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QVS2 Reading
Energy and BREEAM Statement
WA0305-TBA-Q2-XX-RP-N-00002

4th August 2022

JOB
QVS2 Reading

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REPORT
Energy and BREEAM Statement

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Partner

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This report is hereby prepared for and signed off by: -

Company	FCH Architects
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Executive Summary

The energy strategy for the 138-144 Friar Street development has been developed to comply with Building Regulations Part L 2013 and the policies of Reading Borough Council (RBC).

The RBC sustainable Design and Construction SPD 2019 requires new developments above 1000m² to achieve BREEAM Excellent. The development comprises a new building and a refurbishment of a small corner building. It will be assessed as BREEAM 2018 New Construction.

This report assesses the Part L and BREEAM Ene01 energy performance of the development and reports the results of the BREEAM New Construction 2018 pre-assessment.

Low and zero carbon (LZC) measures were assessed and are reported in detail in a separate report [TBA-Q2-XX-RP-N-00003]. The recommendations of the report were integrated into the energy strategy.

In summary, the proposed energy strategy includes:

- + High performing fabric for new build and refurbished elements
- + High performance VRF heat pump heating and cooling
- + Heat pumps for DHW with gas top up
- + MVHR for ventilation
- + High performance LEDs throughout with presence/absence detection and daylight dimming
- + 100m² PV on the roof

The energy performance results are summarised in the table below.

	Energy Savings		CO ₂ Emissions Savings			
	in %	in MWh/year	Part L		SAP10.2	
			in %	in tons CO ₂ /year	in %	in tons CO ₂ /year
After passive design	42%	1328.1	40%	365.9	43%	259.6
After active design	54%	1698.8	62%	559.4	51%	309.7
After LZC	80%	2513.7	68%	618.4	84%	509.9

The proposed energy strategy achieves five Ene01 credits in line with the BREEAM Excellent requirement

1.0 Introduction

The development involves the demolition of existing buildings at 138-143 Friar Street, Reading and the construction of a new hotel building comprising of 163 hotel rooms, restaurant and bar.

2.0 Planning Policies

Building Regulations (England) Part L 2013

The proposed development will be assessed under Part L 2013.

Reading Borough Local Plan (2019)

CC2: Sustainable Design Construction

Proposals for new development, including the construction of new buildings and the redevelopment and refurbishment of existing building stock, will be acceptable where the design of buildings and site layouts use energy, water, minerals, materials, and other natural resources appropriately, efficiently and with care and take account of the effects of climate change.

To meet these requirements:

- + All major non-residential developments or conversions to residential are required to meet the most up to date BREEAM 'Excellent' standards, where possible.
- + All minor non-residential developments or conversions to residential are required to meet the most up to date BREEAM 'Very Good' standard as a minimum.

CC3: Adaption and Climate Change

All developments will demonstrate how they have been designed to incorporate measures to adapt to climate change. The following measures shall be incorporated into development:

- + Wherever possible, new buildings shall be orientated to maximise the opportunities for both natural heating and ventilation and reducing

exposure to wind and other elements.

- + Proposals involving both new and existing buildings shall demonstrate how they have been designed to maximise resistance and resilience to climate change for example by including measures such as solar shading, thermal mass, heating, and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, green walls, etc

CC4: Decentralised Energy

In meeting the sustainability requirements of this plan, developments of the sizes set out below shall demonstrate how consideration has been given to securing energy for the development from a decentralised energy source.

Any development of more than 20 dwellings and/ or non-residential development of over 1,000sqm shall consider the inclusion of decentralised energy provision, within the site, unless it can be demonstrated that the scheme is not suitable, feasible or viable for this form of energy provision.

Sustainable Design and Construction

Supplementary Planning Document (2019)

The Sustainable Design and Construction SPD outlines the requirements for Non-residential development (including development for non-C3 residential) and Non-residential refurbishment (including refurbishment for non-C3 residential) as follows:

- 1) Minor (less than 1,000m² of floorspace) **BREEAM 'Very Good'**
- 2) Major (1,000 m² of floorspace or more) **BREEAM 'Excellent'**

The proposed development comprises 6,286 m² floorspace and will therefore be targeting BREEAM Excellent.

3.0 BREEAM Pre-Assessment

3.1. Introduction

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's leading and most widely used environmental assessment method for buildings. It sets the standard for best practice in sustainable design and has become the industry standard measure used to describe a building's environmental performance. BREEAM is developed, operated, and maintained by BRE Global Ltd and the operation and direction of the method is overseen by an independent Sustainability Board, representing a wide cross-section of construction industry stakeholders. Launched in 1990, to date, BREEAM has been used to certify over 590,000 assessments of buildings across the building life cycle and is being applied in over 89 countries.

The main output from a certified BREEAM assessment is the BREEAM rating. The rating enables comparability between projects and provides reassurance to customers and users, in turn underpinning the quality and value of the asset. The BREEAM ratings range from Acceptable (In-Use scheme only) to Pass, Good, Very Good, Excellent to Outstanding and it is reflected in a series of stars on the BREEAM certificate.

It is understood that a BREEAM of rating of minimum "Excellent" is required for the proposed new building. BREEAM Excellent rated buildings represent the top 10% of all BREEAM certified buildings that demonstrate best practice in sustainability.

3.2. BREEAM Scope and Scheme Definition

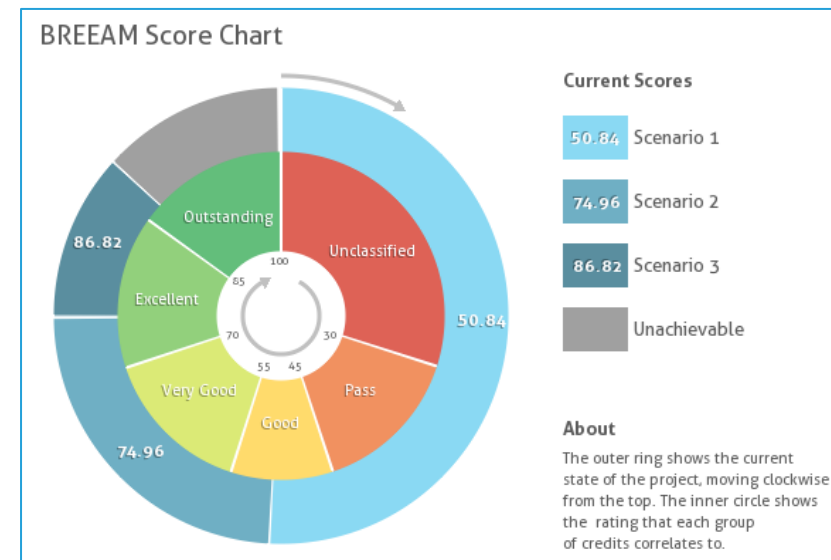
Troup Bywaters + Anders have arranged two BREEAM introduction meetings with the design team on 25th May 2022 and 7th June 2022. A BREEAM Pre-Assessment tracker was developed and shared with the team to collate and record feasibility and aspiration of the different BREEAM requirements. The

following and Appendix A set out a route to achieving the target rating and highlights the outstanding evidence to be provided for each credit.

It is recommended the building should be registered under the BREEAM New Construction 2018 scheme and assessed using the New Construction Residential Institution (short term stay)-hotel criteria. BREEAM New Construction 2018 pre-assessment was carried out for the proposed development to demonstrate how the BREEAM Excellent target can be achieved. The pie chart below shows the achievable scores and the table below shows a summary of the credits under different scenarios.

- + Scenario 1 indicates the credits currently targeted and likely achievable.
- + Scenario 2 shows the Scenario 1 credits and extra credits that can be easily gained to achieve Excellent target through scope change or appointments.
- + Scenario 3 shows a few extra credits that can be won but not easily gained, also achieves Outstanding rating. Note that these options may be costly or produce less benefit than others.

A margin of at least 5% is recommended above the minimum required score to secure the target rating taking into account contingency for design changes and potential constraints identified during the construction stage.



	Total Available Credits	Weighting	Scenario 1	Scenario 2	Scenario 3
Management	21	11%	13	18	21
Health & Wellbeing	18	14%	9	14	16
Energy	25	16%	12	19	19
Transport	12	10%	5	5	5
Water	9	7%	5	6	6
Materials	14	15%	6	11	12
Waste	10	6%	7	7	7
Land Use & Ecology	13	13%	5	10	11
Pollution	12	8%	7	10	11
Exemplary/Innovation	10	10%	1	1	7
Total	144		70	101	115
Score:			50.84%	74.96%	86.82%

Table 1 Summary of credits.

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A BREEAM feasibility report which provides further detail of the feasibility of credits is provided in Appendix A.

4.0 Energy Strategy

This section describes the predicted energy performance and carbon dioxide emissions of the proposed development based on the information provided by the design team.

The methodology set out by the Department of Energy and Climate Change (DECC) for assessing the energy use of is the Simplified Building Energy Model (SBEM). The current version of SBEM utilises out of date Part L2013 SAP2012 carbon factors. The scheme has also been assessed against SAP10.2 Carbon factors in order to present more meaningful figures.

Methodology

Dynamic thermal modelling software IES 2022 was used to determine regulated energy consumption and CO2 emissions under Part L 2013 in accordance with the following energy hierarchy:

- + Step 1: Passive Design Measures
- + Step 2: Active Design Measures
- + Step 3: Decentralised Energy
- + Step 3: Low and Zero Carbon Energy

Performance improvement measures were compared to the Ene04 Standard building base case, i.e., the building before passive design measures. The energy consumption data of the Standard building, as well as all performance improvement steps are shown in Appendix B.

Passive Design Measures

Enhanced 'U' Values

Table 1 shows the proposed U-values for the development:

	Building Element	U-value in W/m ² K
External wall	New Build	0.15
	Refurbished	2.1
Ground Floor	New Build	0.1
	Refurbished	1.2
Roof	New Build	0.1
	Refurbished	0.18
Windows	New Build	1.3
	Refurbished	1.8

Table 1 proposed and retained U-values

Air Tightness

The proposed development will aim to improve upon the Part L 2013 minimum standards for air tightness by targeting an air permeability rate of 5m³/m² at 50Pa (inclusive of Bugle pub).

Reducing the Need for Artificial Lighting

The design of the development incorporates large areas of glazing across all building elevations, to optimise daylight in occupied spaces. Good internal daylight levels will translate to less dependency on artificial lighting and will indirectly deliver energy and carbon savings, together with pleasant, healthy spaces for occupants.

The energy and carbon savings attributed to passive design measures are summarised in Table 2.

Energy Savings		CO ₂ Emissions Savings			
in %	in MWh/year	Part L		SAP10.2	
		in %	in tons CO ₂ /year	in %	in tons CO ₂ /year
42%	1328.1	40%	35.9	43%	259.6

Table 2 energy and carbon savings after passive design measures

Active Design Measures

High Efficacy Lighting

The development intends to incorporate low energy lighting fittings throughout the spaces. All light fittings will be specified as low energy lighting with an average lighting efficacy of 100 lum/W.

Heat Recovery Ventilation

Mechanical ventilation with heat recovery (MVHR) is proposed for all occupied spaces. MVHR units will have 85% heat recovery and average SFPs of 0.9W/l/s.

Heating, Cooling and DHW

A condensing gas boiler is assumed for this scenario. Please see Low and zero carbon energy section for the proposed design strategy for heat generation.

Controls

Advanced lighting and space conditioning controls will be incorporated, specifically:

- + For areas of infrequent use, occupant sensors will be fitted for lighting, whereas day lit areas will incorporate daylight sensors where appropriate; and,
- + Space conditioning will be controlled by time and temperature zone controls

Monitoring

Apart from the above design measures, the development will incorporate monitoring equipment and systems to enable building users to monitor and reduce their energy use.

Where feasible, a BMS system that enables monitoring and reporting of the energy use of the building will be installed.

The cumulative energy and carbon after active design measures are summarised in Table 3.

Energy Savings		CO ₂ Emissions Savings			
in %	in MWh/year	Part L		SAP10.2	
		in %	in tons CO ₂ /year	in %	in tons CO ₂ /year
54%	1698.8	62%	559.4	51%	309.7

Table 3 energy and carbon savings after active design measures

Decentralised heating

As discussed in the LZC study [TBA-Q2-XX-RP-N-00003] Appendix A the application site is located in an area which currently has no DHN, but straddles two of the four town centre clusters where DHN will be prioritised in the future. In line with the Sustainable Design and Construction SPD, space provisions will be made and capped off pipework provided for a future connection to a DHN.

The hybrid VRF system proposed for space heating in the Low and zero carbon section below can be adapted to work with a water-based energy source.

The ASHP for DHW could be replaced by a water-to-water system in due course.

However, as the DHN proposals are at a very early stage with unknown flow temperatures and carbon factors, at present no regulated carbon savings can be calculated in this step.

Low and zero carbon energy

An LZC study has been carried out and is reported in document TBA-Q2-XX-RP-N-00003. The following technologies are recommended in the report:

- + VRF heat pumps for heating and cooling and DHW preheat
- + 100m² PV on the roof

The following technologies were discounted on account of technical or economic issues:

- + Ground source heat pump
- + Biomass
- + Solar thermal
- + Wind turbines
- + District Heating

Following the recommendations of the report, heat pumps and PV were implemented in the design.

Heat pumps

A high efficiency VRF heat pump system will provide space heating (and cooling where required). A separate heat pump will provide the DHW with 10% top up from gas-fired water heaters.

Photovoltaics

An 100m² (22.2 kWp) south-facing array will be mounted on the roof of the building.

The cumulative energy and carbon savings after LZC measures are summarised in Table 4.

	Energy Savings		CO ₂ Emissions Savings			
	in %	in MWh/year	Part L		SAP10.2	
			in %	in tons CO ₂ /year	in %	in tons CO ₂ /year
After VRF	80%	2502,3	68%	610.6	84%	508.4
After PV	80%	2513.7	68%	618.4	84%	509.9

Table 4 Energy and carbon savings after LZC measures

BREEAM Ene01 credits

The proposed building achieves 5 Ene01 credits under BREEAM NC2018.

5.0 Conclusions

Dynamic thermal modelling was undertaken to develop an energy strategy suitable for the needs of the building while also achieving the mandatory credits for a BREEAM Excellent rating.

Table 6 shows the cumulative energy and carbon savings after each step relative to the Ene04 Standard building, leading to achievement of four BREEAM Ene01 credits. The building as designed achieves an improvement over PartL2A of 15.1% (see BRUKL in Appendix C).

	Energy Savings		CO ₂ Emissions Savings			
	in %	in MWh/year	Part L		SAP10.2	
			in %	in tons CO ₂ /year	in %	in tons CO ₂ /year
After passive design	42%	1,328.1	40%	365.9	43%	259.6
After active design	54%	1,698.8	62%	559.4	51%	309.7
After L2C	80%	2,513.7	68%	618.4	84%	509.9

Table 5 Summary of impact of energy performance measures relative to the Ene04 Standard building baseline.

Table 6 shows summarises the design measures taken to achieve the four mandatory Ene01 credits.

Design measure		
Fabric improvements	U value	See Table 1
	Air permeability	
MEP	Heating	VRF system with heat recovery, SCOP5.5
	DHW	90% ASHP with SCOP=2.85, 10% gas-fired water heater, 935
	Cooling	VRF system, SEER=6.5
	MVHR	SFP0.9W/l/s, 85%HR
	Lighting	100lm/W
Renewables	PV	100m ² , 22% efficient, 10° inclination, south-facing

Table 6 Summary of applied energy performance measures

Appendix A – BREEAM Pre-Assessment Tables

Management						
Man 01 - Project brief and design						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Project delivery planning	1	1	1	1	Prior to completion of the Concept Design (RIBA Stage 2), the project delivery stakeholders have met to identify and define roles, responsibilities, and contributions for each key phase of project delivery. The project team has demonstrated how the project delivery stakeholders' contributions and the consultation process outcomes influenced the Initial Project Brief; Project Execution Plan; Communication Strategy and Concept Design. Documents (sustainability brief, meeting minutes, design reports etc.) to be reviewed to determine if the criteria have been met. Design team meeting feedback confirms consultations undertaken. Please refer to the BRE definitions under Man 01. To be undertaken immediately due to the credit's Stage 2 requirement. <u>Suggested design stage evidence:</u> • Consultation plan • Sustainability brief • Roles and responsibilities matrix

2	Stakeholder consultation (interested parties)	1	1	1	1	Prior to completion of the Concept Design (RIBA Stage 2), the design team has consulted with all interested parties on matters that cover the minimum BREEAM consultation content and demonstrated how the stakeholder contributions and consultation exercise outcomes have influenced the Initial Project Brief and Concept Design. Documents to be reviewed to determine if the criteria has been met. If all the consultation content has been covered, all interested parties shall then receive consultation feedback prior to completion of the detailed design (RIBA Stage 4).
3	BREEAM AP (concept design)	1	1	1	1	Appointment of a BREEAM AP required at (RIBA Stage 1) Preparation and Brief Stage to facilitate the formal setting and achievement of BREEAM performance targets for the project during (RIBA Stage 2) Concept Stage. <u>Suggested design stage evidence:</u> • Meeting Minutes • Confirmation Letter
4	BREEAM AP (developed design)	1	1	1	1	Credit requires the above credit to be achieved and ongoing monitoring and support from the BREEAM AP. <u>Suggested design stage evidence:</u> • Meeting minutes • Email communication of progress reports • Confirmation letter
Man 02 - Life cycle cost and service planning						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments

1	Elemental LCC	2	0	0	2	This credit is not targeted for Scenario 1 and 2. Potential for Scenario 3. LCC typically presents a high appointment cost versus the score uplift provided, and benefit of the exercise to the project. An LCC is carried out in RIBA Stage 2 to inform the expected lifecycle cost of the whole building. An outline, entire asset elemental life cycle cost (LCC) plan has to be carried out at Process Stage 2 (equivalent to Concept Design - RIBA Stage 2) in line with 'Standardised method of life cycle costing for construction procurement' PD 156865:2008. <u>Suggested design stage evidence:</u> • Elemental LCC report • Evidence confirming how LCC plan has been used to influence building and systems design
2	Component level LCC options appraisal	1	0	0	1	A component level LCC plan can be developed by the end of Process Stage 4 (equivalent to Technical Design RIBA Stage 4) in line with PD 156865:2008 and includes an OPEX vs CAPEX cost analysis against building fabric , core services, local services and interior finish options. Scenario 3 target due to cost uplift as per previous credit comment.
3	Capital cost reporting	1	1	1	1	The capital cost of the works is reported in £/m2. Cost consultant. <u>Suggested design stage evidence:</u> Capital cost in £/m2
Man 03 - Responsible construction practices						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req 1	Prerequisite - Legally harvested and traded timber	✓	✓	✓	✓	All timber and timber-based products are to be legally harvested and traded timber as per the UK government requirements. The architect has confirmed their adherence to this legal requirement within the design team meeting. The contractor preliminaries are to ensure contractor adherence. Please note this is a mandatory requirement to achieve

						BREEAM certification. <u>Suggested design stage evidence:</u> - Contractors Preliminary Contract - Confirmation letter from Client to confirm the prelim contract has been issued and accepted.
1	Environmental management	1	0	1	1	The principal contractor is to operate a third-party certified ISO 14001, EMAS, or have a BS8555:2003 compliant structure in implementation stage, as well as adhere to PPG6 guidelines on site during all operations. This will be confirmed via the tendering process. <u>Suggested design stage evidence:</u> - Contractors Preliminary Contract - Confirmation letter from Client to confirm the prelim contract has been issued and accepted.
2	BREEAM AP (site)	1	1	1	1	A sustainability champion shall be appointed by the principal contractor to monitor BREEAM targets during construction, handover, and close out stages. Regular site visits at key stages are to be undertaken. The appointed person must be qualified as either a BREEAM AP, or BRE Site Sustainability Manager and listed on the Green Book Live - http://www.greenbooklive.com/search/scheme.jsp?id=172 This will be confirmed via the tendering process. <u>Suggested design stage evidence:</u> - Contractors Preliminary Contract - Confirmation letter from Client to confirm the prelim contract has been issued and accepted.

3	Responsible construction management	2	1	2	2	The Contractor shall achieve all nine Responsible Construction Management items required for one credit. For Excellent, the above is achieved plus at least six further items to achieve two credits. This will need to be included in the Contractor Prelims. Note exemplary achievement of CCS and a FORS Gold certificate for the contractor fleet will meet these requirements. This will be confirmed via the tendering process. <u>Suggested design stage evidence:</u> - Contractors Preliminary Contract - Confirmation letter from Client to confirm the prelim contract has been issued and accepted.
4	Monitoring of construction site impacts	2	1	2	2	The Contractor shall assign responsibility to an individual for setting targets, monitoring, recording and reporting energy use, water consumption and transportation data resulting from all on-site construction processes (and dedicated off-site manufacturing) throughout the build programme. This will be confirmed via the tendering process. <u>Suggested design stage evidence:</u> - Contractors Preliminary Contract - Confirmation letter from Client to confirm the prelim contract

e1	Responsible construction management	1	0	1	1	No credit targeted for Scenario 1. The Contractor shall be required to achieve and robustly demonstrate all nineteen Responsible Construction Management items. Credit is not required but potential to be looked into at the tendering stage for additional performance. <u>Suggested design stage evidence:</u> • BREEAM Contractor Preliminaries • Confirmation letter from Client to confirm the prelim contract
Man 04 - Commissioning and handover						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Prerequisite (Very Good to Outstanding)	✓	✓	✓	✓	Prior to handover, develop two building user guides (see Methodology) for the following users: A non-technical user guide for distribution to the building occupiers. A technical user guide for the premises facilities managers. This will be confirmed via the tendering process.
1	Commissioning - testing schedule and responsibilities	1	1	1	1	Required for Very Good rating: A schedule of commissioning and testing shall be prepared identifying the appropriate standards for all commissioning activities to be conducted. The BMS shall be commissioned in accordance with the BREEAM criteria. The Contractor shall appoint an appropriate project team member to monitor and programme pre-commissioning, and account for the commissioning and testing programme, responsibilities and criteria within their budget and the main programme of works. This will need to be included in the Contractor Prelims. <u>Suggested design stage evidence:</u> • Contractors Preliminary Contract

						• Confirmation letter from Client to confirm the prelim contract has been issued and accepted. • M&E specification/strategic programme or schedule of commissioning
2	Commissioning - design and preparation	1	0	1	1	Suggested for Excellent: A specialist commissioning manager is appointed by the client or the principal contractor during the design stage to undertake design reviews and give advice on suitability for ease of commissioning; provide management input to construction programming; and manage the commissioning, performance testing and handover or post-handover stages. <i>Please note: The SCM is required to be appointed at design stage.</i> <u>Suggested design stage evidence:</u> • Contractors Preliminary Contract • Confirmation letter from Client to confirm the prelim contract has been issued and accepted. • Letter of appointment & scope of work of specialist commissioning manager, if appointed by client at design stage
3	Testing and inspecting building fabric	1	0	1	1	Potential Credit within scenario 2 and 3. Note that this credit may require extensive post construction snagging and remediation if thermographic faults are found within the finished construction works. The mixture of new and existing building elements may present challenges in air testing and infrared scanning. The Contractor shall appoint a suitably qualified professional to complete post-construction testing and inspection to quality-assure the integrity of the building fabric, including airtightness testing and a thermographic survey. Any defects identified during post-construction testing and inspection prior to building handover and close out shall be rectified by the Contractor. Contractor Prelims. <u>Suggested design stage evidence:</u>

						- Contractors Preliminary Contract - Confirmation letter from Client to confirm the prelim contract has been issued and accepted.
4	Handover	1	1	1	1	Required for Very Good: The Contractor shall develop two building user guides and two training schedules for the building occupiers (non-technical) and the premises facilities managers (technical). Prepare two training schedules timed appropriately around handover and proposed occupation plans for the following users: A non-technical training schedule for the building occupiers. A technical training schedule for the premises facilities managers. This will be confirmed via the tendering process. <u>Suggested design stage evidence:</u> - Contractors Preliminary Contract - Confirmation letter from Client to confirm the prelim contract has been issued and accepted. - Letter of confirmation
Man 05 - Aftercare						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Aftercare support	1	1	1	1	The Contractor shall be required to provide aftercare support by having in place operational infrastructure and resources. Additionally, operational infrastructure and resources are required to be established to coordinate the collection and monitoring of energy and water consumption data for a minimum of 12 months once the building is substantially occupied. This can be included in the contractor preliminaries.

						Credit confirmed by TP Bureau via email. <u>Suggested design stage evidence:</u> Commitment letter
2	Commissioning - implementation	1	1	1	1	Required as part of Excellent rating. The Contractor shall appoint an independent specialist commissioning manager over a minimum 12-month period to undertake commissioning responsibilities including: - testing all building services under full load conditions; - carrying out testing during periods of extreme (high or low) occupancy; - interviewing building occupants; - producing monthly reports comparing sub-metered energy performance to the predicted performance; - and re-commissioning systems where necessary. This will be confirmed via the tendering process. <u>Suggested design stage evidence:</u> - Commitment letter
3	Post occupancy evaluation (POE)	1	1	1	1	Confirmed by TP Bureau in the correspondences on 20th June. The client or building occupier can make a commitment that an independent party will be appointed to carry out a post occupancy evaluation (POE) exercise one year after the building is substantially occupied. Client will require to commits funds to pay for the POE in advance. <u>Suggested design stage evidence:</u> Commitment letter
		21	13	18	21	Standard Management Credit Total
		1	0	1	1	Exemplary Management Credit Total
		11.92	6.76	10.36	11.92	% Management Total (Standard + Exemplary)

Health & Wellbeing						
Hea 01 - Visual comfort						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Control of glare from sunlight	1	1	1	1	The Architect shall carry out a glare control assessment to identify areas at risk of glare and justify any areas deemed not at risk of glare. The architect has confirmed that blind will be specified. These are to meet a TV value of less than 10%. The glare control strategy must not increase energy consumption used for lighting. This is achieved by: 1. Maximising daylight levels in all weather, cloudy or sunny 2. Ensuring the use or location of shading does not conflict with the operation of lighting control systems. Credit is typically achieved as requirements for the blinds transmittance value are not onerous. Confirmed as targetable by FCH Architects during the pre-assessment meeting. <u>Suggested design stage evidence:</u> • Manufacturers datasheet for any glare control items/architectural specifications • Glare control assessment
2	Daylighting (building type dependent)	1	0	0	1	Not targeted for Scenario 1 and 2. The current layout of rooms within the hotel general area drawings, and local massing surrounding the site, suggests difficulties in sufficient daylight provision. Some functional areas have restricted daylight. Good practice daylight factors and other criteria are needed to be demonstrated by a daylight study using any of the three available calculation methodologies outlined in the BREEAM Technical Manual. Additional cost to appoint daylight modeller.

3	View out	1	0	0	0	Credit not targeted due to proximity to nearby buildings which means certain areas have less than 10m view out. For reference, the requirements are that 5% of the floor area in 95% of spaces for each relevant building area provides an adequate view out. This is where relevant building areas are within 8m of an external wall which has a window or permanent opening, and the window or opening is 20% of the surrounding wall area. FCH Architect
4	Internal and external lighting levels, zoning and control	1	1	1	1	All internal lighting in all relevant areas of the building will be designed in accordance with the SLL Code for Lighting 2012 and CIBSE Lighting Guide 7. All external lighting located within the construction zone shall be specified in accordance with BS 5489-1:2013 and BS EN 12464-2:2014. Internal lighting shall be zoned to allow for occupant control as per the BREEAM manual (in this case, the staff and FM team). Credit determined targetable within the pre-assessment workshop. MEP <u>Suggested design stage evidence:</u> Internal and external lighting plans; calculations, specifications and schedule
e1	Daylighting (building type dependent)	1	0	0	0	Not targeted due to onerous requirements and constraints as stated in prior Hea 01 credits. Relevant building areas would need to meet exemplary daylight factors and exemplary average and minimum point daylight illuminance criteria.
e2	Internal and external lighting levels, zoning and control	1	0	0	0	No credit targeted for any Scenarios. Lighting in each zone will need to be manually dimmed by occupants down to 20% of the maximum light output using dimmer switches positioned in accessible locations. Dimming and control gear should avoid flicker and noise.
Hea 02 - Indoor air quality						

	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Prerequisite - Indoor air quality (IAQ) plan	✓	✓	✓	✓	A site-specific indoor air quality plan has been produced before Concept Design (RIBA Stage 2) and will be implemented in accordance with the guidance in Guidance Note GN06 to minimise indoor air pollution during occupation of the building. Typically provided by the contractor as standard practice. This can be provided by the MEP during design stage. <u>Suggested Design Stage evidence:</u> Indoor air quality plan
1	Ventilation	1	0	1	1	The building shall be designed to minimise the indoor concentration and recirculation of pollutants in the building by providing fresh air; ingress and build-up of air pollutants are to be minimised and HVAC systems where present shall incorporate suitable filtration. Occupation levels and patterns are anticipated to be relatively stable, so CO2 sensors are not considered to be needed. Most of building areas will be naturally ventilated and mechanical ventilation will be installed in toilets, showers and viewing rooms. The ventilation strategy shall provide adequate cross flow of air to maintain the required thermal comfort conditions and ventilation rates in accordance with CIBSE AM10. MEP <u>Suggested Design Stage evidence:</u> - Mechanical services drawings and specifications - File note on ventilation strategy
2	Emissions from building products	2	1	2	2	Three out of the five product types meet Formaldehyde and total volatile organic compounds emission limits and testing requirements for 1 credit and all five product types for 2 credits. This covers all VOC emitting products within the thermal envelope and proven via certificates and datasheets. FCH Architects <u>Suggested Design Stage evidence:</u> VOC product specification

						Proforma confirmation letter
3	Post-construction indoor air quality measurement	1	1	1	1	The Contractor shall undertake post construction (but pre-occupancy) testing to demonstrate emissions levels are within standard limits. Any exceeded values against the benchmark will require remediation. This will need to be included in the Contractor Prelims. <u>Suggested Design Stage evidence:</u> Contractor's Preliminary Contract
e1	Minimising sources of air pollution - Emissions from building products	1	0	0	1	Credit is only targeted in scenario 3 as the stringent level of certification required could easily fail with the introduction of a single non-compliant product. Three of the five product types listed meet the enhanced emission limits, testing requirements and any additional requirements listed.
Hea 04 - Thermal comfort						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Thermal modelling	1	0	1	1	Full dynamic thermal modelling can be carried out using software in accordance with CIBSE AM11 to demonstrate summer and winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design. TB+A can provide this service, appointment is required. MEP <u>Suggested design stage evidence:</u> Thermal comfort report
2	Design for future thermal comfort	1	0	1	1	The thermal modelling above can be used to demonstrate that the temperature ranges are achieved for a projected climate change environment. MEP <u>Suggested design stage evidence:</u> Thermal comfort report
3	Thermal zoning and controls	1	0	1	1	The thermal modelling above can be used to inform the temperature control strategy for the building and its users. The strategy for proposed heating or cooling systems must demonstrate that it has addressed zones within the building; the degree of occupant control required for these zones; how the proposed systems will interact with each other and the need or otherwise for an accessible building

						user actuated manual override for any automatic systems. MEP <u>Suggested design stage evidence:</u> Thermal comfort report
Hea 05 - Acoustic performance						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Acoustic performance	4	3	3	3	A Suitably Qualified Acoustician (SQA), KP Acoustics, has been appointed, to confirm that all performance requirements are met as per Approved Document E 2003 edition, with amendments 2004 and 2010 Resistance to the passage of sound. This will be reconfirmed throughout the design stage. Remedial works shall be undertaken within areas of non-compliance during pre-completion testing. The building design is to ensure that the airborne sound insulation performance; the indoor ambient noise levels; and the control of reverberation and sound absorption standards set out in the following: Airborne sound insulation: values are at least 3 dB higher and impact sound insulation values are at least 3 dB lower than the performance standards in the relevant building regulations or standards. These can be increased to 5 dB for two credits. Indoor ambient noise level: Section 7 of BS 8233:2014 to be met. Room acoustics: Achieve the requirements relating to sound absorption within residential spaces and within the common spaces of the building described in the relevant building regulations or building standards national guidance. Please note: A suitably qualified acoustician (SQA) is one that holds a degree or equivalent in acoustics/sound testing, has 3 years practical experience, and holds a membership with a professional body. <u>Suggested design stage evidence:</u>

						- CV and/or cover letter of the author of the guide demonstrating SQA qualification criteria - Acoustic design guide
Hea 06 - Security						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Security of site and building	1	1	1	1	A Suitably Qualified Security Specialist (SQSS) is needed to conduct an evidence-based Security Needs Assessment (SNA) during or prior to Concept Design (RIBA Stage 2). The SQSS shall develop a set of security controls and recommendations for incorporation into the proposals and these shall be incorporated into proposals and implemented in the as-built development. The scope of measures may consider design and layout; physical security and technological security including the security systems ability to resist cyber-related attack. To be conducted at RIBA Stage 2. Late appointment can still be justified by the SQSS if their works are not impacted by this. Secured by Design would provide most of the SNA required items and is expected as part of the design stages during pre-assessment discussion. The SQSS however will still need to be appointed. <u>Suggested Design Stage evidence:</u> - CV and/or cover letter demonstrating SQSS qualification criteria - SNA minutes/of existing building Drawings and/or specs confirming any recommendations have been incorporated into the design

e1	Security of site and building	1	1	0	0	No credit targeted for any scenarios. A compliant risk-based security rating scheme will need to be used to develop the Security Needs Assessment during or prior to Concept Design (RIBA Stage 2). In this case, the SABRE standard is the only applicable standard, which is typically a further appointment, and still uncommon in the building security market.
Hea 07 - Safe and healthy surroundings						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Safe access	1	0	0	1	Only targeted for Scenario 3. Delivery areas are to meet design standards as within the BRE manual. Limited scope means the credit is to be further investigated for applicability. FCH Architects
2	Outside space	1	1	1	1	A small area on the ground floor is confirmed in the correspondences by TP Bureau on 20th June. An outside space shall be designed to provide building users with an external amenity area. The space must have appropriate seating areas and be non-smoking for users to gather, socialise, relax and connect with the natural environment. The space shall avoid areas that will have disturbances from sources of noise. As discussed in the pre-assessment meeting, the flat roof or part of the side road is potential for further design as an outside space. FCH Architects
		18	9	14	16	Standard Health & Wellbeing Credit Total
		4	1	0	1	Exemplary Health & Wellbeing Credit Total
		17.86	7.93	10.78	13.32	% Health & Wellbeing Total (Standard + Exemplary)

Energy						
Ene 01 - Reduction of energy use and carbon emissions						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments

1	Energy performance	9	4	4	4	Through completing a BRUKL energy report an energy performance improvement progressively better than Building Regulations Part L sufficient to have an $EPR_{NC} > 0.4$ (equivalent to 4 credits). INP file has been provided by the energy modeller and 5 credits have been achieved at this stage. Prerequisite - Relevant members of the design team shall hold a preliminary design workshop focusing on operational energy performance.
2	Prediction of operational energy consumption	4	0	4	4	Additional energy modelling during the design and post-construction stage shall be required to generate predicted operational energy consumption figures. Predicted energy consumption targets by end user, design assumptions and input data shall be reported. A risk assessment will be required to highlight any significant design, technical, and process risks that should be monitored and managed throughout the construction and commissioning process. MEP
e1	Beyond zero net regulated carbon	3	0	0	0	No credit targeted for all scenarios. It is not expected that the building will be able to achieve an EPR_{NC} 0.9 and zero net regulated CO2 emissions.
e2	Post-occupancy stage - Exemplary level criteria	2	0	0	2	Not sought by the client. Scenario 3: Potential to undertake as part of the POE exercise. Heavily weighted credit. Maximum credits in Ene 02 Energy monitoring are required to have been achieved. The client would need to commit funds to pay for the post occupancy stage assessment. This requires an assessor to be appointed and to report on the actual energy consumption compared with the targets set for predicted energy consumption etc.
Ene 02 - Energy monitoring						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments

1	Sub-metering of end use categories	1	1	1	1	Energy metering systems shall be installed so that at least 90% of the estimated annual energy consumption of each fuel is assigned to the end-use categories. The energy consumption shall be metered by end-use category with an appropriate energy monitoring and management system which shall be easily identified by building users. MEP This is likely to be achieved as a matter of standard practice when designing a building to building regulations. The design stage assessor is to review and confirm after design freeze. <u>Suggested design stage evidence:</u> • MEPH Specification covering sub-meters and BMS • Design Schematics • Sub metering strategy/file note
2	Sub-metering of high energy load and tenancy areas	1	1	1	1	Sub-meter per floor plate in large single occupancy or single-tenancy buildings with one homogeneous function. An accessible energy monitoring and management system is provided, covering a significant majority of the energy supply to relevant function areas or departments within the building. It was confirmed that a new BMS will be specified. MEP
Ene 03 - External Lighting						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	External lighting	1	1	1	1	All new external light fittings on the building are required to have an average initial luminous efficacy of not less than 70 luminaire lumens per circuit Watt with automatic control to prevent operation during daylight hours and presence detection in areas of intermittent pedestrian traffic. Emergency light fittings, including security lighting, that are also used for normal operation are assessed for this issue. Non-maintained lighting which only activates in an emergency can be excluded from the assessment of this issue. Decorative lighting and floodlighting are also assessed. MEP <u>Suggested design stage evidence:</u>

						• MEPH Specification covering external lights • Design Schematics
Ene 04 - Low carbon design						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Passive design	2	0	1	1	A Passive design analysis report has been carried out highlighting measures to reduce the total heating, cooling, mechanical ventilation, lighting loads and energy consumption during Concept Design (RIBA Stage 2) Measures are implemented in line with the findings and a reduction in energy demand and emissions is demonstrated. It was confirmed that natural ventilation strategies and daylight sensors will be implemented. Appropriate measures are to be implemented into the building design and the credit awarded at later design stage. MEP <u>Suggested design stage evidence:</u> • Passive design analysis Credit 2 - Free cooling No credit targeted. It's expected that areas of the building will require mechanical services to meet thermal comfort. Free cooling technologies are not being specified within the development.
2	Low and zero carbon technologies	1	1	1	1	The energy specialist has completed an LZC feasibility study to demonstrate that the existing technology is the most appropriate for the assessed building or development. The study seeks to identify any other options to supply a higher proportion of the building's energy demand in addition to that supplied by the existing source. To be compliant, the LZC energy source must continue to provide low carbon energy to existing buildings and provide additional low carbon energy to the new building. It was confirmed that heat pumps will be specified. The results are likely to vary from design changes to the building as RIBA stages progress. As such, credit

						compliance will be awarded at design stage freeze. MEP <u>Suggested design stage evidence:</u> • Feasibility Study • CV for the energy specialist • Results from a dynamic simulation model demonstrating demand reductions from the specified low zero carbon technology
Ene 05 - Energy efficient cold storage						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Refrigeration energy consumption	1	1	1	1	In the case of a dedicated cold room space, integrated into the chiller system of the building, the following specification could be undertaken as part of the Excellent scenarios. Design, install and commission the refrigeration system: 1a: In accordance with the Code of Conduct for carbon reduction in the refrigeration retail sector¹(see Additional information) and BS EN 378-2:20162. 1b: Using robust and tested refrigeration systems or components included on the Enhanced Capital Allowance (ECA) Energy Technology Product List (ETPL)³or an equivalent list (see Components on the ECA Energy Technology Product List for a list of components). 2: Commission the refrigeration plant in compliance with the commissioning criteria in BREEAM issue Man 04 Commissioning and handover. Cold Storage Designer/MEP
2	Indirect greenhouse gas emissions	1	0	1	1	Achieve the first credit. Demonstrate a saving in indirect greenhouse gas emissions (CO₂-eq) from the installed refrigeration system over the course of its operational life.
Ene 06 - Energy efficient transportation systems						

	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Energy consumption	1	1	1	1	Lift energy Assessment has been confirmed by TP Bureau on 20th June. Determine the optimum specification of lifts by analysis of the transportation demand and usage patterns. The energy consumption shall be calculated in accordance with BS EN ISO 25745 Part 2 or Part 3 for at least two types of system. The use of regenerative drives shall be considered and the lowest energy consumption solution specified. Lift consultant <u>Suggested design stage evidence:</u> • Transport systems analysis report • Energy Analysis report • Lift specifications
2	Energy efficient features	1	0	1	1	The lifts specified by the team shall include a standby condition for off-peak periods; the lift car lighting and display lighting shall provide an average luminous efficacy of > 70 luminaire lumens per circuit Watt and use a drive controller capable of variable speed, variable-voltage, and variable-frequency (VVVF) control of the drive motor. Where regenerative drives are demonstrated to save energy they shall be specified. Lift consultant
Ene 08 - Energy efficient equipment						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Energy efficient equipment	2	2	2	2	To achieve this credit it is required that the building's unregulated energy consuming loads are identified and estimate their contribution to the total annual unregulated energy consumption of the building, assuming a typical/standard specification. Further systems and/or processes that use a significant proportion of the total annual unregulated energy consumption of the development and its operation need to be summarised. Normally the client needs to demonstrate a meaningful reduction in the total annual unregulated energy consumption of the building, but that does not apply to hotels. MEP/Client

						<u>Suggested Design Stage evidence:</u> • Total energy load calculation and breakdown of unregulated energy consuming systems/operations • List of Equipment specified and their specifications/datasheets. Example categories include small power/plug in equipment; kitchen and catering; and IT intensive operating areas. 90% of the total unregulated energy load is to be accounted for.
		25	12	19	19	Standard Energy Credit Total
		5	0	0	2	Exemplary Energy Credit Total
		21	7.68	12.16	14.16	% Energy Total (Standard + Exemplary)
Transport						
Tra 01 - Transport assessment and travel plan						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Travel plan	2	2	2	2	A draft travel plan based on a site-specific travel assessment or statement has been developed and issued by Mode Transport to include proposals to increase or improve sustainable modes of transport and movement of people and goods during the building's operation and use. The travel plan will need to be implemented and supported by the building's management in operation.
Tra 02 - Sustainable transport measures						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Pre-requisite	✓	✓	✓	✓	Above credit is achieved.

1	Transport options implementation	10	3	3	3	Building expected to be Type A in the BRE methodology. The calculated AI of the site is 27. Transport measures considered include providing electric recharging station, utilizing the existing accessible amenities and AI, and providing new cyclist facilities. Additional sustainable transport measures are potential to get 2 points, e.g. providing public transport information. FCH Architects/Transport consultant. Implementation of cyclist storage and facilities may increase the score in this section. The building is expected to be Other Buildings - Type A, which would require 1 space for 10 staff.
		12	5	5	5	Standard Transport Credit Total
		0	0	0	0	Exemplary Transport Credit Total
		9.96	4.15	4.15	4.15	% Transport Total (Standard + Exemplary)
Water						
Wat 01 - Water consumption						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Water consumption	5	1	2	2	The building water specification shall be required to implement at least a 25% improvement over the baseline for domestic water-consuming components (WC, basin taps, showers, and kitchenette tap etc.). No greywater or rainwater systems are anticipated. FCH Architects/MEP It is not expected that the Wat 01 credit will achieve higher than 2 credits due to the performance requirements on showers. <u>Suggested design stage evidence:</u> - Sanitary-ware schedule and specifications showing flow rates and number of fittings - Product datasheets

						- Floor plans - Area schedule
e1	Water consumption	1	0	0	0	No credit targeted for all scenarios. The water consumption cannot achieve the 65% improvement criteria without significant low flow sanitary-ware, and harvesting systems.
Wat 02 - Water monitoring						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Prerequisite (Good to Outstanding)	✓	✓	✓	✓	Specify a water meter on the mains water supply to each building. This includes instances where water is supplied via a borehole or other private source.
1	Water monitoring	1	1	1	1	A water meter will be specified on the mains water supply to the building (MANDATORY requirement). Separate sub-meters shall be required on the supply to the following areas where present: areas consuming 10% or more of the buildings total water demand; laundries; supplementary supply of water from a cold-water tank. Each meter (main and sub) shall have a pulsed or other open protocol communication output and connected to BMS, for the monitoring of water consumption. MEP <u>Suggested design stage evidence:</u> - Annotated water schematics - Sub metering strategy and/or specification - BMS Specification
Wat 03 - Water leak detection						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments

1	Leak detection system	1	1	1	1	The building design shall be required to incorporate a leak detection system capable of detecting a major water leak on the utilities water supply within the building and between the building and the utilities water supply. The leak detection system shall be required to be a permanent automated system that alerts the building occupants to the leak; is activated when the flow of water is at a flow rate above a pre-set maximum for a pre-set period of time; programmable and able to identify different flow and therefore leakage rates. MEP <u>Suggested design stage evidence:</u> • Annotated water schematic • Specifications • Product details (Manufacturer datasheet)
2	Flow control devices	1	1	1	1	The building design shall be required to install flow control devices to be installed to groups of 10 rooms rather than to each individual room that regulate the water supply to each WC area or sanitary facility according to demand, in order to minimise undetected wastage and leaks from sanitary fittings and supply pipework. MEP <u>Suggested design stage evidence:</u> • Annotated water schematic • Specifications • Product details (Manufacturer datasheet)
Wat 04 - Water efficient equipment						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Water efficient equipment	1	1	1	1	Identify processes or systems to reduce water demand for items outside of the scope of Wat 01 through either good practice design or specification, a meaningful reduction in the total water demand of the building. This could be irrigation or watering can fed planting. Wat 04 can be scoped out if no items can be identified. FCH Architects/ MEP <u>Suggested Design Stage Evidence:</u>

						• Letter or calculation sheet • Regularly compliance is demonstrated through use of a signed letter, stating that irrigation has not been used
		9	5	6	6	Standard Water Credit Total
		1	0	0	0	Exemplary Water Credit Total
		7.93	3.85	4.62	4.62	% Water Total (Standard + Exemplary)

Materials						
Mat 01 - Environmental impacts from construction products - Building life cycle assessment (LCA)						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Superstructure	6	2	6	6	Comparison with the BREEAM LCA benchmark during Concept Design & Technical Design: 1 credit achievable using BRE simplified tool which will require assessment of the superstructure and inputting of data at RIBA Stage 2 and 4. Option appraisal during Concept Design: 1 credit potential carrying out LCA options appraisal using BRE simplified tool at RIBA Stage 2. For each design option, fulfil the same functional requirements specified by the client and all statutory requirements (to ensure functional equivalency). Integrate the LCA options appraisal activity within the wider design decision-making process. FCH Architects Scenario 2: An LCA is undertaken with superstructure options compared and the resulting carbon emissions are discussed with the design team. An update is made at RIBA Stage 4 comparing specific products within chosen elements. LCA assessor.
2	Substructure and hard landscaping options appraisal during Concept Design (all building types)	1	0	0	1	This credit requires the above LCA options appraisal. Currently not targeted for Scenario 1 and 2 due to cost constraints stated by TP Bureau in the correspondences on 20th June. A substructure assessment is undertaken by the LCA assessor which covers the scope of foundations options and hard landscaping options. Results are given back to the design team.

e1	Core building services options appraisal during Concept Design (all building types)	1	0	0	1	Credit not suggested for LCA due to the time required and increased cost of the more onerous core services credit. Additionally, it's likely the operational requirement for core services will override the embodied energy requirements. During Concept Design (RIBA Stage 2) a building LCA options appraisal of at least 3 significantly different core building services design options would be required.
e2	LCA and LCC alignment (all building types)	1	0	0	1	Credit can only be undertaken after the LCC report has been produced. This report previously has been advised against due to cost vs benefit. It is required to achieve Elemental LCC plan and Component Level LCC options appraisal credits (Man 02 Life cycle cost and service life planning). The design options appraised in the LCA need to be included in the LCC. Integrate the aligned LCA and LCC options appraisal activity within the wider design decision-making process.
e3	Third party verification (all building types) - Exemplary level criteria	1	0	0	1	Currently only targeted for Scenario 2/3 due to cost constraints stated by TP Bureau in the correspondences on 20th June. A suitably qualified third party would need to carry out the building LCAs or produce a report verifying the building LCAs accurately represent the designs under consideration during Concept Design and Technical Design.
Mat 02 - Mat 02 Environmental impacts from construction products - Environmental Product Declarations (EPD)						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Specification of products with a recognised environmental product declaration (EPD)	1	0	1	1	Specify construction products with EPD that achieve a total EPD points score of at least 20, according to the BREEAM calculation Methodology. FCH Architects/Contractor Preliminaries.

Mat 03 - Responsible sourcing of construction products						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Prerequisite	✓	✓	✓	✓	All timber and timber-based products will be legally harvested and traded timber as per the UK government requirements. Contractor preliminaries to ensure contractor adherence. As this is a UK legal procurement requirement, it is likely to be achieved as standard practice. <u>Suggested design stage evidence:</u> - Contractors Preliminary Contract - Confirmation letter from Client to confirm the prelim contract has been issued and accepted.
1	Enabling sustainable procurement	1	1	1	1	A sustainable procurement plan must be in place before Concept Design (RIBA Stage 2) and be used by the design team to guide specification towards sustainable construction products. It must include sustainability aims, objectives and strategic targets to guide procurement activities; include a requirement for assessing the potential to procure construction products locally; and include details of procedures in place to check and verify the effective implementation. As the NC18 literature requires this to be addressed at Stage 1/2, it's suggested the architect and design team collaborate to produce this document.
2	Measuring responsible sourcing	3	1	1	1	The architect shall be strongly encouraged to source materials used in the superstructure (for one credit), internal finishes, substructure, hard landscaping (for two credits) and core building services (For three credits) from certified responsible sources. Products will be required to have BREEAM recognised responsible sourcing certifications scheme (RSCS) certification or environmental management system (EMS) certification. It was confirmed the requirements will be included in the specifications. FCH Architects/Contractor Prelims

						<u>Suggested design stage evidence:</u> • BREEAM contractor preliminaries • Documentary evidence detailing how the tool has been completed (i.e. Certificates, specifications) • Completed Mat03 calculator tool • Material specification and schedules
e1	Measuring responsible sourcing	1	0	0	0	Credit not targeted due to the restrictions this would place on procurement and product selection against existing building design guides for the client. Requires the measuring responsible sourcing scope to include core building services and at least 50% of available points to be achieved.
Mat 05 - Designing for durability and resilience						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Protecting vulnerable parts of the building from damage/material degradation	1	1	1	1	Protection measures will be incorporated into the building's design and construction to reduce damage to the building's fabric or materials in case of accidental or malicious damage occurring. It's expected that both items can be easily addressed during the building design and consolidated into a single narrative. Key exposed building elements will be designed and specified to limit long and short term degradation due to environmental factors. This includes providing convenient access to the roof and facade for cost-effective cleaning, replacement, and repair, and designing the roof and facade to prevent water damage, ingress, and detrimental ponding. FCH Architect/MEP/Structural <u>Suggested design stage evidence:</u> • Specification document • Sketch/mark up/drawings showing vulnerable areas and proposed protective measures • File note describing implemented measures

Mat 06 - Material efficiency						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Material efficiency	1	1	1	1	At the Preparation and Brief and Concept Design stages (RIBA Stages 1 & 2), the Design Team has set targets, opportunities and methods to optimise the use of materials. In Developed Design Stage (RIBA Stage 3) the design team would need to Develop design proposals based on learning from the concept design. From Technical Design stage (RIBA Stage 4) through construction (RIBA Stage 5), the team would be required to develop and record the implementation of material efficiency. The design team has set targets for Stage 1 and 2, therefore it has been targeted for Scenario 1. FCH Architect/MEP/Structural/Contractor <u>Suggested design stage evidence</u> • File note describing opportunities and strategies to optimise the use of material • Design specifications and drawings • BREEAM Contractor Preliminaries
		14	6	11	12	Standard Materials Credit Total
		4	0	0	3	Exemplary Materials Credit Total
		18.98	6.42	11.77	15.84	% Materials Total (Standard + Exemplary)

Waste						
Wst 01 - Construction waste management						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Pre-demolition audit	1	1	1	1	A pre-demolition audit of any existing buildings, structures or hard surfaces being considered for demolition will be required. This aims, in the case of demolition, to maximise the recovery of material for subsequent high grade or value applications. This must be carried out at Concept Design stage (RIBA Stage 2) by a competent person, prior to demolition works. To be undertaken either when prior to demolition contractor appointment, or via the demolition contractor. <u>Suggested design stage evidence:</u> • Pre-demolition audit
2	Construction resource efficiency	3	1	1	1	The Contractor shall be expected to develop a compliant Resource Management Plan (RMP) covering non-hazardous waste materials (from on-site construction and dedicated off-site manufacture or fabrication), including demolition and excavation waste. The Contractor shall be required to meet or improve upon the benchmarks for non-hazardous construction waste, excluding demolition and excavation waste of 11.1 tonnes per 100 m (gross internal floor area. This will be confirmed via the tendering process. Contractor <u>Suggested design stage evidence:</u> • SWMP • BREEAM contractor's preliminaries
3	Diversion of resources from landfill	1	1	1	1	The Contractor shall be required to sort waste materials into separate key waste groups and divert from landfill 80% of non-hazardous construction waste and 90% of demolition waste generated. This will need to be included in the Contractor Prelims.

						Suggested design stage evidence: • SWMP • BREEAM contractor's preliminaries
E1	Construction resource efficiency/Diversion of resources from landfill	1	0	0	0	Credit not targeted due to the onerous requirements for the contractor to meet. A significant increase in contractor cost, programme, and scope expected. Non-hazardous construction waste generated, excluding demolition and excavation waste, will have to be demonstrated to be less than or equal to 1.9 tonnes per 100 m (gross internal floor area) and the following weights diverted from landfill non-hazardous construction (>90%), demolition (>95%) and excavation waste (>95%). Contractor
Wst 02 – Use of recycled and sustainably sourced aggregates						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Prerequisite	✓	✓	✓	✓	A pre-demolition audit of any existing buildings, structures, or hard surfaces in accordance with Wst01 is required to be completed during RIBA Stage 2 .
1	Project Sustainable Aggregate points	1	0	0	0	The Contractor could be requested to identify all aggregate uses, types, and the quantity in tonnes on the project. The region in which the aggregate source is located and the distance in kilometres travelled shall be recorded. The Project Sustainable Aggregate points will then need to be calculated and if > 3.5 would qualify for a credit. This credit is not targeted due to the limitations imposed on sources of aggregates. It can be reviewed at design stage.
E1	Project Sustainable Aggregate points	1	0	0	0	No credit targeted for all scenarios. The Project Sustainable Aggregate Points score will need to meet or exceeds the exemplary level performance benchmark.
Wst 03 – Operational waste						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments

1	Operational waste	1	1	1	1	A dedicated space for the segregation and storage of operational recyclable waste generated shall be required. It is expected the minimum sizing requirement will be met, as the BREEAM requirements are not onerous. This shall be clearly labelled; accessible to building occupants or facilities operators (within 20m); and of a capacity appropriate to predicted volumes of waste that will arise from daily or weekly operational activities. 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 buildings use and operation, the following facilities are provided: Static waste compactor(s) or baler(s); situated in a service area or dedicated waste management space. As organic waste will be produced, a dedicated space is required for segregating food waste for collection. In addition the space will require a washdown tap. FCH Architects <u>Suggested design stage evidence:</u> • Waste strategy • Floor plans showing waste store and bins • Details of signage • Letter of confirmation, if required by assessor
Wst 05 – Adaptation to climate change						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Resilience of structure, fabric, building services and renewables installation	1	1	1	1	The team shall complete a climate change adaptation strategy appraisal using a systematic risk assessment to identify the impact of expected extreme weather conditions arising from climate change on the building over its projected life cycle. Recommendations or solutions based on the climate change adaptation strategy appraisal, must be developed before or during Concept Design (RIBA Stage 2), that aim to mitigate the identified impacts. During Technical Design (RIBA Stage 4) an update demonstrating how the recommendations or solutions

						proposed have been implemented where practical and cost effective would be required. FCH Architects/MEP <u>Suggested design stage evidence:</u> Climate change adaptation strategy appraisal
e1	Responding to climate change	1	0	0	0	Credit not targeted as the Wat 01, Ene 01, and Pol 03 credits are not expected to meet requirement. All of the following credits will need to have been achieved to demonstrate a holistic approach to the design and construction of the building's life cycle to mitigate against the impacts of climate change: - Hea 04 Thermal comfort - Ene 01 Reduction of energy use and carbon emissions - Ene 04 Low carbon design - Wat 01 Water consumption - Mat 05 Designing for durability and resilience - Pol 03 Flood and surface water management
Wst 06 - Design for disassembly and adaptability						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Design for disassembly and functional adaptability - recommendations	1	1	1	1	Before the end of Concept Design (RIBA Stage 2) a study to explore the ease of disassembly and the functional adaptation potential of different design scenarios must be undertaken. Recommendations or solutions based on the study must be developed during Concept Design (RIBA Stage 2), that aim to enable and facilitate disassembly and functional adaptation. FCH Architect/MEP
2	Disassembly and functional adaptability implementation	1	1	1	1	During Technical Design (RIBA Stage 4) the team would be required to provide an update on how the recommendations or solutions proposed have been implemented. The team would also be required to produce a building adaptability and disassembly guide to communicate the characteristics allowing functional adaptability and disassembly. FCH Architect/MEP <u>Suggested design stage evidence:</u>

						- Floor plans with marked up elements showing how the design can be changed - File note at Stages 2 and 4 showing which measures have been identified, and which measures were implemented/omitted
		10	7	7	7	Standard Waste Credit Total
		3	0	0	0	Exemplary Waste Credit Total
		9	4.2	4.2	4.2	% Waste Total (Standard + Exemplary)

Land Use & Ecology						
LE 01 - Site selection						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Previously occupied land	1	1	1	1	At least 75% of the proposed developments footprint is on an area of land which has previously been occupied. Site plan to be used by design stage assessor to confirm credit achieved. It's unexpected any greenfield land will be utilised.
2	Contaminated land	1	0	0	0	Not targeted as the land is expected not to be contaminated. A contaminated land professional undertakes a site investigation, risk assessment and appraisal, which deems that land within the development footprint to be affected by contamination. This report identifies: the degree of contamination, the contaminant sources or types and the options for remediating sources of contamination which present an unacceptable risk. The client or principal contractor confirms that a remediation strategy will be implemented, in line with the report.
LE 02 - Ecological risks and opportunities						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments

Pre-req	Prerequisite - Statutory obligations	✓	✓	✓	✓	At this stage it is not clear if the site can be assessed through Route 1 (Guidance Note GN34 BREEAM Ecological Risk Evaluation Checklist or approved by an ecologist) or if Route 2 (an ecologist required to produce full reports) will be required. The route will dictate the level of work required and the number of available credits. The ecologist has been appointed and the required documents have been confirmed by the client to be available on the week commencing 25.07.2022.
1	Survey and evaluation/Determining ecological outcomes	2	1	2	2	1/2 credit targeted for scenario 1. 2/2 credits potential for scenario 2 and 3. The site is evaluated using the BREEAM Ecological Risk Evaluation Checklist (Guidance Note34) confirming that Assessment route (for sites where ecological opportunities and risks are limited in nature). 2 credits potential if a Suitably Qualified Ecologist (SQE) is appointed to carry out a survey and evaluation for the site early enough to influence site preparation works, layout and, where necessary, strategic planning decisions (typically Preparation and brief stage).The SQEs survey and evaluation determines the sites Ecological baseline. Recommendations and data collected from the survey and evaluation are shared with appropriate project team members to influence decisions made for activities during site preparation, design and construction works, which can support ecological features. The ecologist has been appointed and the required documents have been confirmed by the client to be available on the week commencing 25.07.2022. The early stage ecology report allows for the BREEAM RIBA Stage requirement to be met, and addresses any early risks.
e1	Wider site sustainability - Exemplary level criteria	1	0	0	0	No credit targeted for all scenarios. The credit to 'determine the ecological outcomes for the site' must have been achieved and the wider site sustainability-related activities and the potential for ecosystem service related benefits must also be considered. Requires Hea 07 (both credits) and Pol 03 (credit 2&3) to be achieved and therefore not targeted
LE 03 - Managing impacts on ecology						

	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Prerequisite - Ecological risks and opportunities	✓	✓	✓	✓	Route 2 (an ecologist required to produce full reports) will be utilised to maximise the ecology score on-site. The route will dictate the level of work required and the number of available credits. The ecologist has been appointed and the required documents have been confirmed by the client to be available on the week commencing 25.07.2022.
1	Planning and measures on-site	1	1	1	1	Further planning to avoid and manage negative ecological impacts on-site is carried out early enough to influence the concept design and design brief as well as site preparation planning (typically Concept Design stage). On-site measures for managing negative ecological impacts during site preparation and construction are implemented in-practice. These are based on input from the project team in collaboration with representative stakeholders and data collated as part of the Determining ecological outcomes in LE 02 Ecological risks and opportunities. The ecologist has been appointed and the required documents have been confirmed by the client to be available on the week commencing 25.07.2022.
2	Managing negative impacts	2	0	2	2	No credit targeted for scenario 1. 1/2 credit targeted for scenario 2 and 3. The contractor shall need to avoid negative impacts from site preparation and construction works and losses shall be minimised. This will need to be included in the Contractor Prelim.
LE 04 - Ecological change and enhancement						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Prerequisite - Managing negative impacts on ecology	✓	✓	✓	✓	LE02 and LE03 credits are expected to be achieved. The Contractor shall be required to confirm compliance will be monitored against all relevant UK and EU or international legislation relating to the ecology of the site. This will need to be included in the Contractor Prelims. The ecologist has been appointed and the required documents have been confirmed by the client to be available on the week commencing 25.07.2022.

1	Change and enhancement of ecology / Ecological enhancement	1	0	1	1	Change and enhancement of ecology (Route 1 only): Locally relevant ecological measures have been implemented that enhance the site's ecological value. Ecological enhancement (Route 2 only): Measures have been implemented that enhance ecological value, which are based on input from the project team and SQE in collaboration with representative stakeholders and data collated as part of the Determining ecological outcomes in LE 02. The ecologist has been appointed and the required documents have been confirmed by the client to be available on the week commencing 25.07.2022.
2	Change and enhancement of ecology	3	1	1	2	Only targeted for Scenario 3. It is not expected that a large improvement in site ecology is to be achieved with current site constraints. However, a green wall, roof, or planters may enable a single credit or greater. Ecological value occurring as a result of the project must be calculated in accordance with the process set out in GN36 BREEAM Ecology Calculation Methodology. The ecologist has been appointed and the required documents have been confirmed by the client to be available on the week commencing 25.07.2022.
e1	Change and enhancement of ecology - Exemplary level criteria	1	0	0	0	Not targeted. The change in ecological value calculated under credit 2 above confirms significant net gain has been achieved as set out in GN36 - BREEAM Ecology Calculation.
LE 05 - Long term ecological management and maintenance						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
Pre-req	Prerequisite - Statutory obligations, planning and site implementation	✓	✓	✓	✓	LE02 and LE03 credits are expected to be achieved. The Contractor shall be required to confirm that compliance is being monitored against all relevant UK, EU and international <i>standards</i> relating to the ecology of the site. This will need to be included in the Contractor Prelims.

1	Management and maintenance throughout the project / Landscape and ecology management plan	2	1	2	2	Measures have been implemented to manage and maintain based on from LE 02. These measures must monitor and review the effectiveness of the mitigation and enhancement measures in place for LE03 & LE 04 to ensure they are implemented. A section on Ecology and Biodiversity has been included as part of the tenant or building owner information supplied, to inform the owner or occupant of local ecological features. This should include detailed management and maintenance plans as required by landscape and asset managers. Landscape and management plan: A landscape and ecology management plan, in accordance with BS 42020:2013, covering as a minimum the first five years after project completion will be required to be developed.
		13	5	10	11	Standard Land Use & Ecology Credit Total
		2	0	0	0	Exemplary Land Use & Ecology Credit Total
		15	5	10	11	% Land Use & Ecology Total (Standard + Exemplary)

Pollution						
Pol 01 - Impact of refrigerants						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Impact of refrigerants	3	1	2	2	Prerequisite - The team shall ensure all systems with electric compressors comply with the requirements of BS EN 378:2016 (parts 2 and 3) and refrigeration systems containing ammonia comply with the Institute of Refrigeration Ammonia Refrigeration Systems code of practice. MEP Credit 1 - Impact of refrigerants: The team shall calculate the direct effect life cycle CO2 equivalent emissions (DELCO) and specify a solution of 1000kg CO2-eq/kW or less. A second credit could be awarded if this is below 100kg CO2-eq/kW. MEP Leak detection (Potential second credit choice). The team shall be required to ensure where the refrigerant systems are not hermetically sealed there will be a permanent automated refrigerant leak detection system, or an inbuilt automated diagnostic procedure for detecting leakage, which allow, in the event of a leak, the system to automatically respond and manage the remaining refrigerant charge to limit loss of refrigerant. MEP Condensers will be present. Currently 410a specified with a preference to not include pump down as these typically have large CAPEX, and VRF units are expected to be too small for practical implementation. Potential for R32 refrigerant to be used, or hermetical sealed units to allow a second credit. <u>Suggested design stage evidence:</u> • MEP specification • DELCO calculation • Refrigerant datasheet
Pol 02 - Local air quality						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments

1	Local air quality	2	2	2	2	The majority of heating and hot water is expected to be supplied by non-combustion systems. For example, only powered by electricity. Emissions from all installed combustion plant that provide space heating and domestic hot water are not to exceed the levels set in Table 12.4 and Table 12.5. MEP to confirm all the systems are either primarily electric based or meet NOx levels within the guidance. <u>Suggested design stage evidence:</u> - Boiler/CHP/Heat Emitter/Cooling/Heater schedules - Drawings showing quantity of each item of heating/hot water/cooling equipment - Datasheets and/or manufacturer emails confirming NOx emissions for each piece of equipment OR Letter or calculation sheet calculating the NOx emissions for the development.
Pol 03 - Flood and surface water management						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Flood resilience	2	1	2	2	Prerequisite – a draft site flood risk assessment (FRA) has been carried out by JM Enviro Limited in July 2022. Flood resilience: An FRA report has been produced as part of the planning application. This early stage report shows some mitigation measures to ensure the site flood risk remains low. The main body of the report suggests an overall low flood risk. The design stage assessor is to confirm compliance with the drainage engineer and award credit as appropriate. <u>Suggested design stage evidence:</u> - Flood Risk Assessment report - Letter of confirmation

2	Surface water run-off	2	1	2	2	Assessor at design stage to check whether there is no change in impermeable surface. It is likely this credit can be achieved. A blue roof has been specified at this stage to contribute towards achieving a second credit and addressing run-off requirements at planning stage. Surface water run-off - rate: If drainage measures are specified so that the peak rate of run-off from the site to the watercourses (natural or municipal) shows a 30% improvement for the developed site compared with the pre-developed site. This should comply at the 1-year and 100-year return period events. Relevant maintenance agreements for the ownership, long term operation and maintenance of all specified Sustainable Drainage Systems (SuDS) are in place. Calculations include an allowance for climate change. FRA with drainage calculation and advise measures has been undertaken for planning. Design stage assessor to confirm compliance. Surface water run-off - volume: Flooding will not occur due to local drainage system failure, and drainage is designed so post-development run-off volume is no greater than prior site. This must be for a 100-year 6-hour event with climate change allowances made. Any additional volume of run-off for the event is prevented via SuDS. The drainage engineer can utilise criterion 13-16 if the above is not achieved. <u>Suggested design stage evidence:</u> • Drainage report
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3	Minimising watercourse pollution	1	0	0	1	Scenario 3 only as the credit requirement for no discharge from 5mm can be difficult to achieve. The site shall ensure that there is no discharge from the developed site for rainfall up to 5 mm (confirmed by the appropriate consultant). Areas at risk of pollution runoff require measures to stop pollution from entering waterways (i.e. via a separator). A comprehensive and up to date drainage plan of the site will be made available for the building or site occupiers. Relevant maintenance agreements for the ownership, long term operation and maintenance of all specified SuDS must be in place. All external storage and delivery areas are designed and detailed in accordance with the current best practice planning guidance. <u>Suggested design stage evidence:</u> • Calculation of the 5mm rainfall event from the relevant areas • Calculation results for the pre and post refurbishment volume of run-off • Calculation results for the pre and post refurbishment peak rate of run-off
Pol 04 - Reduction of night time light pollution						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
1	Reduction of night time light pollution	1	1	1	1	The MEP designers shall ensure any external lighting (except for safety and security lighting) shall be designed to be automatically switched off between 23:00 and 07:00. Safety and security lighting design shall comply with the lower levels of lighting recommended during these hours in Table 2 of the ILP guidance notes. Any illuminated advertisements shall be designed in compliance with ILP PLG05 The Brightness of Illuminated Advertisements. MEP
Pol 05 - Reduction of noise pollution						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments

1	Reduction of noise pollution	1	1	1	1	KP Acoustics have been appointed. A BS7445 noise impact assessment has been carried out by the SQA to determine existing background noise at the nearest or most exposed development to the proposed site or a location where background conditions are similar, and the rating noise level resulting from the new source. At this stage, the planning requirement can be met. However, the plant specification is still subject to change, and the credit is to be awarded during the design stage after the plant schedule and any attenuation is finalised. The noise level from the assessed building must be at least 5dB lower than the background noise throughout the day and night. <u>Suggested design stage evidence:</u> • SQA CV
		12	7	10	11	Standard Pollution Credit Total
		0	0	0	0	Exemplary Pollution Credit Total
		7.92	4.62	6.6	7.26	% Pollution Total (Standard + Exemplary)

Innovation						
AI - Approved Innovation						
	Credit	Available	Scenario 1	Scenario 2	Scenario 3	Comments
e1	Approved innovations	1	0	0	0	
		0	0	0	0	Standard Innovation Credit Total
		1	0	0	0	Exemplary Innovation Credit Total
		1	0	0	0	% Innovation Total (Standard + Exemplary)

Appendix B – Energy performance data for the proposed building at every improvement step

Step	Total gas consumption in kWh/m ²	Total Electricity consumption in kWh/m ²	Total energy	Carbon in kg CO ₂ /m ²		Total Carbon in tons	
				Part L	SAP 10.2	Part L	SAP 10.2
Building before passive design	382.6	118.0	3146.0	143.9	96.4	904.2	605.8
Building after passive design	212.8	76.5	1817.9	85.6	55.1	538.3	346.2
Building after active design	213.4	16.9	1447.2	54.9	47.1	344.8	296.1
Building after VRF/HP	21.2	81.2	643.8	46.7	15.5	293.6	97.4
Building after PV	21.2	79.4	632.3	45.5	15.3	285.9	95.9

Appendix C – Excerpts from BRUKL document

BRUKL Output Document HM Government Compliance with England Building Regulations Part L 2013

Project name

QVS2 Green DHW=10% gas

As designed

Date: Tue Jul 05 19:24:51 2022

Administrative information

Building Details

Address: 138 - 144 Friar Street, Reading, RG1 1SY

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.15

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.15

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: TB+A

Telephone number: Phone

Address: 3 Park Place, Cardiff, CF10 3DP

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	53.1
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	53.1
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	45.1
Are emissions from the building less than or equal to the target?	BER <= TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _{value}	U _{value}	U _{value}	Surface where the maximum value occurs*
Wall**	0.35	0.19	2.09	00000018:Surf(2)
Floor	0.25	0.13	1.17	00000018:Surf(0)
Roof	0.25	0.1	0.18	00000018:Surf(1)
Windows***, roof windows, and rooflights	2.2	1.31	1.6	00000024:Surf(1)
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

U_{limit} = Limiting area-weighted average U-values [W/(m²K)]
 U_{calc} = Calculated area-weighted average U-values [W/(m²K)]
 U_{calc} = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.
 ** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
 *** Display windows and similar glazing are excluded from the U-value check.
 N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	5

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	3.02	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	52.98	136.49
Primary energy* [kWh/m ²]	274.98	314.37
Total emissions [kg/m ²]	45.1	53.1

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