

BREEAM FEASIBILITY DESIGN NOTE

9631 – QUEEN VICTORIA STREET

19/01/2021 by Louisa Treadwell, reviewed by FH/SP

The purpose of this document is to explore the viability of achieving the following BREEAM assessment certifications, located within the development at 1-15 Queen Victoria Street & 147-148 Friar Street, within the jurisdiction of Reading Borough Council:

1. A BREEAM Refurbishment and Fit-Out 2014 score of 'Excellent' on the Hotel within the Listed Building;
2. A BREEAM New Construction 2018 score of 'Very Good' on the rear extension, for the apart-hotel within the listed building; and,
3. A BREEAM Refurbishment and Fit-Out 2014 score of 'Excellent' on the rear extension, for retail use within the listed building;
4. A BREEAM New Construction 2018 score of 'Very Good' on the new building for retail use at the rear of the site.

This document responds to policy CC2, within the Sustainable Design and Construction section of the Reading Borough Local Plan. The design note concludes that the measures required for the BREEAM certifications would be overly invasive to the listed building and would result in harm to its historic character, however, this impact has been balanced with as many feasible sustainability measures to ensure the principles of BREEAM are maximised where possible, in place of a formal certification.

INTRODUCTION

The scheme consists of the renovation of a listed building and rear extension to accommodate ground floor retail and a 41-unit apart-hotel on the upper floors.

The refurbishment part of the scheme consists of the renovation of a listed building comprising retail units on the basement and ground floor and an apart-hotel, located on the first, second and third floors. The new element of the scheme includes a rear extension comprising retail units on the ground floor and apart-hotel units located on the first, second and third floors. The listed existing building has ~2,500sqm of floor area and the rear extension will provide and additional ~550sqm of floor area, the new build will provide ~240sqm.

A detailed analysis presented below demonstrates the limitations a Grade II Listed Building has with respects to achieving the required BREEAM compliance, the report also demonstrates the limitations applicable to the rear

extension with respects to BREEAM compliance. Finally the report details the complications with respects to achieving BREEAM certification for the new building for retail use at the rear of the site.

SUSTAINBLE DESIGN AND CONSTRUCTON – READING BOROUGH COUNCIL

The Sustainable Design and Construction (2019) is a supplementary planning document in Reading Borough's development plan, it is intended to supplement the policies of the Local Plan and further details planning requirements related to sustainability and construction.

Policy CC2 - Sustainable design and 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;*
- *All non-residential development or conversions to residential should incorporate water conservation measures so that predicted per capita consumption does not exceed the appropriate levels set out in the applicable BREEAM standard. Both residential and non-residential development should include recycling greywater and rainwater harvesting where systems are energy and cost effective.*

BREEAM REFURBISHMENT AND FIT-OUT 2014 (RFO) & BREEAM NEW CONSTRUCTION 2018 (NC)

BREEAM RFO & BREEAM NC are performance based environmental assessment methods and certification schemes for existing and new buildings. The primary aim of BREEAM is to mitigate the impact of developments on the environment over the entire life-cycle of the building in a comprehensive and cost-effective manner. This is achieved through the integration of the BREEAM scheme at key stages of the design and procurement process.

For developments that are a mix of new-build and refurbishment of existing spaces the choice of scheme selection and application is determined according to the scope of the new-build and refurbishment works. If the development is predominantly a refurbishment with new-build extension, like the retail part of the proposal, then the BREEAM RFO scheme is the most appropriate assessment as it contains thresholds under which a single RFO assessment can be completed. The threshold, as detailed in the BREEAM RFO manual, states that '*where the original building area is greater than 1,000m² but smaller than 2,500m² and the new extension is less than 20% of the original building area*'. However, this threshold has not been met for the apart-hotel part of the proposal, therefore, the refurbished and new spaces should be assessed separately.

Furthermore, as mentioned in the local plan the thresholds for a major and minor development are relevant to the development at Queen Victoria Street. A minor development is defined as a development where the floor space to be built is less than 1,000m².

Table 1 below shows that the apart-hotel renovations is considered a major development as the total area is ~1,450m², similarly the retail renovations and extension is considered a major development as the total area is ~1100m². The other two elements of the proposal are considered minor developments and therefore, should target a 'very good' BREEAM rating.

Finally, the following assessments would be required (see below Table 1 and images for further clarification):

- Hotel: First, second and third floors – RFO assessment (Excellent);
- Hotel: First, second and third floors – NC assessment (Very Good);
- Retail: Basement, ground and first floors – RFO assessment (Excellent); and,

- Retail (new build): Ground and first floors – NC assessment (Very Good).

Table 1: BREEAM threshold calculations

Retail (within the listed building)			
Floor	Refurbished area (m ²)	Extension (m ²)	% increase (threshold =20%)
Basement	492	-	
Ground	570	128	
First	47	-	
Total	1,109	128	12%

Apart-hotel (within the listed building & extension)			
Floor	Refurbished area (m ²)	Extension (m ²)	% increase (threshold =20%)
First	481	166	
Second	502	137	
Third	482	121	
Total	1,465	424	29%

Retail (new build)	
Floor	New build area (m ²)
Ground	163
First	77
Total	240

BASEMENT



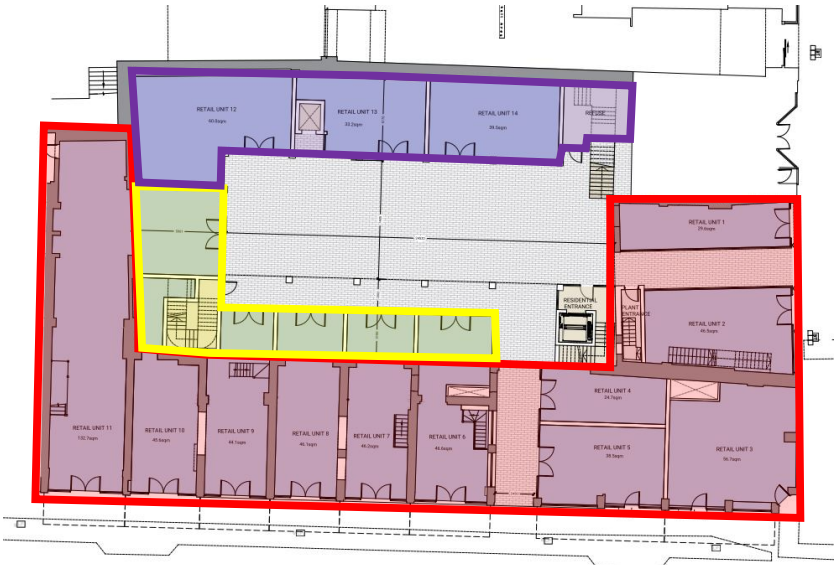
RFO ASSESSMENT

- RETAIL**
- RETAIL - NEW**

NC ASSESSMENT

- RETAIL**

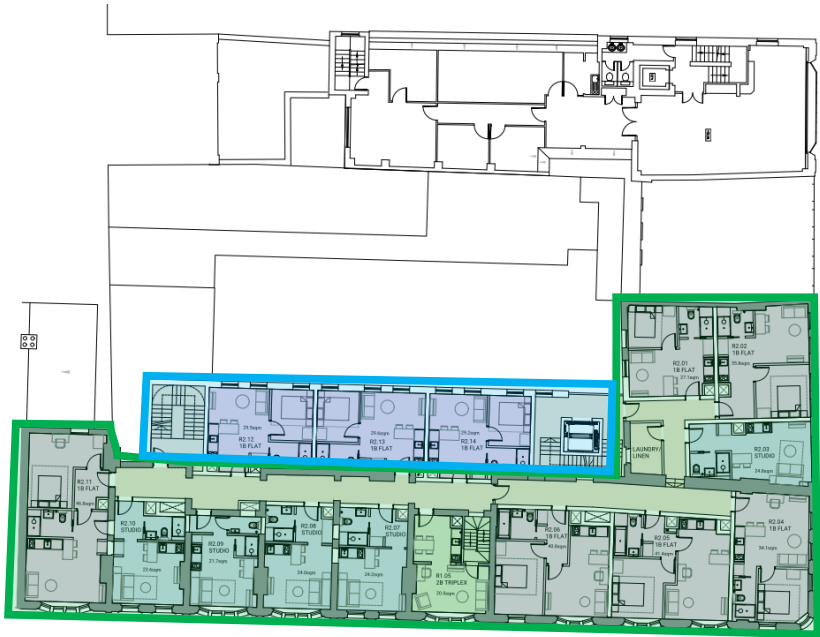
GROUND

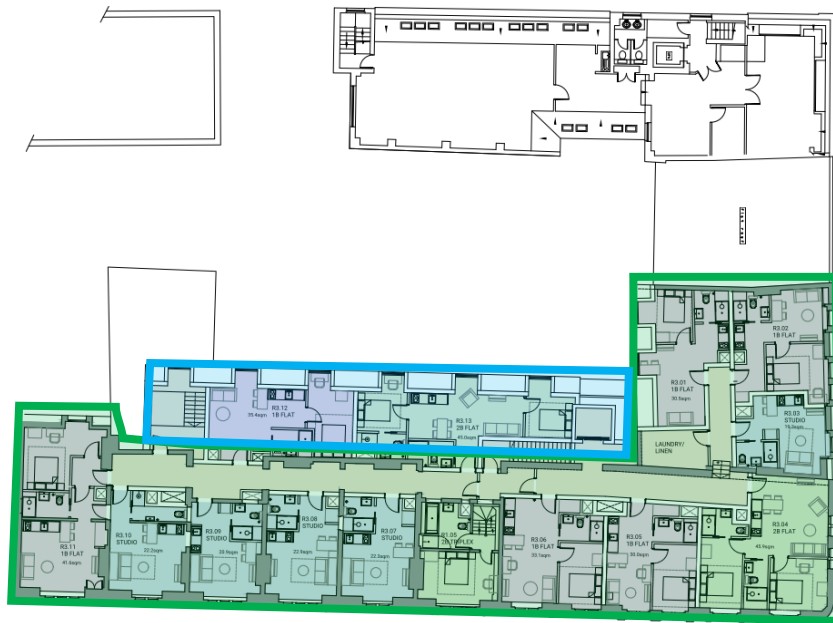


FIRST



SECOND



THIRD**BREEAM RFO*****BREEAM BRIEFING PAPER: SUSTAINABLE REFURBISHMENT OF HERITAGE BUILDINGS***

BREEAM has produced a briefing paper which details and explains the levels of environmental performance that can be achieved in listed buildings. The report noted that for these types of building there can be several inherent restrictions which limit the potential improvements that can be delivered. Features such as location, orientation, fabric and form cannot be altered and other constraints may exist, for example, there are further limitations on design options and specific requirements associated with listed buildings.

Physical and functional constraints for refurbishment projects, particularly for Listed Buildings, are outlined below:

- Limited options to improve thermal performance of windows and walls;
- Ensuring breathability of traditional constructions;
- Location and size of windows restricting daylight provision;
- Restricted layout and provision of view out;
- Identifying space for cycle storage; and,
- Increase in proposed occupancy levels and performance requirements impacting on measures required to achieve higher building regulations performance levels.

In particular the areas in which listed refurbishment projects tend to score poorly are Waste and Health and Wellbeing. Furthermore, there are several credits in categories such as Transport, Pollution and Land-use and Ecology which are site dependant. The amount of external space within the site boundary is extremely challenging to incorporate ecological enhancements. Furthermore, the space available for the require cycle storage and facilities for the size of the development is very challenging.

Whilst these are not minimum requirements for BREEAM, the development Queen Victoria Street is not able to successful meet the required criteria for many of these credit issues, therefore, making it increasingly challenging to meet BREEAM compliance.

TECHNICAL CONSTRAINTS

There are a number of credits within the BREEAM RFO 2014 assessment which have been found to be feasible, there are, however, a number of credits have been identified as unfeasible for the two RFO assessments required at Queen

Victoria Street. It is these 'unfeasible' credits which have a consequential impact on the proposal's aspirations for a formal BREEAM certification. The design team recognises the benefits of BREEAM, and it should be noted that the scheme aims to incorporate the principles of BREEAM where possible, in place of formal certification. The table below sets out the credits that are not deemed feasible for the refurbishment elements of the Queen Victoria Street development. While both RFO assessments are for different building types the credits available and unfeasible are very similar, and therefore can be considered together with respects to this report. It must be noted that the energy modelling for the proposal has been finalised, therefore, with respects to the energy credits these are very much still assumptions and further information will be known once the modelling has finished.

Table 2: BREEAM RFO credits with restrictions

Credit Issue	Credit Criteria	Reason for Omission
Man 02	Elemental Life cycle cost (LCC) (1 credit)	Whilst the durability of the materials proposed for Queen Victoria Street has been taken into consideration, to appoint an external consultant to carry out a Life cycle cost (LCC) for a building of this scale will represent some financial implications for the development, and could delay the programme. The LCC assessment will not bring about any significant benefits to the project as no notable changes can be made to the building fabric due to the listed nature of the building. It will not be reasonable to target this credit.
Man03	Monitoring of refurbishment or fit-out-site impacts - Transport of construction materials and waste (1 credit)	Whilst the monitoring of energy and water use on site is easily reported, it is highly onerous to manage and report the transport to and from site in line with the BREEAM requirements as often delivery drivers will have more than one site on their route. This is not considered feasible for the development at Queen Victoria Street. There are also added complications between dividing up the data between the four different assessment types
Man04	Testing and inspecting building fabric	There are no proposed improvements to the building fabric, there would therefore be no benefit in carrying out airtightness testing and thermographic surveys.
Hea01	Visual comfort – Daylighting & View out (up to 5 credits)	The daylight credit is generally challenging on most developments, the scope to influence daylight levels and view out are restricted by the building's existing form and plan depth, as well as proximity to neighbouring buildings and the urban context of the site. There is no scope to alter the existing building's facades. There will be good levels of daylight achievable for the scheme, but daylight levels and view out meeting BREEAM compliance is not deemed achievable for all areas of the building. These credits are not deemed achievable.
Hea02	Indoor Air Quality (5 credit)	The credit requires air intake to the building to be 20m away from sources of pollution (roads). This is not deemed feasible due to the location of the building.
Hea04	Thermal Comfort (1-2 credits)	The existing structure creates a number of barriers for the proposal to achieve the required criteria. Natural ventilation for example, is not deemed sufficient for thermal comfort for future building users.
Ene01	Reduction of Energy Use and Carbon Emissions (up to 15 credits)	High efficiency heating, cooling and ventilation systems will be installed as part of the redevelopment of the building. However, due to the listed status of the building, scope of any fabric improvements (apart from addition of secondary glazing, where feasible) are very limited which will not enable the building to achieve sufficient credits under ENE01.
Ene04	Low Carbon Design – Passive design (2 credits)	There is no scope for altering the existing building fabric, internal structures, and limited scope for altering internal finishes on a listed building development.
Ene04	Low Carbon Design - Free Cooling (1 credit)	Due to the layout of the spaces and the restrictions from the existing structure, comfort cooling will have to be provided from localised Variable Refrigerant Flow (VRF) systems via Fan Coil Units and therefore the credit has not been targeted. Natural ventilation (where provided) is not deemed sufficient for thermal comfort for future building users.
Wat01	Water Consumption (2 credits)	Greywater and rainwater harvesting is not deemed appropriate or possible for a listed building, therefore, the proposal will not be able to make water consumptions savings beyond 25%, equating to a maximum of 2 credit.
Wat03	Water monitoring (1 credit)	The flow control devices credit required each bathroom in all guest rooms to have a flow control device fitted. Due to the listed nature of the building and the complications with the existing fabric this is not considered technically and financially feasible. Credit not achievable.

Credit Issue	Credit Criteria	Reason for Omission
Mat01	Project lifecycle assessment (6 credits)	To target this credit a specialist report would have to be undertaken – Life Cycle Assessment (LCA). Similar to the Man 02 credit, this will have a financial implication for the project and not bring about any notable benefits. However the design will look to incorporate low-impact materials. The scheme is inherently low impact due to retention of majority of the existing building.
Mat03	Responsible sourcing of materials (RSM) (4 credits)	Whilst 100% of timber and timber-based products will be 'Legal' and 'Sustainable' as per the UK Government timber procurement policy (TPP), it would be challenging at this stage to fully estimate and manage the procurement of responsibly sourced materials for the listed building, and therefore the additional credits have not been targeted.
Mat05	Designing for Durability and Resilience (1 credit)	The building façade will be refurbished as far as the listed building scope allows. The refurbishment extent is not likely to meet Mat05 requirements.
Wst06	Functional Adaptability (1 credit)	This credit is not achievable due to the listed nature of the scheme. For example, partitions cannot easily be adapted or altered; there are a number of limitations and constraints with flexible M&E set up.
Land use and Ecology	Land use and Ecology	There is limited potential for Ecology credits to be achieved due to the nature of the site.
Pol03	Surface water run off (2 credits)	Due to the nature of the site and the building's listed status there is limited potential for SuDS strategies to be implemented. This credit would therefore be challenging for the proposal.

BREEAM NC

With regards to the new build extension to the listed building, the ground floor extension to the retail area can be considered within the RFO assessment, however, on the upper floors the extension to the hotel must be considered separately to apart-hotel refurbishment as the area threshold requirements cannot be met (see Table 1). In contrast to the two RFO assessments mentioned in the previous section, the two NC assessments must be considered separately. It must be noted that the energy modelling for the proposal has not been finalised, therefore, with respects to the energy credits these are very much still assumptions and further information will be known once the modelling has finished.

As mentioned in Table 1 the area of the extension for the apart-hotel exceeds the 20% threshold for the new construction element of the apart-hotel to be considered within the RFO assessment. Therefore, the new extension of the apart-hotel must be considered as a standalone NC assessment. Following a brief review of this approach for this part of the scheme, it is not deemed suitable to carry out a standalone assessment for the new build extension portion only, for the following reasons:

- The new build extension portion (comprising of apart-hotel units to the first, second and third floors) cannot be deemed standalone from the existing/refurbishment portion of the building as they will be connected to it via a corridor. There is no obvious separation between the 2 elements of the development. It will not be possible to carry out energy modelling only for the new build portion, for the purpose of assessing ENE01 credits, and for it to be entirely standalone from the refurbishment portion of the scheme.
- A large number of environmental measures are applicable to the full development, and not only to the new build portion of the scheme. These would include energy metering, water metering, water efficient sanitary fittings and appliances, responsible construction practices, construction waste management etc. Carrying out the NC only assessment does not fully reflect the sustainability aspirations that the whole development is set out for.
- The benefits of retention of the existing building cannot be accounted for in the NC only assessment.
- The specialist reports listed out in the following section are still applicable to the NC only assessment, despite the limited footprint that the extension comprises. There will be notable financial cost to commission these reports which is not deemed financially viable to the scheme.
- It will be very difficult to separate out the construction data which is required by the contractor within the Management section, for example, monitoring of the energy and water consumption.
- Testing and inspecting the building fabric will be tricky as the apart-hotel rooms which are part of the new extension all have entrance doors leading from a corridor located within the listed building.

- Passive design analysis will be complicated and limited with respects to building fabric improvements as the new extension extrudes from the building envelope of the listed building, which cannot be improved or enhanced.
- The location and positioning of the extension, and the restrictive site means that there are very limited opportunities for the extension becoming adaptable to different future design scenarios.
- The nature of the site has little or no opportunities for ecological enhancement, particularly as the apart-hotels do not have private amenity areas. The external spaces would be jointly shared amongst the retail and the apart-hotel.

With regards to the two storey new build comprising retail units to the rear of the site, this will also require a BREEAM NC assessment, with a 'very good' rating, as it is a minor development. Whilst this part of the development does result in a freestanding building, there are still a number of constraints with respects to achieving a BREEAM certification. There are several cross-overs between the credits for the RFO and NC assessments, many of these restrictions have already been mentioned in Table 2 and earlier in this section. These credit restrictions can be looked at in greater detail, as a full pre-assessment would be required. There would also be added complications and restrictions with respects to developing so close to a listed building.

Achieving a rating of 'excellent' created a number of requirements the most stringent one is the requirement to achieve a minimum of 4 credits within the ENE01 credit. As mentioned already in the report the energy modelling for the proposal hasn't been completed, therefore, we are unable to say with certainty what the proposal is currently achieving within that particular issue.

FINANCIAL CONSTRAINTS

For both options of the assessment (BREEAM RFO for the listed building, and BREEAM NC for the rear extension), there are a number of BREEAM credits, that whilst adding design considerations for compliance also require specific specialist reports. These in turn have associated costs due to additional appointments from widening the design team to include acousticians, travel consultant, ecologists, and air quality specialists and post occupancy evaluators. Although some of these reports may be produced as part of the project and planning submission process, for the purpose of BREEAM compliance, many require dedicated workshops, with the output as standalone (BREEAM compliant) reports; of which these services would usually incur additional fees, consequently impacting the financial viability of the development.

The principals of the above assessment and requirements have been thoroughly considered by the client and design team, and are inherently implemented as part of the current design as far as the building constraints allows. The generation of additional standalone reports at extra costs to scheme for the purpose of the formal BREEAM Assessment would not bring additional sustainability value to the project.

PROPOSED SUSTAINABILITY MEASURES

It has been noted that BREEAM compliance for both the refurbished and new elements of the scheme is not considered feasible; the project, however, has included within the design as many practical sustainability measures to ensure many of the principles of BREEAM are considered.

- The site makes extremely good use of an already occupied site; by opting to renovate and refurbish an existing building the development significantly reduces its life cycle environmental impacts.
- The refurbishment will enhance the value of the existing Listed Building, and notably improve the energy and sustainability properties of the building, which should be deemed valuable to the local area and community.
- Embodied carbon emissions will be far lower than constructing a building of a similar size and scale at a similar location as majority of the building fabric and structure will be retained.
- High fabric efficiency in relation to u-values, where feasible, is also beneficial as this decreases the heating and cooling demands on the building services systems therefore reducing the amount of carbon used each year, particularly for the new build elements of the scheme.
- The scheme would entail replacement of all existing HVAC systems with new high efficiency systems.
- The good thermal performance is coupled with a new air source heat pump in the build to ensure good performance. The need for artificial internal light is also reduced through a largely glazed façade providing good levels of natural light, which further decreases the carbon consumption.

- All materials will be carefully specified for both the refurbished and new elements of the development to ensure a sustainable construction process and a low lasting impact on the environment.
- Energy and water metering will be provided to enable better visibility of operational resource consumption, and facilitate better management of the building's performance.
- High-efficient sanitary fittings and appliances will be installed to minimise water consumption, which will significantly reduce water consumption of the existing building.
- There will be provision of cycle storage spaces as part of the redevelopment, which promotes the use of sustainable transport for future occupants.
- Provision of landscaped areas within the wider site boundary at ground floor will provide amenity benefits to the building users as well as the general public. Soft landscaping and planting will also bring about biodiversity benefits and enhance the ecological value of the site.
- Waste storage area will be sufficiently spaced and enable storage of recyclable waste as per Reading Council's requirements.
- The scheme is designed to incorporate spaces that are flexible and can be adapted easily in the future should the nature of the building use change.
- The scheme will minimise pollution sources, including:
 - Air pollution - with the specification of ASHPs there is anticipated to be no combustion and minimal on-site emissions.
 - Noise pollution – all external building services plant items will meet Reading Council's noise impact requirements. To be evaluated by an acoustic consultant.
 - Light pollution – all external lighting will be limited wherever possible. The external lighting strategy will be designed in line with ILP Guidance notes for the reduction of obtrusive light. All external lighting (excluding security lighting) will be automatically switched off between 23:00 and 07:00.

CONCLUSION

The design team recognises the benefits of BREEAM. This report has explored the feasibility of a BREEAM RFO 2014 assessment for the refurbishment of the Grade II listed building and the feasibility of a BREEAM NC 2018 assessment for the extension to the rear of the listed building.

The design note has shown that due to site constraints, the development scope, the number of specialist studies and their associated reports needed at their appropriate RIBA stages, in addition to the limitations associated with its grade II listed status it is considered unfeasible to achieve full BREEAM RFO 2014 certification. Furthermore, for the rear extension numerous limitations, the number of specialist studies and their associated reports needed at their appropriate RIBA stages has meant that it is also considered unfeasible to achieved full BREEAM NC 2018 certification.

The design note has also shown that there are a number of credits the scheme is unable to target and consequently achieve. Table 2 outlined a number of credits which are not feasible for the RFO elements of the proposal, as mentioned already in the report many of these credits are also applicable to the NC elements of the proposal. Energy is an important issues within BREEAM and the report has already outlined the complications with respects to meeting the minimum standards required for 'excellent', and also the difficulties surrounding the identification of the RFO apart-hotel extension as a standalone element. Another significant impact to the RFO element of the proposal is the restriction of improvements to the building fabric and changes to the structure, this impacts a number of BREEAM credits including Man04, Hea04, Ene01, Ene04, Mat05, and Wst06. This ultimately impacts the achievable BREEAM rating, for example, the unfeasible credits identified for the apart-hotel RFO assessment could be between 50-60% of the available credits, meaning that the scheme would potentially be limited to a 'good' rating only.

With respects to the new build elements of the proposal, and their associated NC assessments, the report has shown that BREEAM certification would also be restrictive and not feasible. For the NC assessment comprising the apart-hotel extension the report stated that the extension cannot be deemed standalone from the existing/refurbishment portion of the listed building as it will be connected via a corridor. Additionally, there is no scope for altering the existing building fabric, internal structures, and limited scope for altering internal finishes on a listed building development. This presents a number of issues and restrictions with respects to the BREEAM assessment, for example, it will not be possible to carry out energy modelling for the new extension. Additionally there are no benefits within the NC assessment which rewards the retention of the existing building, and due to the listed status of the building improvements to the building fabric are not possible.

With respects to the new build retail units at the rear of the site there are also a number of restrictions which impact its potential for a BREEAM certification. A large number of environmental measures are applicable to the full development, and not only to the new build portion of the scheme. These would include energy metering, water

metering, water efficient sanitary fittings and appliances, responsible construction practices, construction waste management etc. Carrying out the NC only assessment does not fully reflect the sustainability aspirations that the whole development is set out for, furthermore many of these measures require data monitoring for a BREEAM assessment and it is much more complicated to separate out that data for the required assessment, for example, monitoring of the construction energy and water consumption.

It must be noted that the energy modelling for the proposal has not been finalised, therefore, with respects to the energy credits these are very much still assumptions and further information will be known once the modelling has finished. It must be noted that the development is fully committed to enhancing and increasing the energy efficiency of the listed building, where possible. This will include high efficiency building fabric and systems of new build, high efficiency and low impact Air Source Heat Pumps, future proofing against changes in the grid, movement towards a zero carbon development, use of renewables with Photovoltaics.

Across the site the sustainability strategy will be as developed as possible, however, as already mentioned the site requires four BREEAM assessments; meaning that each assessment would have to stretch their sustainability features across the board to meet BREEAM requirements, rather than focusing on the best enhancement to that particular element of the site.

The measures required for a BREEAM certifications would be overly invasive to the listed building and result in harm to its historic character, however, this impact has been balanced with as many feasible sustainability measures to ensure the principles of BREEAM are maximised where possible, in place of a formal certification.