, and as such is a more complex scoring methodology, requiring thermal modelling. Instead of the EPC, it is the building's energy and carbon breakdown on the Part L BRUKL document that is used. Further details are in Appendix 1.

4.0 University of Oxford Core Credit Matrix

The University of Oxford aims to achieve Excellent BREEAM ratings for all new constructions and refurbishments. Going beyond the BREEAM Mandatory criteria, the Core Credit Matrix has been developed by Oxford University Estates Services (OUES) as part of the University's sustainability strategy for its building portfolio. The scheme gives all credits within BREEAM a classification of *mandatory*, *priority* or *beneficial*.

To ensure the majority of mandatory credits have been targeted, and all priority credits are treated accordingly, an edited version of the Core Credit Matrix is included in Appendix 2 which demonstrates the credits assigned at the pre-assessment stage alongside the matrix's classifications. Table 3 summarises the number of mandatory, priority and beneficial credits that have been considered 'Targeted' and 'Potential' credits at the pre-assessment stage.

Table 3. Summary of Core Credit Matrix

Pre-assessment Credits	Mandatory	Priority	Beneficial
Targeted	32	18	5
Potential	9	10	6
Not Applicable	2	3	1
Not Targeted	0	2	1

5.0 Assessment Tracking and Management

For all BREEAM assessments performed by Hoare Lea an online tracker system, IES TaP, is used throughout the assessment process. IES TaP for BREEAM is a BRE Global approved, secure online collaborative portal for managing the evidence gathering and credit tracking process for BREEAM assessments. It has been designed to manage all the evidence in one place, allowing for effective collaboration with the whole project team working towards certification.

Once the Pre-assessment has been carried out, the entire assessment is set up on IES TaP and each credit is classified as either 'targeted', 'potential' and 'not targeted'. Credit evidence requirements are then assigned to the relevant team member, enabling each member to manage their responsibilities and directly upload evidence. For each credit, IES TaP provides the specific information pages from the BREEAM Manual and gives concise details of the format and contents of the criteria requirements. The project dashboard and reporting gives real-time project status, progress and control.

IES TaP manages the assessment process directly through to BRE for QA and BREEAM certification. Based upon compliant evidence received at the Design Stage, an Interim BREEAM certificate is issued. However, this rating is superseded by the evidence assessed at Post Construction and a Final certificate is issued.

The usability of the IES TaP web tool is considered simple and is unlikely to require training. However, Hoare Lea can provide query support and arrange briefing sessions for team members if required.

www.iestap.com

6.0 Pre-assessment scoring

Figure 2 and Table 4 (together with further details in Appendix 2) summarise the initial assessment of the Begbroke CIE Extension based upon discussions with the design team at concept stage, concerning the opportunity to achieve each credit.

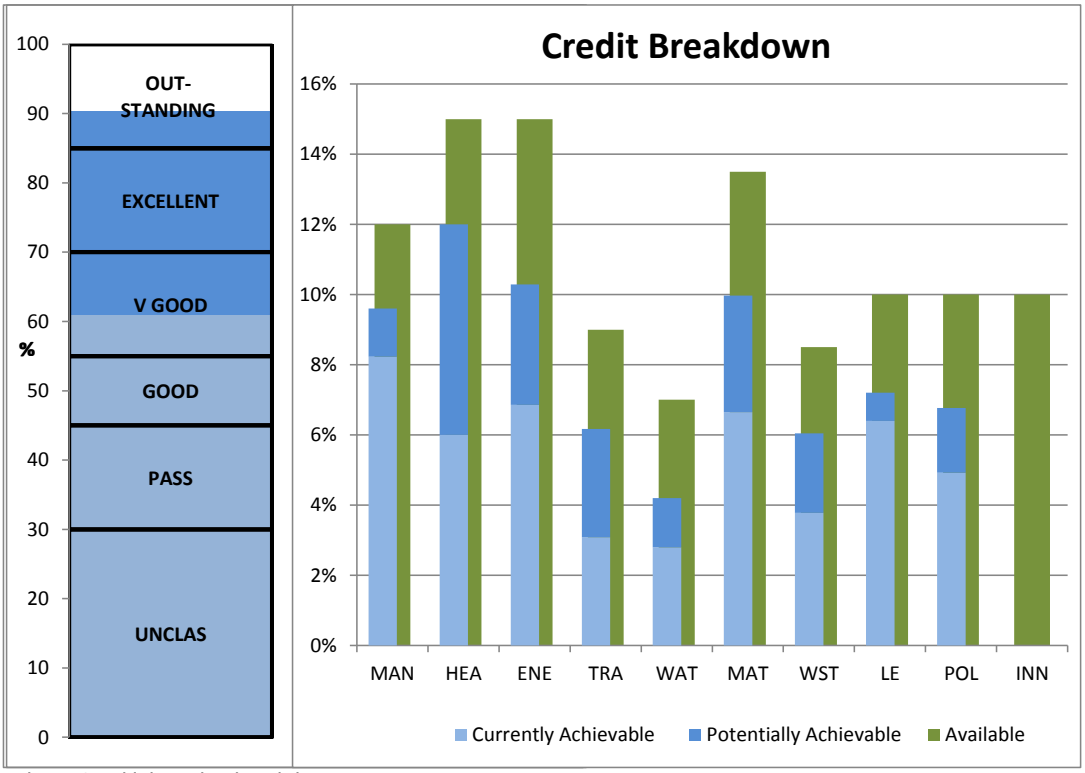


Figure 2: Initial scoring breakdown

Table 4. Initial scoring breakdown

Issue Category	Number of Credits Achieved (a)	Number of Credits Available (b)	Number of Opportunity Credits Potential	Issue Weighting (c)	Weighted Score Achieved (a/b) x c	Potential Opportunity Credits; Additional weighted Score
Management	18	21	3	12%	10.29	1.71
Health & Wellbeing	9	18	9	15%	7.50	7.50
Energy	16	28	8	15%	8.57	4.29
Transport	3	7	3	9%	3.86	3.86
Water	4	8	2	7%	3.50	1.75
Materials	8	13	4	13.5%	8.31	4.15
Waste	5	9	3	8.5%	4.72	2.83
Land use & Ecology	8	10	1	10%	8.00	1.00
Pollution	8	13	3	10%	6.15	2.31
Innovation	0	10	0	10%	0.00	0.00
Total					***60.90***	***29.40***
				Total Potential Score		**90.30%**

The main assessment indicates that a baseline score of 60.90% (**Very Good** rating), and a maximum potential score of 90.30% (**Excellent** rating, as some mandatory credits for an Outstanding rating are not targeted) is achievable for the Begbroke CIE Extension.

7.0 Early-action credits

All credits within BREEAM require early consideration in order to incorporate their requirements into the building design with the greatest ease, and at the lowest cost. There are however some credits that require specific actions, reports and/or surveys to be carried out at an early design stage in order to be achieved. The credits that specifically affect this project are listed in Table 5:

Table 5: List of credits that require early action by the design team

Issue	Description
MAN 1: Project Brief & Design	- Minutes of meetings at briefing stage between client, building occupier, and design team are recorded to identify roles and responsibilities. - Sustainability Champion / BREEAM AP to produce a report setting targets and identifying strategy
MAN 1: Project Brief & Design	A consultation plan must be prepared and includes a timescale and methods of consultation for all stakeholders. There is a specific list of topics that must be covered under BREEAM compliance requirements
HEA 5: Acoustic Performance	An acoustician is appointed to report on external noise sources, the site layout and zoning of the building for appropriate acoustic performance.
HEA 6: Safety and Security	The design team must consult with the suitably qualified security consultant occurred during or prior to the concept design stage (RIBA stage C) or equivalent. Lesley Nesbitt at Oxford University shall be the representative for this project.
ENE 4: Low Carbon Design	An analysis into passive design for reducing the heating and cooling requirements of the building, together with a feasibility study by an energy specialist to establish the most appropriate local (on-site or near-site) low or zero carbon (LZC) energy source for the building/development.
TRA 5: Travel Plan	A site-specific transport survey must be carried out and a travel plan created which considers all types of travel relevant to the building type and users.
POL 3: Surface water run-off	A site specific Flood Risk Assessment must be carried out, regardless of whether site can be deemed to be in a low-risk zone by reviewing the zonal maps on the EA website.
POL 5: Noise Attenuation	An acoustician must be appointed to carry out a pre-construction noise impact assessment in compliance with BS 7445:1991.
ALL	The chosen contractor is either partially or fully responsible for a large percentage of the credits within BREEAM. The rating achieved is therefore heavily dependent on their understanding and acceptance of the various credit requirements. It is recommended to include specific BREEAM clauses in the main contract documentation (not simply state the BREEAM rating targeted).

In some cases, the BREEAM guidance specifically states a design stage (B or C) that the above credits must be completed by, however the intent of these deadlines are to ensure that the conclusions/recommendations of the actions described can be incorporated into the building and development's design, i.e. their effectiveness is not hindered by being commissioned too late in the design process.

Assuming the actions in Table 5 are currently being carried out to comply with BREEAM criteria, their conclusions can be expected to be incorporated into the Begbroke CIE Extension BREEAM scheme.

8.0 Strategy Breakdown

The following sub-sections highlight the building design and construction aspects that have been targeted for BREEAM credits and give an overview of the design team's assumptions/expectations when preparing the pre-assessment. Each section also summarises potential additional credits and outline areas that have been omitted due to applicability, complexity or affordability. As stated in the executive summary, the baseline score does not achieve the desired Excellent BREEAM rating, however there are numerous additional credits classified as 'opportunity' which could be targeted in order to uplift the score.

8.1 Management

MANAGEMENT		
Targeted	***Potential***	***Excluded***
Consultation with stakeholders	Lifecycle costing exercise	None
Good 'Considerate Contractors Scheme' score & site waste management plan	Transport of construction materials and waste	
Component level life cycle cost analysis		
BREEAM AP services		
Pre-completion thermographic survey		
Commissioning and handover		
Seasonal commissioning		
Post-occupancy evaluation		

Most Management credits have been targeted. Capital cost reporting has been included, however lifecycle comparisons for building elements and the completion of a BREEAM-compliant study is significantly more in-depth and has been deemed an opportunity rather than an assumption at this stage. Similarly, the transport of construction waste and materials is considered an onerous credit to achieve due to the efforts required from all logistical distributors.

8.2 Health and Wellbeing

HEALTH & WELLBEING		
Targeted	***Potential***	***Excluded***
Good internal daylight levels	View out	None
Safety & security consultant services	Glare Control	
Thermal Modelling	Ventilation/Natural Ventilation	
Specification of low Volatile Organic Compound (VOC) Finishes	Thermal comfort adaptability for projected climate change	
Pre-completion Volatile Organic Compound (VOC) Testing	Internal & external lighting levels, zoning & control	
Safe laboratory containment devices and containment areas	Acoustic consultancy services (to achieve internal design criteria)	
Indoor air quality plan		

The acoustic performance credits are to remain an opportunity until an acoustician is appointed. Ventilation and potential for natural ventilation are considered an opportunity dependent on further investigation into the ventilation layouts, the intakes and exhausts locations. The lighting design credit is currently considered a potential as the control strategy requirements of BREEAM are quite onerous and shall be reviewed on first design of the lighting layouts. The visual comfort credits are to be investigated further once room layouts and depths have been finalised.

8.3 *Energy*

ENERGY		
Targeted	***Potential***	***Excluded***
Energy/Carbon Performance equal to 8 credits in ENE01	Best Practice laboratory equipment in line with BREEAM efficiency standards	
Additional energy sub-metering	Energy-efficient lift specification	
Efficient external lighting specification		
Passive design analysis and provision of Low/Zero Carbon Technology		
Energy-efficient specification of all equipment		

Further information regarding the calculation process for ENE01 is included in Appendix 1. A review of the BREEAM standards for laboratory equipment shall be undertaken at the next design stage in order to ascertain whether the two additional credits for efficient laboratory equipment are achievable. The inclusion of a lift and its design and purpose are currently being considered, however all other credits in the energy section have been targeted.

8.4 *Transport*

TRANSPORT		
Targeted	***Potential***	***Excluded***
Dedicated bus service	Changing facilities equal to the minimum required by BREEAM	Accessibility Index
Cycle storage equal to the minimum required by BREEAM	Car parking capacity calculations for site-wide development	Proximity to local amenities
Transport survey and generation of travel plan		

The public transport and amenity credits are assumed to be unlikely to achieve due to the site location, however a dedicated bus service may be provided. Cycle storage facilities shall be included in line with Planning and BREEAM requirements.

There are two credits available for limiting the car parking capacity of the building. The calculation (car parking spaces per building user) should be undertaken for the entire development to see whether the provisions are compliant with BREEAM limits. It is yet to be determined whether the accessibility and provision of changing facilities will meet the BREEAM criteria, therefore these issues have been deemed a 'potential' credit.

8.5 *Water*

WATER		
Targeted	***Potential***	***Excluded***
Low-flowrate water fittings	Rainwater collection systems	Greywater systems
Pulsed output water meters	Minor water leak detection system	
Major water leak detection system (between site boundary and building)		
Sub-metering of water usage		

Most of the water credits have been targeted, however the exact WAT01 score cannot be ascertained until a more detailed stage of design, therefore a conservative estimated has been

used. Efficient fittings specification will reduce the water consumption of the development. A major leak detection system is assumed to be installed, however solenoid values liked to PIR sensors in toilet blocks are not a preferred technology by the University due to previous experience, therefore there is an opportunity to look into alternative minor leak detection solution.

8.6 Materials

MATERIALS		
Targeted	***Potential***	***Excluded***
Building materials with very good 'GreenGuide' ratings	Building materials with excellent 'GreenGuide' ratings	Material efficiency analysis
Building materials with very good responsible sourcing ratings	Building materials with excellent responsible sourcing ratings	
Sustainable procurement plan		
Specification of durability measures on vulnerable internal/external areas	Hard landscaping and boundary protection materials with excellent 'GreenGuide' ratings	

Most of the materials category credits have been targeted, however the exact MAT01 and MAT04 scores (Green Guide ratings and responsible sources of materials) cannot be ascertained until a more detailed stage of design, therefore a conservative estimated has been used.

8.7 Waste

WASTE		
Targeted	***Potential***	***Excluded***
Segregated external recyclable waste storage area	Best practice Site Waste Management Plan (SWMP)	
Good practice Site Waste Management Plan (SWMP)	Analysis of future climate impact on building fabric	
Designed for future adaptability of internal space	High percentage of recycled aggregate in all aggregate uses	

The design team shall set good practice targets for the contractor to meet as part of their site waste management plan, however until appointed, the exact credit breakdown has been estimated. Recycled aggregate is difficult to source especially in compliance with BREEAM criteria, therefore this credit is currently considered an opportunity dependent on further investigation. There is an option to commission an analysis of future climate impact on building fabric, however this is currently considered an opportunity credit.

8.8 Land Use and Ecology

LAND USE AND ECOLOGY		
Targeted	***Potential***	***Excluded***
Landscaping and habitat management plan to manage long term impact on biodiversity	Site classification of 'low ecological value' and 'previously developed'	Site classification of 'contaminated'
Minimal negative impact on ecological value of site		
Protection of the ecological value and features of the site		
Enhancement of the ecological value of the site		
Appointment of an Ecologist		

The site is not expected to be classified as contaminated, although, there is potential for it to be determined as 'previously developed' or having a low ecological value. Some soft landscaping is planned for surrounding areas in the attempt to enhance the ecological value of the site. A long term landscaping and habitat management plan is to be developed with the assistance of an ecologist to act as a Biodiversity Champion for the site post construction.

8.9 Pollution

POLLUTION		
Targeted	***Potential***	***Excluded***
Best practice heating plant specification for NOx emissions	Flood Risk Assessment carried out with suitable remediation measures implemented	Refrigerant leak detection systems.
Specification of Sustainable Urban Drainage (SUD) devices	No refrigerant use/ Good refrigerant GWP	
Suitable drainage attenuation measures implemented		
Acoustic consultancy services (to reduce noise impact on external environment) and suitable attenuation measures implemented		
Site classification of 'low annual probability of flooding'		
Watercourse pollution prevention measures		

The specification of heating plant will comply with BREEAM energy efficiency guidance, and the drainage & attenuation measures on site are expected to be both appropriate and compliant with the relevant credits within this category. The use of refrigerants is yet to be confirmed, however without, the building can achieve an extra three credits. If refrigerants are required, there is potential to achieve one credit by ensuring the refrigerants used have a Global Warming Potential (GWP) ≤ 10.

8.10 Innovation

Exemplary or 'Innovation' credits are achieved by exceeding the compliance criteria in certain credits throughout the main categories of the assessment, however, none of these credits are targeted for this project.

POLLUTION		
Targeted	***Potential***	***Excluded***
None		Exemplary level Considerate Contractors score
		>30% energy contribution from renewable technologies
		Exemplary level Low-flowrate water fittings
		Extensive rainwater harvesting system linked to WC/urinal flushing
		Building materials with exemplary 'GreenGuide' ratings and responsible sourcing ratings
		Exemplary Site Waste Management Plan (SWMP)
		Zero-carbon building performance
		Additional project-specific approved innovations from BRE

9.0 Potential Additional Credits & Costs

Each of the 'opportunity' credits that have been outlined in the Section 8 'Potential' columns are detailed below. Brief descriptions of the criteria requirements are included as guidance, however, reference to the BREEAM manual is recommended for a comprehensive description. This selection of opportunity credits has been determined by the design team to be most achievable for this project.

Table 6: Potential risk credits that could be achieved (subject to a review of any additional design or cost implications)

Issue	Credits	Description
MAN 2	2	Carry out an elemental lifecycle costing analysis in line with the relevant BS standards and BREEAM criteria to pursue the most appropriate solution for the building.
MAN 3	1	Monitor and record data on transport movements and impacts resulting from delivery of the majority of construction materials to site and construction waste from site.
HEA 1	1	Provide users with operable shading devices i.e. blinds in occupied areas, to manage glare.
	1	Carry out view out assessment to determine whether the credit can be achieved.
	1	Ensure the lighting design complies with the relevant BS and CIBSE standards, and the control strategy requirements of BREEAM. The lighting design is expected to comply with the relevant BS and CIBSE standards, the control strategy requirements of BREEAM are quite onerous and shall be reviewed on first design of the lighting layouts.
HEA 2	2	Provide fresh air in to the building in accordance with the criteria of the relevant standard for ventilation. Design ventilation pathways to minimise the build-up of air pollutants in the building. Demonstrate the building ventilation strategy is designed to be flexible and adaptable to potential building occupant needs and climatic scenarios.
HEA 4	1	Ensure the thermal modelling complies with the thermal comfort criteria. If the criteria are not met for the projected climate change environment, ensure the thermal model demonstrates how the building has been adapted, or designed to be easily adapted in the future using passive design solutions.
HEA 5	3	Appoint an acoustician and pursue the recommended measures to ensure the buildings' acoustic performance including sound insulation meet the appropriate best practice standards for its purpose.
ENE 6	3	Calculate the energy consumption in accordance with BS standards and ensure energy efficient features are specified. The lift provision of the building has not been confirmed, therefore the applicability of these credits cannot be determined at present.
ENE 7	5	Pursue best practice energy efficiency measures in laboratory equipment specification, in line with BREEAM technical manual.
TRA 3	1	Install a sufficient number of changing facilities and showers which are accessible by the all building users to promote cycling.
TRA 4	2	Assess the occupancy of all the buildings that the car park will serve and the building's public transport Accessibility Index. Determine the maximum car parking capacity and compare with the BREEAM

		benchmarks. Credits are available for limiting the car parking capacity.
WAT 1	1	Specify best practice water fittings with low flow rates in order to reduce potable water consumption and achieve additional credits in WAT01.
WAT 3	1	Install water leak prevention measures (similar to automated shut off valves to all toilet blocks) such as sensor linked taps/water fittings.
MAT 1	2	Ensure all major building elements (walls, roofs etc.) achieve best practice embodied carbon values in line with the Green Guide rating system.
MAT 2	1	As per MAT01 but for hard landscaping materials.
MAT 3	1	All suppliers of the building materials achieve best practice responsible sourcing credentials i.e. BES 6001 and ISO standards.
WST 1	1	Contractor commits to divert 80% by weight (or 70% by volume) of waste from landfill and aims to produce less than 13.3 m^3 per 100 m^2 (gross internal floor area), or 11.1 tonnes per 100 m^2 of construction waste.
WST 2	1	For 6 element applications, the percentage of highgrade aggregate that is recycled or secondary aggregate, must meet the specified minimum percentage levels (15% - 100%), by weight or volume.
WST 5	1	Commission an analysis of future climate impact (extreme weather scenarios) on building fabric, and specify suitably robust materials.
LE 1	1	An assessment should be carried out to determine whether the site can be classified as 'Previously occupied land' or land of 'low ecological value'.
POL 1	1	The use of refrigerants is yet to be confirmed, however without, the building can achieve an extra three credits. If refrigerants are required, there is potential to achieve one credit by ensuring the refrigerants used have a Global Warming Potential (GWP) ≤ 10.
POL 3	2	Commission a site specific flood risk assessment (FRA) to confirm that the development is situated in a flood zone that is defined as having a low annual probability of flooding. The FRA must take all current and future sources of flooding into consideration.

At the early project stage the design team should target sufficient 'risk' credits to fall within a 5-10% buffer above the desired rating threshold. Therefore, for a desired rating of Very Good, 60-65% should be targeted, and for an Excellent rating, 75-80%.

Credits are inevitably lost due to a variety of reasons throughout design development and construction phases, therefore this safety margin is required to ensure that the desired BREEAM rating is maintained at post-construction stage. This document should be reviewed as the design process develops to pursue a higher score. To identify the most suitable additional credits to target a hierarchy of value to the overall score would help as discussed on the next page.

Table 7: Example weighted exercise to ascertain potential credits to pursue if required

Issue Category	Total number of credits available (a)	Category weighting (b)	Weighted % value per credit (b/a)	Hierarchy of credit values	Cost of additional credits	Credit value per pound spent (%/£)
Waste	6	7.5%	1.250	1	tbc	tbc
Health & Wellbeing	14	15%	1.071	2	tbc	tbc
Land use & Ecology	10	10%	1.000	2	tbc	tbc
Materials	13	12.5%	0.962	4	tbc	tbc
Transport	11	8%	0.727	5	tbc	tbc
Pollution	13	10%	0.769	6	tbc	tbc
Energy	27	19%	0.704	7	tbc	tbc
Water	9	6%	0.667	8	tbc	tbc
Management	22	12%	0.545	9	tbc	tbc

Due to the differing number of issues in each category, combined with the various weightings of the categories towards to the overall score, credits have differing values depending on their category. Table 7 shows that a credit scored in the Waste category is worth over twice that of a credit scored in the management category. Once the capital costs of achieving each of the additional opportunity credit items are known, the cost per % improvement can be calculated, and added to table 7 which would then enable the design team to identify the credits that would incur the lowest additional cost to achieve the desired BREEAM rating.

Some of the items in table 7 will also reduce the energy consumption of the building during its lifespan, or may results in other less quantifiable benefits to the building or its users. Therefore the client may also want to consider the potential payback of the measures suggested rather than simply the capital cost.

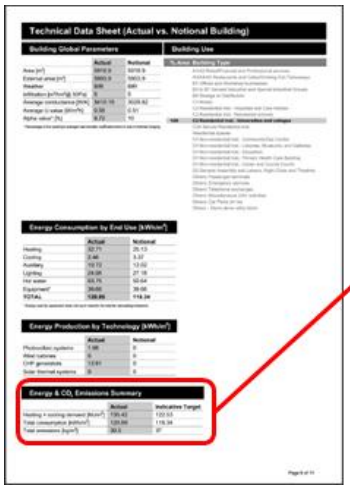
10.0 Conclusion

The baseline score of 60.04% exceeds a **Very Good** rating by 5.04% but is 9.96% below an **Excellent** rating. It is estimated that 36 further credits, the equivalent of 28.54%, are technically achievable but not currently assumed (and would have a varying impact upon cost) which would uplift the overall score to a maximum potential score of 88.59%. Therefore, around half of the opportunity credits are expected to be required to uplift the score to the desired design stage percentage of 75%.

This report reviews the initial pre-assessment exercise outcome and is intended to offer advice as to the strategy by which the design team can ensure the targeted BREEAM rating is achieved. This is a BREEAM 2014 New Construction (SD5076 Version 3.0) assessment. An Interim certification is issued after the Design Stage, however this is superseded by the Final certification which will be awarded after the Post Construction Stage assessment.

11.0 Appendix 1 – Credit ENE01 scoring methodology

Previously under BREEAM 2008, a building's EPC score could be converted directly into points under BREEAM credit ENE01. Under the new BREEAM 2011 New Construction, this calculation procedure has changed and relates to the BRUKL document instead of the EPC. It takes into account three metrics; energy demand, energy consumed and carbon emissions. The performance of the building under these three metrics is compared to the 'notional' building (created by the software when carrying out Part L SBEM calculations). The results are printed on one of the last pages of the BRUKL document shown below.



Energy & CO_2 Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m²]	135.42	122.53
Total consumption [kWh/m²]	120.89	118.34
Total emissions [kg/m²]	30.5	37

The ratio of the actual:notional building in each of these three metrics is added together to form the final score, called the EPR_{NC} (Energy Performance Ratio for New Construction).

The example above shows that whilst the building's CO_2 emissions beat Part L by 17.5% (i.e. 30.5 vs. 37kgCO_2/m²), the building's design demands more energy than the notional building (top row) and the systems consume more energy than the notional building (middle row), therefore the building would score 0 in two out of the three metrics.

The left table below shows how a 17.5% improvement in CO_2 emissions equates to an EPR of 0.1462 (blue box) but the two previous metrics score 0. Therefore the total EPR_{NC} score remains at 0.1462 which equates to only 1 credits (red box) under BREEAM using the conversion table on the right., i.e. it is 0.0038 from 2 credits.

Notional building energy demand	122.53	MJ/m2/annum
Actual building energy demand	135.42	MJ/m2/annum
Notional building energy consumption	118.34	kWh/m2/yr
Actual building energy consumption	120.89	kWh/m2/yr
Target Emission Rate (TER)	37.00	kgCO2/m2/yr
Building Emission Rate (BER)	30.50	kgCO2/m2/yr
Building Emission Rate improvement over TER	17.57%	
Demand Energy Performance Ratio (EPR)	0.0000	
Consumption Energy Performance Ratio (EPR)	0.0000	
CO_2 Energy Performance Ratio (EPR)	0.1462	
Overall Building Energy Performance Ratio (EPR_{NC})	0.1462	

Credits	EPR	Rating
1	0.075	Very Good
2	0.150	
3	0.225	
4	0.300	
5	0.375	Excellent
6	0.450	
7	0.525	
8	0.600	Outstanding
9	0.675	
10	0.750	
11	0.825	
12	0.900	

To achieve BREEAM Excellent requires an overall EPR_{NC} of $\geq$0.375 which achieves 5 credits (green box) which means that the building fabric and systems must play their part too, rather than simply flooding the building with PV panels to meet the CO_2 target.

12.0 Appendix 2 – Core Credit Matrix and BREEAM Pre-assessment Breakdown

BREEAM New Construction 2014 Core Credit Matrix - 1520483 Begbroke CIE Extension, Oxford

Section	Sub section	Credit Tile/Reference	Credits Available	Targeted Credits	Opportunity Credits	Core Category	Mandatory for BREEAM Excellent
Management	Man 01: Project brief and design	Stakeholder consultation (project delivery)	1	1		Mandatory	
		Stakeholder consultation (third party)	1	1		Priority	
		Sustainability Champion (design)	1	1		Mandatory	
		Sustainability Champion (monitoring progress)	1	1		Mandatory	
	Man 02: Life cycle cost and service life planning	Elemental life cycle cost (LCC)	2		2	Beneficial	
		Component Level LCC plan	1	1		Mandatory	
		Capital cost reporting	1	1			
	Man 03: Responsible construction practices	Pre-requisite (all timber used on the project)		Yes		Mandatory	
		Environmental Management	1	1		Mandatory	
		Sustainability Champion (construction)	1	1		Mandatory	
		Considerate construction	2	2		Mandatory	1 credit
		Monitoring of construction site impacts		Yes		Beneficial	
		Utility consumption - Energy consumption	1	1		Beneficial	
		Utility consumption - Water consumption				Beneficial	
		Transport of construction materials and waste	1		1	Beneficial	
		Exemplary level criteria (Considerate construction)	1 Innovation	0	0	Beneficial	
	Man 04: Commissioning and handover	Commissioning schedule and responsibilities	1	1		Mandatory	
		Commissioning and building services	1	1		Mandatory	
		Commissioning building fabric	1	1		Priority	
		Handover	1	1		Mandatory	Criterion 9
	Man 05: Aftercare	Aftercare support	1	1		Mandatory	
		Seasonal commissioning	1	1		Mandatory	1 credit
		Post occupancy evaluation	1	1		Mandatory	
		Exemplary level criteria (activities within the first three years of building occupation)	1 Innovation	0	0		

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Section	Sub section	Credit Tile/Reference	Credits Available	Targeted Credits	Opportunity Credits	Core Category	Mandatory for BREEAM Excellent
Health and Wellbeing	Hea 01: Visual comfort	Daylighting and glare control - Glare control	1		1		
		Daylighting and glare control - Daylighting	1	1		Priority	
		View out	1		1	Priority	
		Internal and external lighting levels, zoning and control - Internal lighting	1		1	Beneficial	
		Internal and external lighting levels, zoning and control - External lighting				Beneficial	
		Internal and external lighting levels, zoning and control - Zoning and occupant control				Beneficial	
		Exemplary level (daylighting and glare control)	1 Innovation	0	0	Beneficial	
	Hea 02: Indoor air quality	Minimising source of air pollution - Indoor air quality plan (IAQP)	1	1		Beneficial	
		Minimising source of air pollution - Ventiliation	1		1	Beneficial	
		Minimising source of air pollution - Volatile organic compound (VOC) emmissions levels (products)	1	1		Beneficial	
		Minimising source of air pollution - Volatile organic compound (VOC) emmissions levels (post construction)	1	1		Beneficial	
		Potential for natural ventilation	1		1	Priority	
		Exemplary level (Volatile organic compound (VOC) emmissions levels (products)	2 Innovation	0	0	Beneficial	
	Hea 03: Safe containment in laboratories	Laboratory containment devices and containment areas	1	1		Priority	
		Buildings with containment level 2 and 3 laboratory facilities	n/a			Priority	
	Hea 04: Thermal comfort	Thermal modelling	1	1		Mandatory	
		Adaptability - for a projected climate change scenario	1		1	Priority	
		Thermal zoning and controls	1	1		Priority	
	Hea 05: Acoustic performance	Sound insulation	1		1	Priority	
		Indoor ambient noise level	1		1	Priority	
		Reverberation times	1		1	Priority	
	Hea 06: Safety and security	Safe access - External site areas	1	1		Priority	
		Safe access - Vehicle delivery access and drop-off areas				Priority	
		Security of site and building	1	1		Priority	

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Section	Sub section	Credit Tile/Reference	Credits Available	Targeted Credits	Opportunity Credits	Core Category	Mandatory for BREEAM Excellent
Energy	Ene 01: Reduction of energy and carbon emmissions	Energy performance	12	8		Mandatory	5 credits
		Exemplary level	5 Innovation	0		Beneficial	
	Ene 02: Energy monitoring	Sub-metering of major energy consuming systems	1	1		Mandatory	1 credit
		Sub-metering of high energy load and tenancy areas	1	1		Mandatory	
	Ene 03: External lighting	External lighting	1	1		Mandatory	
	Ene 04: Low carbon design	Passive design - Passive design analysis	1	1		Mandatory	
		Passive design - Free cooling	1	1		Mandatory	
		Low zero carbon technologies	1	1		Mandatory	
	Ene 05: Energy efficient cold storage	Refrigeration energy consumption	n/a			Mandatory	
		Indirect greenhouse gas emissions				Mandatory	
	Ene 06: Energy efficient transportation systems	Energy consumption	1		1	Mandatory	
		Energy efficient features	2		2	Mandatory	
	Ene 07: Energy efficient laboratory systems	Pre-requisite (Hea 03: criteria 1)		Yes		Mandatory	
		Design specification	1		1	Mandatory	
		Best practice energy efficient measures	up to 4		4	Mandatory	
	Ene 08: Energy efficient equipment	Energy efficient equipment	2	2		Mandatory	
	Ene 09: Drying space	Drying space	n/a			Priority	
Transport	Tra 01: Public transport accessibility	Accessibility Index	n/a			Priority	
		Dedicated bus service	1	1			
	Tra 02: Proximity to amenities	Proximity to local amenities	1	0	0	Priority	
	Tra 03: Cyclist facilities	Cycle spaces	1	1		Mandatory	
		Cycle facilities	1		1	Mandatory	
	Tra 04: Maximum car parking capacity	Car parking capacity	up to 2		2	Priority	
	Tra 05: Travel plan	Site specific travel assessment/statement	1	1		Priority	
		Travel plan				Mandatory	

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Section	Sub section	Credit Tile/Reference	Credits Available	Targeted Credits	Opportunity Credits	Core Category	Mandatory for BREEAM Excellent
Water	Wat 01: Water consumption	Domestic scale water consuming components	up to 5	2	1	Mandatory	1 credit
		Exemplary level	1 Innovation	0	0	Beneficial	
	Wat 02: Water monitoring	Water monitoring	1	1		Mandatory	Criterion 1
	Wat 03: Water leak detection	Leak detection system	1	1			
		Flow control device	1		1		
	Wat 04: Water efficient equipment	Unregulated water demands	n/a			Priority	
Materials	Mat 01: Life cycle impacts	Life cycle impacts	up to 5	3	2	Priority	
		Exemplary level	3	0	0	Beneficial	
	Mat 02: Hard landscaping and boundary protection	External hard landscaping	1		1		
		Boundary protection					
	Mat 03: Responsible sourcing of materials	Pre-requisite (all timber)		Yes		Mandatory	1 credit
		Sustainable procurement plan	1	1		Priority	
		Responsible sourcing of materials	up to 3	2	1	Priority	
		Exemplary level	1	0	0	Beneficial	
	Mat 04: Insulation	Embodied impact	1	1		Beneficial	
	Mat 05: Designing for durability and resiliance	Protection vulnerable parts of the building from damage	1	1			
		Protecting exposed parts of the building from materials degredation					
	Mat 06: Material efficiency	Material efficiency	1	0	0		
Waste	Wst 01: Construction waste management	Construction resource efficiency	3	2	1	Mandatory	Criterion 1
		Pre-demolition audit	n/a			Beneficial	
		Diversion of resources from landfill	1	0	0	Beneficial	
		Exemplary level	2 Innovation	0	0		
	Wst 02: Recycled aggregates	Recycled aggregates	1	0	1	Beneficial	
		Exemplary level	1 Innovation	0	0		
	Wst 03: Operation waste	Operation waste	1	1		Mandatory	1 credit
	Wst 04: Speculative floor and ceiling finishes	Speculative floor and ceiling finishes (office type only)	1	1			
	Wst 05: Adaption to climate change	Adaption to climate change - structural and fabric resilience	1		1	Beneficial	
		Exemplary credit - responding to adaption to climate change	1 Innovation	0	0		
	Wst 06: Functional adaptability	Functional adaptability	1	1		Priority	

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Section	Sub section	Credit Tile/Reference	Credits Available	Targeted Credits	Opportunity Credits	Core Category	Mandatory for BREEAM Excellent
Land Use and Ecology	LE 01: Site selection	Previously occupied land	1		1		
		Contaminated land	1	0	0		
	LE 02: Ecological value of site and protection of ecological features	Ecological value of the site	1	1		Priority	
		Protection of ecological features	1	1		Priority	
	LE 03: Minimising impact on existing site ecology	Change in ecological value 1	up to 2	2		Priority	1 credit
		Change in ecological value 2				Mandatory	
	LE 04: Enhancing site ecology	Ecologist's report and reccomendations	1	1		Priority	
		Increase in ecology value	1	1		Priority	
	Le 05: Long term impact on biodiversity	Suitably Qualified Ecologist	up to 2	2		Priority	
		Landscaping and habitat management plan				Priority	
		Additional measures - Biodiversity Champion				Priority	
		Additional measures - Site workforce training				Priority	
		Additional measures - Record keeping				Priority	
		Additional measures - New ecological habitat valuable and				Priority	
		Additional measures - Contractor programmes site works to minimise disturbance				Priority	
Pollution	Pol 01: Impact of refrigerants	Pre-requisite - Electrical compressors		Yes		Priority	
		Refrigerants	2		1	Priority	
		Leak detection system	1	0	0	Priority	
	Pol 02: NOX emissions	Plant NOX emission level	3	3		Priority	
	Pol 03: Surface water run-off	Flood risk assessment	up to 2		2		
		Surface water run-off	2	2			
		Minimising water course pollution	1	1			
	Pol 04: Reduction of night time light pollution	External lighting	1	1		Priority	
	Pol 05: Reduction of noise pollution	Noise impact assessment	1	1			
		Noise level/attenuation requirment					