49-50 CARTWRIGHT GARDENS WC1H LONDON SUSTAINABILITY STATEMENT

Project:
49-50 Cartwright Gardens, London

Document:
Sustainability Statement

Client:
SLP Crescent Limited

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TLP Project No:
C8316

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Document Control

Document	Sustainability Statement
Project	49-50 Cartwright Gardens
Client	SLP Crescent Limited
Job Number	C8326

Revision	1
Document Date	21st December 2022
Prepared By	AD
Checked By	KB
Description of Revision	FINAL

1.0 EXECUTIVE SUMMARY

This document has been prepared to support a Full Planning application for the refurbishment and change of use of the former Crescent Hotel, located in the London Borough of Camden to create 31 shared-living units for rent. The units would comprise of bedroom space, bathroom and kitchenettes so for the purposes of building control, they are not considered as self-contained dwellings and are categorised as residential (other). The shared-living units would be provided alongside generous internal and external communal amenity space.

The building was formerly in operation as a hotel and is Grade II listed. The current internal arrangement is traditional with relatively modern basic building services installed and operational.

Being a historic building of over 100 years in age the sustainable elements of the property are associated with its embodied carbon, location and transport links.

This report has identified potential for improving on the sustainability of the building in conjunction with the proposed development of the building. No extension of the building is proposed.

- Improved carbon emissions due to partial upgrade of building services
- Improved water consumption rates
- Improved ability to recycle waste
- Retention of the building fabric both internally and externally hence minimising additional embodied carbon.
- The use of prefabricated bathrooms hence minimising construction waste
- Improvement of thermal comfort and air quality in the habitable spaces.
- Improved water quality
- No adverse effect on biodiversity and ecology
- Introduction of cycle lockers
- Modest improvement to fabric heat losses due to rectification of loft insulation

Upgrades to existing building services will provide an estimated annual carbon dioxide saving of 10% compared simulated existing building performance, based on Part L2021 calculation methods.

2.0 INTRODUCTION

This report supports a Full Planning Application for the refurbishment and change of use of the Crescent Hotel, 49-50 Cartwright Gardens, London. It sets out the sustainable design and construction aspects of the Proposed Development with a view to achieving sustainability enhancements within the constraints of the existing building.

Existing Building

The existing hotel provided 27 bedrooms available for booking by the general public, as well as living accommodation for the hotel's owner. Bedrooms were of a variety of sizes, ranging from small single bedrooms, double bedrooms, and three- or four-person group rooms. The larger of these existing rooms were furnished with en-suite bathroom facilities, with the remaining smaller units fitted with a private basin, or a basin and a shower in the bedroom depending on size. Where WC and shower facilities where not provided as part of the bedroom, communal facilities were available on each floor. Accommodation is provided across five floors, of which one is below street level.

Refurbishment and Conversion

The building will be converted into 31 shared living units for long term hire. In addition to the shared living units there will be circulation space, communal kitchen and communal laundry.

The format of the report follows BREEAM credit categories where appropriate, however this report does not constitute a BREEAM assessment or pre-assessment. It has been agreed with all parties that the application of a BREEAM assessment to the internal refurbishment of a grade II listed building is not appropriate or possible. Therefore, this report qualitatively considers the key sustainable points of the refurbishment and provide indications of performance improvements with respect to carbon emissions and energy efficiency.

Target water consumption figures are identified within the report. it should be noted that all reduced residential water consumption figures are based upon reduced usage by way or flow restriction and appliance/sanitary ware specification.

3.0 ACCOMMODATION SUMMARY

Residential (other)

Floor	Unit	Type	Size m^2
Lower Ground	1	Shared Living Unit	16.6
	2	Shared Living Unit	27.8
	3	Shared Living Unit	18.7
	4	Shared Living Unit	16.4
Ground Floor	5	Shared Living Unit	14.9
	6	Shared Living Unit	22.3
	7	Shared Living Unit	16.7
	8	Shared Living Unit	15.1
	9	Shared Living Unit	18.9
	10	Shared Living Unit	13.4
First Floor	11	Shared Living Unit	11.6
	12	Shared Living Unit	14.2
	13	Shared Living Unit	19.1
	14	Shared Living Unit	14.0
	15	Shared Living Unit	11.6
	16	Shared Living Unit	14.0
	17	Shared Living Unit	19.0
	18	Shared Living Unit	19.2
Second Floor	19	Shared Living Unit	11.9
	20	Shared Living Unit	15.2
	21	Shared Living Unit	16.1
	22	Shared Living Unit	11.6
	23	Shared Living Unit	16.4
	24	Shared Living Unit	20.4
Third Floor	25	Shared Living Unit	11.6
	26	Shared Living Unit	12.9
	27	Shared Living Unit	12.0
	28	Shared Living Unit	14.0
	29	Shared Living Unit	18.2
	30	Shared Living Unit	15.9
	31	Shared Living Unit	11.8
Total	**31**		

4.0 RELEVANT POLICY AND TARGETS

4.1 GLA – London Plan

The key policy that applies:

GLA Energy Assessment guidance June 2022

6.15. Where an existing building or group of buildings is refurbished and the development qualifies as a major refurbishment, applicants are required to provide an energy assessment demonstrating how the individual elements of the energy hierarchy have been implemented and how reductions in regulated CO2 emissions have been achieved.

6.16. The following section outlines the approach applicants should take when estimating improvements in CO2 emissions for existing buildings and change of use applications. For non-referable applications, applicants should liaise with the respective borough on any local requirements for existing buildings in relation to demonstrating CO2 emission performance.

6.25. It is generally acknowledged that the level of carbon savings that can be achieved through a refurbishment can vary considerably, however every effort should be made to improve the energy performance of the building in line with London Plan carbon targets and to follow the energy hierarchy.

The measure of improved performance will not follow the GLA notional approach for the following reasons:

- Listed nature of the building meaning no fabric upgrades are possible.
- Not considered a major refurbishment as floor space is not to be increased and total GIA is less than $1000m^2$.

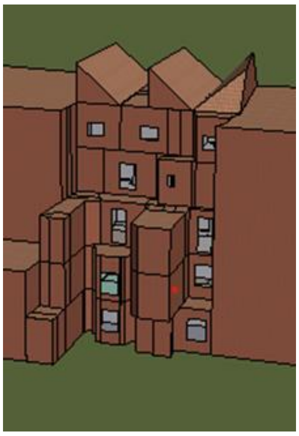
5.0 SUSTAINABILITY

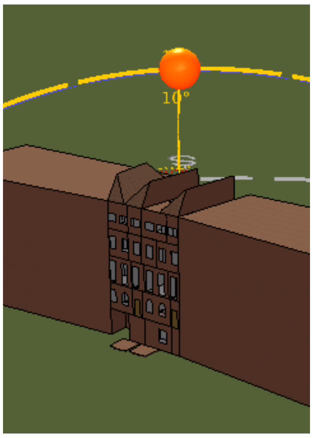
5.1 Energy and Carbon Emissions

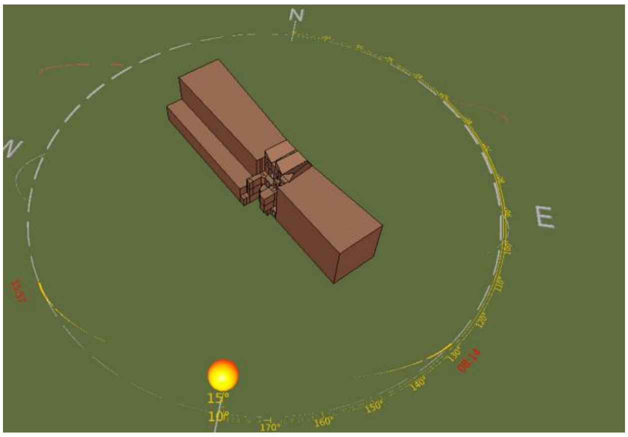
5.1.1 Methodology

The building has been influenced and assessed using modern dynamic simulation modelling (DSM Level 5). IESVE 2021 software will be used to simulate the performance of the design with respect to heating loads, lighting efficiency, control methods, passive measures, domestic hot water delivery, renewable energy contribution and air tightness to minimise predicted energy usage and carbon dioxide emissions. This permits proposals to be developed and evaluated in line with the London Plan Energy Hierarchy where feasible.

The IESVE Software is used to generate preliminary Part L2A compliance calculations to provide a recognised method of energy consumption prediction in accordance with NCM parameters.







The primary data input to the calculations is given below.

All BRUKL calculations are based on the following architect's drawings.

The drawings used for all IES calculations precede the final architects' drawings issued as part of the application. The following drawings provide a suitably accurate representation of this application for IES purposes.

Architect	Drawing	Date
Holder Mathias	Site Location Plan PM_10_20_30 P02 A2 13/12/22	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00001 Existing Lower Ground and Ground Level PM_40_40_34 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00002 Existing Level 1 and 2 PM_40_40_34 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00003 Existing Level 3 and Roof Level PM_40_40_34 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00101 Proposed Lower Ground and Ground Level PM_40_40_34 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00102 Proposed Level 1 and 2 PM_40_40_34 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00103 Proposed Level 3 and Roof Level PM_40_40_34 P02 A2	13/12/22
Holder Mathias	CRSH HMA ZZ ZZ D A 00203 Demolition Plan Lower Ground and Ground Floor PM_40_40_34 P03 A2	13/12/22
Holder Mathias	CRSH HMA ZZ ZZ D A 00204 Demolition Plan Level 1 and 2 PM_40_40_34 P02 A2	13/12/22
Holder Mathias	CRSH HMA ZZ ZZ D A 00205 Demolition Plan Level 3 and Roof Level PM_40_40_34 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00301 Elevations - Existing PM_40_40_27 P02 A2	13/12/22
Holder Mathias	CRSH HMA ZZ ZZ D A 00302 Elevations - Existing Rear Courtyards PM_40_40_27 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00311 Elevations - Proposed PM_40_40_27 P02 A2	13/12/22
Holder Mathias	CRSH HMA ZZ ZZ D A 00312 Elevations - Proposed Rear Courtyards PM_40_40_27 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00401 Building Section A - Existing PM_40_40_18 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00402 Building Section B - Existing PM_40_40_18 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00403 Building Section C - Existing PM_40_40_18 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00411 Building Section A - Proposed PM_40_40_18 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00412 Building Section B - Proposed PM_40_40_18 P02 A2	13/12/22
Holder Mathias	CRSH HMA XX ZZ D A 00413 Building Section C - Proposed PM_40_40_18 P02 A2	13/12/22

Refurbishment method

As previously noted in this report fabric improvements for carbon savings are not possible due to the heritage constraints applied to this listed building. Therefore the emphasis will be on improving building services efficiencies and carbon content. i.e. hierarchy level 2.

Energy hierarchy:

1. *Use less energy*
2. *Supply energy efficiently*
3. *Use renewable / LZC energy*

5.1.2 Efficient energy delivery (hierarchy level 2)

The use of good quality and high efficiency building services to enable maximum utilisation of the buildings passive measures is targeted where possible. The following outlines the key features considered and those adopted, and the important efficiency input data utilised with the calculations.

Space heating

The hotel currently has a centralised gas fired boiler heating system. This is approximate 25 years old with boilers approximately 13 years old, of the modern high efficiency condensing type. The refurbishment will utilise low temperature hot water (LTHW) from this existing supply to feed heat emitters. Currently many radiators do not have thermostatic valves hence resulting in poor, inefficient control. It is proposed that all radiators will be provided with such valves to improve user comfort and energy efficiency.

Currently LTHW distribution pipework is poorly lagged, estimated to be approx. 25% of the entire system. It is anticipated that approx. 50% of pipework can be lagged, with reasonable access. This will improve efficiency, minimise distribution heat loss, and contribute to the overall carbon emissions improvement figure within the report.

The heating medium will be low temperature hot water (LTHW) and will therefore be suitable for connection to a potential future improved / replaced central system or future district heating systems should they become available after completion. Provision of such networks is not proposed as part of this application.

Domestic Hot Water

Currently the building is priced with hot water from a boiler derived calorifier in the plant room. This system will be retained however the calorifiers will be replaced with highly insulated modern types with high efficiency heat exchangers to maximise hot water delivery and efficiency. Control of hot water supply and circulation will be controlled correctly.

Currently HWS distribution pipework is poorly lagged, estimated to be approx. 25% of the entire system. It is anticipated that approx. 50% of pipework can be lagged, with reasonable access. This will improve efficiency and minimise distribution heat loss.

Ventilation

All current habitable rooms are naturally ventilated. This strategy will be retained. All bathrooms are currently provided with mechanical extract ventilation by way of ageing domestic type fans. It is proposed that where fans are insufficient or in poor condition, replacement systems are provided with superior specific fan power and presence detection controls so as to minimize energy consumption and improve air quality. In addition, further new extract systems are applied to the proposed new bathrooms resulting improved fan power efficiency for the building.

Lighting and Metering

Fixed lighting in all rooms currently is provided by a mix of poor quality replacement LED lamps and in some cases older CF lamps and TH lamps with poor control. It is proposed that all lighting is replaced with modern LED luminaire and pendants with presence detection control.

Summary

The energy efficient measures that have been included in the refurbishment emissions model are summarised below.

- Improved heating control
- Reduced heat loss from hot water calorifiers
- High efficiency LED lighting;
- Demand control of mechanical ventilation systems through presence detection.
- Higher efficiency fans;
- Improved lagging to HWS and LTHW pipework

5.1.3 Energy Model

BASELINE EXISTING BUILDING

U-values	Existing for time of build. Windows are timber framed single glazed sliding sash. Loft – 100mm rock will insulation Walls – solid masonry no cavity or insulation Lower ground floor solid concrete, insulation.
Air tightness	Existing for time of build. Assumed 25
Heating Zoning	Single timeclock control zone. TRVs on 50% radiators No TRVs on remaining radiators
HVAC inputs	**Heating:** LTHW rads served by gas boilers. 13 years old. Broag Quinta. Condensing Basic controls Poor pipe lagging – 25% lagged **WC/bathroom Ventilation** Ageing individual extract fans – assumed SFP of 1.2 Light switch control **All other spaces ventilation:** Natural ventilation
HWS inputs	LTHW calorifiers with return pump. High heat loss kwh/day due to degraded lagging Basic controls – constant operation Poor pipe lagging – 25% lagged
lighting Watts per meter squared and proposed lux values	Etail type replacement LED lamps in pendants, with some CF/TH. Lm/w figure of twice to three times notional assumed Manual switch control
Renewables	None feasible

REFURBISHED BUILDING

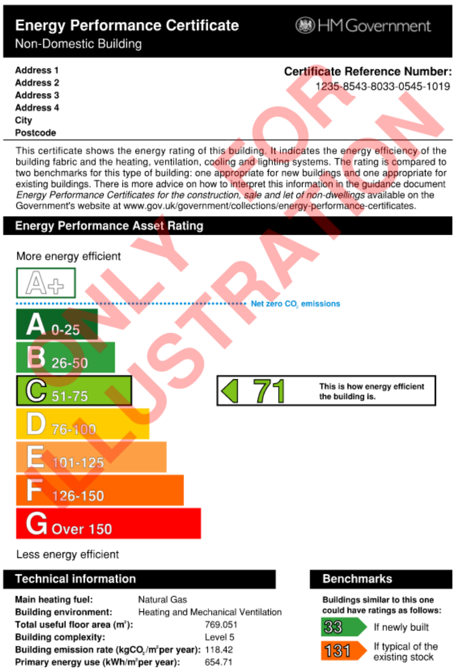
U-values	Existing for time of build. Windows are timber framed single glazed sliding sash. Loft – 150mm rock will insulation Walls – solid masonry no cavity or insulation Lower ground floor solid concrete, insulation.
Air tightness	Existing for time of build. No change from existing
Heating Zoning	Single timeclock control zone. TRVs on 100% radiators
HVAC inputs	**Heating:** LTHW rads served by gas boilers. 13 years old. Broag Quinta. Condensing Basic controls Pipe lagging – 50% lagged **WC/bathroom Ventilation** New individual extract fans – SFP of 0.4 PIR control **All other spaces ventilation:** Natural ventilation
HWS inputs	Replaced LTHW calorifiers with return pump. Notional building loss kwh/day Time clock control Pipe lagging – 50% lagged
lighting Watts per meter squared and proposed lux values	New LED lighting throughout Notional lm/w figures PIP control with absence detection.
Renewables	None feasible

Results of energy model

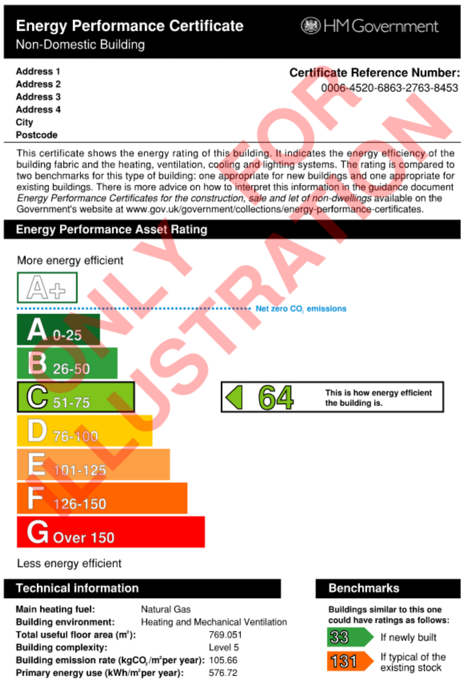
Scenario	BER $kgCO_2/m^2/yr$	Area m^2	CO_2/year tonnes	Potential EPC Rating	Remarks
Existing Building	118.42	790	93.55	71 C	
Refurbished building	105.66	790	83.47	64 C	10% improvement

The above demonstrates that, by using Part L2 DSM level 5 calculations for comparative purposes only, up to 10% carbon savings can be achieved.

Current Building Performance



Proposed Building Performance



BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Crescent Hotel As built

Date: Thu Dec 15 10:47:54 2022

Administrative information

Building Details
Address: Address 1, City, Postcode

Certifier details
Name: Name
Telephone number: Phone
Address: Street Address, City, Postcode

Certification tool
Calculation engine: Apache
Calculation engine version: 7.0.17
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.17
BRUKL compliance module version: v6.1.c.0

Foundation area [m²]: 90.93

The CO_2 emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	54.38	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	118.42	
Target primary energy rate (TPER), $kWh/m^2.annum$	301.02	
Building primary energy rate (BPER), $kWh/m^2.annum$	654.71	
Do the building's emission and primary energy rates exceed the targets?	BER > TER	BPER > TPER

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

Fabric element	$U_{a-Limit}$	U_{a-Calc}	U_{i-Calc}	First surface with maximum value
Walls*	0.26	2.43	2.54	0F000005:Surf[2]
Floors	0.18	1.22	1.22	0F000005:Surf[0]
Pitched roofs	0.16	-	-	No Pitched roofs in building
Flat roofs	0.18	0.34	0.35	0F000005:Surf[1]
Windows** and roof windows	1.6	5.43	5.6	0F000005:Surf[3]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	2.2	2.2	0F000000:Surf[0]
Vehicle access & similar large doors	1.3	-	-	No Vehicle access doors in building
High usage entrance doors	3	-	-	No High usage entrance doors in building

$U_{a-Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]
U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]
* 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.
*** Values for rooflights refer to the horizontal position.
^ For fire doors, limiting U-value is 1.8 W/m²K
NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	25

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Crescent Hotel As built

Date: Thu Dec 15 11:14:06 2022

Administrative information

Building Details
Address: Address 1, City, Postcode

Certifier details
Name: Name
Telephone number: Phone
Address: Street Address, City, Postcode

Certification tool
Calculation engine: Apache
Calculation engine version: 7.0.17
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.17
BRUKL compliance module version: v6.1.c.0

Foundation area [m²]: 90.93

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The building does not comply with England Building Regulations Part L 2021

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	54.38	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	105.66	
Target primary energy rate (TPER), $kWh/m^2.annum$	301.02	
Building primary energy rate (BPER), $kWh/m^2.annum$	576.72	
Do the building's emission and primary energy rates exceed the targets?	BER > TER	BPER > TPER

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

Fabric element	$U_{a-Limit}$	U_{a-Calc}	U_{i-Calc}	First surface with maximum value
Walls*	0.26	2.43	2.54	0F000005:Surf[2]
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NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	25

5.2 Water conservation

All units will be assessed using the BRE water efficiency calculator to achieve a daily consumption per person of 105 litres which is equivalent to Code for Sustainable homes level 3-4 and improves on part G minimum requirements of 125 l/p/day. This will be achieved by way of flow restrictors and efficient sanitary ware. This represents a significant improvement on the current installation which is subject to uncontrolled flow rates.

5.3 Water Quality

Currently the building is served by a combination of mains cold water and stored water at roof level. Tanks are old, exposed to heavy solar gain and undersized. Tanks will be renewed with a modern insulated type to provider a safer, cooler water supply.

5.4 Construction Waste

The reduction of construction waste not only minimises environmental impacts through ensuring the responsible use of resources and waste disposal but can also significantly reduce construction costs for the developer.

Prior to construction, The contractor will develop a Site Waste Management Plan which will establish ways of minimising waste at source, assess the use, reuse and recycling of materials on and off-site and prevent illegal waste activities. This plan will then be disseminated to all relevant personnel on and off-site.

The following waste minimisation actions will be considered:

- Design for standardisation of components and the use of fewer materials.
- Design for off-site or modular build.
- Return packaging for reuse.
- Consider community reuse of surplus materials or offcuts.

- Engage with supply chains and include waste minimisation initiatives and targets in tenders and contracts.
- Minimise replacement of fabric wherever possible.

The contractor will regularly monitor and record the site's waste reduction performance. This will be compared against a target benchmark where at least 85% (by volume) of non-hazardous waste is to be diverted from landfill.

5.5 Residential Waste

The operator is committed to following the waste hierarchy and reducing waste sent to landfill. As such, adequate storage is to be provided in dedicated and communal stores located at lower ground floor level, where both recyclable and non-recyclable waste can be stored in accordance with Camden's waste collection service requirements.

Space will be provided for segregated recycling waste bins within the kitchen areas.

This will involve the installation of recycling bins, where waste can be segregated into paper, glass, cans, plastic and cardboard, if necessary.

5.6 Materials

The nature of the project is to retain the majority of existing material on the site. This minimises additional material energy and embodied carbon, along with maximising construction waste reduction.

New building materials will be selected, where possible, to ensure that they minimise environmental impact and have low embodied energy – from manufacture, transportation and operational stages, through to eventual demolition and disposal.

New building materials will be selected to ensure that they minimise environmental impact and have low embodied energy – from manufacture, transportation and operational stages, through to eventual demolition and disposal.

The main building materials will be responsibly and legally sourced from manufacturers with environmental management systems and/or responsible sourcing credentials, such as BES 6001.

Timber used on site, including timber used in the construction phase, such as hoarding, fencing and scaffolding, will be sourced from sustainable forestry sources (e.g. PEFC and FSC) where possible.

Use of off site pre -fabricated bathroom pods will minimise materials use and waste, and provide close control of materials used.

5.7 Sustainable Transport

Being a city centre location the building benefits fully from all local sustainable transport facilities such as bus, rail, tube, cycle hire.

Encouraging sustainable transport modes including, walking and cycling, not only makes a positive contribution to health and well-being, but also reduces pressure on existing transport systems. As part of the refurbishment up to 10 new foldable cycle lockers are proposed. This concurs with the applicants wishes to deter private car usage and hence achieve a car free development. This approach, along with the change of use of the building, will reduce the daily number of car trips to and from the building.

5.8 Biodiversity and Ecology

The existing site has very low ecological value and contains no significant planting. The proposals for the refurbishment of the building may include the introduction of planters and shrubs to the external spaces resulting in a modest improvement on ecology and biodiversity.

To protect any existing biodiversity found on site, a series of measures will be implemented to reduce any impact on local wildlife. These include the following:

All site operatives to be made aware of current legislation, including the protection of certain species;

Prior to commencement of works a check should be carried out prior to the works to determine the presence of any active nests; Suitable fencing should be erected to reduce the possibility of any damage to established vegetation; and

Native species, or species of known wildlife value, should be used for any proposed new planting.

Green roof proposal have been considered but are deemed not feasible due to roof profile, existing structure and heritage/listed building status.

5.9 Sustainable Construction

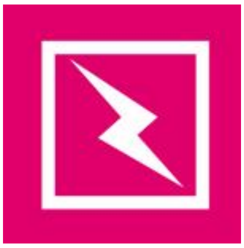
During the construction processes, control procedures will be put in place to minimise noise dust pollution and roads will be kept clean. The management systems will generally comprise procedures and working methods that are approved by the development team together with commercial arrangements to ensure compliance.

Further to the above, additional measures will be adopted to minimise the impact on the local area during construction. This will include the limiting of air and water pollution in accordance with best practice principles, as well as the recording, monitoring and displaying of energy a water use from site activities during construction.

In terms of construction traffic, this will be minimised by restricting deliveries and arrival time order to manage potential impacts on existing and future occupants. Work will be limited to appropriate hours to be agreed with the Council, and suppressors will be used to reduce noise from machinery.

Use of off site pre -fabricated bathroom pods will minimise construction waste and transportation emissions.

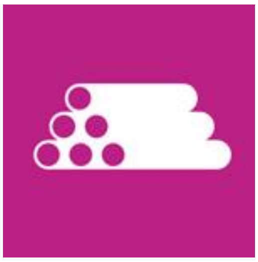
5.10 BREEAM Based targets by category

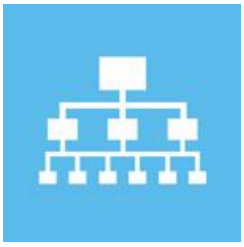

Energy


Health and Wellbeing


Innovation


Land Use


Materials


Management


Pollution


Transport


Waste


Water

Category	Measure	Impact
Energy	Improved building services. Improved loft insulation	Lower carbon emissions, lower running costs
Health and Well Being	Improved ventilation. Modern paints and coverings. New Water storage	Improved air quality Improved water quality
Land use	Re-use of existing property	No greenfield loss
Materials	Retention of existing. Use of pre-fabricated bathrooms.	Low material impact
Pollution	No air conditioning. Improved heating efficiency.	No GWP/ODP refrigerants. Reduced annual NOx levels
Transport	Bike lockers Nearby public transport	Reduced vehicle use
Waste	Improved recycling facilities. Control of construction waste	Less landfill
Water	Water control fittings. Improved hot water systems	Lower water consumption. Less wastage on hot water cold legs.

6.0 CONCLUSION

This report has identified potential for improving on the sustainability of the building in conjunction with the proposed development of the building. No extension of the building is proposed.

- Improved carbon emissions due to partial upgrade of building services
- Improved water consumption rates
- Improved ability to recycle waste
- Retention of the building fabric both internally and externally hence minimising additional embodied carbon.
- The use of prefabricated bathrooms hence minimising construction waste
- Improvement of thermal comfort and air quality in the habitable spaces.
- Improved water quality
- No adverse effect on biodiversity and ecology
- Introduction of cycle lockers
- Modest improvement to fabric heat losses due to rectification of loft insulation