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SUSTAINABILITY & ENERGY REPORT

54 GEORGE STREET
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CONTENTS

EXECUTIVE SUMMARY

The scheme is primarily the conversion of the existing disused retail space across two upper floors (first and second) to residential use, together with a small infill extension to the rear. The newly converted residential space will be accessed from an existing opening from the pedestrianised Brewers Lane but self contained from the existing and protected commercial space across the GF and Basement, which will be refurbished and let as part of the project.

There are no new portions of the building and therefore the existing sections of building are legislated under Part L2B of the Building Regulations and LP20 and LP22 of the Local Policy Plan.

Due to numerous competing restrictions within the existing design and structural constraints passive measures have had to be applied to the scheme to reduce energy consumption and waste as far as possible. Spaces will be naturally ventilated in the summer, and have passive acoustic ventilation for the winter with high efficiency self-contained low emitting boiler systems.

All new apartments will have energy efficient heating systems with smart controls for enabling the occupant to minimise Carbon emissions and therefore energy bills. Furthermore newly wired electric systems, metered electric and water mains will increase the efficiency of the working systems.

New sanitaryware coupled with water efficient taps and shower-heads will be utilised to achieve the water efficiency target of 110 litres per days as outlined within the Construction Sustainability Summary attached to Appendix 5.

In addition BREEAM Domestic Refurbishment “Excellent” level will be achieved as highlighted within the Pre-Assessment report attached to Appendix 6.

District heating was considered, but we were not aware of any existing systems coupled with the scale of the project not deemed appropriate or cost effective. However as stated within LP22 this would remain a material consideration in the future if required.

Electric air source heat pumps were considered but the requirement for external space to house the ancillary equipment coupled with the additional levels of noise these units would create for the residents both existing and future meant this solution was deemed site inappropriate.

A PV array was considered to help meet the target of a 35 % reduction in regulated carbon emissions in local and regional planning policy. Having approached three specialist firms (E M Power, Spirit Energy & UPS Power) it became apparent that a 5% carbon reduction could be achieved across the scheme if 28m2 of roof space were made available, no other outside space being available for this scheme. Unfortunately the existing plant and machinery located on the roof space left no spare capacity to provide the PV cells necessary for this 5% reduction.

Introduction

Site context:

The site is located within a dense urban environment surrounded by neighbouring buildings along all four facades. Each neighbouring use, and the site, had competing requirements from an acoustic, heritage, amenity and energy perspective.

All such issues had to be taken into consideration when agreeing the energy requirements of the proposed scheme.

The retail space at ground and basement levels, whilst not forming part of this application are to be refurbished, fire compartmentalised and upgraded as part of the overall project.

Planning Policy Context

In respect of energy efficiency, LBRuT Local Plan Policy LP 22 requires development to achieve the highest standard of sustainable design and construction, with proposals to achieve a 35% reduction in Carbon emissions. However, LP 22 also recognises the challenges of retro-fitting existing buildings.

London Plan policy SI 2 provides a regional policy direction and similarly encourage all new development to reduce Carbon emissions with an over-all aim to be net-zero. To achieve this, a hierarchy has been established to guide design – *be Lean, be Clean, be Green and be Seen*. The intention is to reduce energy consumption in the first instance through considered building design and then look at options for green technology to reduce reliance on unsustainable energy supplies.

Further planning context can be found within the planning statement accompanying this application coupled with the Design & Access Statement together with the additional reports also submitted.

Carbon Context

As far as building regulations are concerned, carbon emissions are calculated using the out-dated figures for grid carbon content.

In reality, the carbon content of grid electricity is lower and projected to decrease further in the future. This is predominantly because of the closure of large coal fired power stations.

It is predicted that by 2030 carbon emissions associated with grid electricity will be less than half the figure for gas.

Based on the predicted carbon trajectory of grid electricity, moving away from coal-powered plant is a positive move in the context of reducing site wide carbon emissions where possible. This formed the rationale for the above considerations.

However due to the above mentioned site specific issues of heritage, acoustic and amenity considerations on an existing site with numerous neighbouring facades, the heating and hot water system will remain gas fired boilers. These have been upgraded to high efficiency, gas saving, smart controlled systems. The kitchen hobs, ovens and white goods are to be high efficiency electric powered and all lights to be of low voltage, high efficiency LED’s.

Summarising the Carbon Dioxide Emissions

The original building was constructed in the 1800's. The modern day Building regulations have moved on substantially from this.

The basis for calculating Energy Consumption is set out within the Governments Standard Assessment Procedure (SAP) for residential development. These calculations are attached within Appendix 4 for each new unit.

Baseline Carbon Dioxide emissions again utilise Government SAP10 conversion factors also contained within the technical data sheets provided in Appendix 4.

These have been tabulated and summarised on Page 13 to ensure the technical data provided is analysed and presented in an easy to read and understandable format as set out in the Sustainable Construction Checklist SPD.

Our approach

The following hierarchy has been followed:

- **Be Lean** – reduce demand and consumption
- **Be Clean** – increase energy efficiency
- **Be Green** – provide low carbon renewable energy where possible

The energy strategy we are proposing focuses on reducing energy consumption and associated running costs, whilst minimising the complexity of the systems. It is by focusing on the building fabric that the subject building can be future proofed. This is the most costly and difficult to change in the future hence concentrating on the improvements that can be made in order to keep the building *Lean* are of utmost importance to achieve these goals.

The main energy demands in a residential scheme are generally space heating and artificial lighting. Therefore to be *Lean* and *Clean*; space heating demand can initially be reduced through passive architectural improvements.

In our view, a sensible energy strategy should aim to:

- reduce space heating demand passively as far as practical – via a high performance thermal envelope
- focus electrically driven smart plant and machinery on the remaining heat demands wherever possible
- lower air permeability
- focus on increased specification of windows as the weakest part of the external envelope
- low energy lighting

Heat Networks

Utilisation of the planned heating network has not been considered for the following reasons:

- Cost to extend any existing network would make the scheme unviable
- Focusing budgets on reduction of energy loss was deemed to be most appropriate for a scheme of this size and nature.

Summertime Thermal Comfort

Achieving good thermal comfort during the summer is easier when there is less heat within the space. The main sources of heat in a residential scheme:

• Solar gains

• People

• Equipment

Solar gains can be most effectively reduced through careful orientation of the building itself, although as an existing building this was not an option open to the design team.

The extensive brick envelope around the façade provides a high level of protection to combat solar gains further.

Heat gains from people are unavoidable but limited by the fact that the number of residents at the building will be minimal due to the size and location of each unit, especially during the peak sunshine hours when the majority of residents would be at work.

Trickle vents and acoustic passive ventilation are to be fitted to all liveable areas as well as windows being available for natural ventilation in summertime. These are specified within the acoustic report submitted with this application and within Appendix 1.

Thermal mass

Regardless of whether a space is naturally ventilated or mechanically cooled, good summertime thermal comfort is more easily achieved when the building's structure can absorb heat gains.

Thermal mass absorbs heat from a room during the daytime, thus moderating the peak daytime temperatures in the building, and delaying the peak temperature until late afternoon / early evening.

For thermal mass to work, during the night when it is cool outside it is necessary to release the heat that has been absorbed by the mass during the day, so that the thermal mass is ready to absorb more heat the next day.

For a naturally ventilated space this 'night cooling' is usually done by leaving the ventilation openings open overnight in hot weather.

For thermal mass to be effective, it needs to be able to absorb heat readily, which means it needs to:

- present a large surface area, exposed to the room, for heat transfer by convection and radiation;
- have a high thermal conductivity so heat can get in and out; and
- have a high heat capacity so it can store a lot of heat

Thermal mass will be provided in the majority of the building by the high mass of brick façade at the subject building in conjunction with all external walls being fitted with a build up of thermal super quilt and insulated boards as well as insulated internal walls.

This will have the effect that the building retains a stable temperature throughout the day thus requiring minimal heating and suffering nominal losses despite the external temperatures. The specification and product details are attached in Appendix 2.

Natural Ventilation

During the summertime, ventilation and cooling will be provided passively via natural ventilation. This reduces the annual energy consumption associated with mechanical fan power, and the need for an active cooling system thus providing a good base for CO2 reduction.

Achieving comfortable conditions in the summer involves lots of airflow. This can be achieved by cross-ventilating spaces – spaces have ventilation openings on at least two sides. This allows air to flow right the way across the space.

Working within the constraints of converting an existing building, the design maximises opportunity for cross-ventilating spaces with all but two units being dual aspect and acoustic vents provided to all windows across the scheme.

When combined with thermal mass, these airflows can provide good comfort during the summer months.

High volumes of air take the heat away in the day.

The structural fabric absorbs substantial heat including the internal wall insulation combined with the inner super-quilt (Appendix 1) fitted to the external envelope acting as a reflectant to prevent over heating keeping the internal temperatures stable.

Be Lean - Passive design

Our approach is to reduce the energy demand as far as possible through passive /energy efficient measures. Whilst expensive they are easy to incorporate – particular when converting an existing building, and provide the largest reduction in a buildings energy load.

A high specification building fabric will minimise both heat loss in the winter and heat gain in the summer. The fabric will also be sealed well, preventing uncontrolled airflow with its associated heat loss in the winter.

Proposed Fabric Specification:

To optimise the best value for the project, whilst meeting all legislative and client requirements, we propose the following standards for fabric performance:.

Fabric Spec:

	Minimum standard	Proposed Standard
Roof	0.20 W/m2K	0.12 W/m2K
Wall	0.3 W/m2K	0.18 W/m2K
Floor	0.25 W/m2K	0.16 W/m2K
Glazing (whole element)	2.0W/m2K	1.20 W/m2K (BFRC)
Air permeability	10 m3 /m2h	4.5 m3 /m2h
Glazing G value		n/a
Glazing light transmission		65% (general)

These provide a design, which complies with the London plan (a minimum target of 10% reduction in Carbon emissions due to passive methods), provide a good level of comfort and thermal performance, without introducing too many constraints on the building form.

Artificial lighting and daylight:

High efficiency LED light fittings will be specified throughout.

In common areas artificial lighting will be movement controlled so that it is only used when there is inadequate daylight combined with movement. Absence detection throughout will ensure unoccupied spaces are unlit.

Glazing levels have been optimised so that an appropriate level of sunlight/daylight can be used for the majority of the day (refer DL/SL note within Appendix 3), whilst limiting solar gains to acceptable levels.

All windows are to be replaced with heritage style double glazed sash windows with acoustic trickle vents. This will minimise acoustic pollution but control heat loss ensuring the entire external envelope meets the highest passive standards.

Be Clean - Alternative technologies

The following systems will be specified to further reduce energy demand and the associated carbon emissions.

Heating and hot water will be provided via individual high efficiency gas saving Vailliant boiler system within each self-contained unit, serving a low temperature distribution network with radiators in all spaces

- The seasonal efficiency of the system would be improved by the high specification of the entire external envelope.
- Considering current carbon figures for gas - A high efficiency gas saving boiler would add to the reduction of carbon emissions associated with the current heating system.

Domestic hot water production via local gas combination boilers:

- Hot water is heated instantaneously local to the application via the choice of a combination boiler in each unit.
- This avoids standing losses, and additional energy demand due to recirculation pumping.

Efficient controls:

Simple controls will also be utilised to minimise the energy use of the heating system. These include:

- Smart system Timers for each residential unit providing complete control to the occupant.
- Thermostatic heating control local to each space

Be Green - Renewable energy

To meet the 35% overall reduction in regulated carbon emissions mandated by the London Plan (SI 2) and Local Planning Policy (LP 22), a PV array was investigated but due to the lack of available space on the roof, the only way to achieve the 35% reduction was the treatment of the external building envelope and various other passive systems as discussed above.

The technical results of the SAP modelling together with the comparison summary are provided within the application and also within Appendix 4.

Considering the current architectural design, we predict that by following the energy strategy defined in this report, carbon emissions will be reduced from the Part L baseline in excess of 40% as calculated within the attached SAP certificates within Appendix 4.

The sustainability summary is also provided within the application and also within Appendix 5.

The BREEAM Excellent report is provided within the application and also within Appendix 6.

Energy Strategy – Existing Buildings

As this is undergoing a material change of use, it is a legal requirement under Building regulations to improve the performance of the existing thermal elements as defined in the Approved document Part L2B.

Thermal element	Standard
Wall – external or internal insulation	0.3 W/m2 .K
Pitched roof – insulation at ceiling level	0.16 W/m2 .K
Pitched roof – insulation at rafter level	0.18 W/m2 .K for the whole unit
Flat roof or roof with integral insulation	0.18 W/m2 .K
Floors	0.25 W/m2 .K

The following measures should be incorporated into the scheme as a starting point and as provided within the SAP summary contained within Appendix 4:

- Install new high efficiency LED light fittings
- Install lighting controls to provide daylight absence detection coupled with movement in all common areas
- Fabric performance as described above

Notwithstanding building requirements and considering the applicants aspirations towards reducing energy consumptions, we propose that the thermal performance of the roof and windows should be upgraded at least if not better than standards set in Approved document Part L2B, as the thermal performance of the fabric of the existing roof will be lower than the fabric of the refurbished scheme.

Doors between new and existing sections of building should be sealed to a high standard, to minimise heat loss from the new residential units.

Summary

Throughout the process, the design team have sought to improve the energy efficiency of the building in order to reduce the carbon emissions and improve the sustainability of the design overall. While there are inherent gains to retaining the existing built fabric of a building, this brings with it challenges such as solar orientation and maximising dual aspect. In addition, there were other considerations for this site relating to heritage, amenity and noise considerations.

As options for installing clean energy were limited (i.e. solar panels, ground source heat pumps), the focus of the design was on 'be lean' and reducing demand on energy in the first instance. This has been achieved by improving the thermal efficiencies of the existing building such as insulation and new windows; proposing high efficiency M&E systems; and enabling passive heating and cooling of each unit by the occupants. Overall as highlighted within the table below, this combination will go beyond the minimum target of a 35% reduction in carbon emissions required by local and regional planning policy.

CO2 Calculations & Savings Summary Table:

	Baseline emissions (kgCO2/yr)	Associated Total CO2 (kgCO2/yr				Reductions of CO2/yr %
		Hot Water	Space Heating	Fixed Electrical	Total Improved Emissions	
Unit 1	**3027.28**	339.64	761.63	307.09	**1408.34**	46.52
Unit 2	**1773.65**	262.98	375.54	191.04	**829.57**	46.77
Unit 3	**1653.16**	276.88	303.97	214.21	**795.06**	48.09
Unit 4	**1691.53**	233.46	300.72	352.25	**886.43**	47.57
Unit 5	**1789.58**	288.31	396.54	407.21	**1092.06**	50.003
Unit 6	**1756.12**	274.4	348.67	214.22	**837.29**	47.77
Unit 7	**2537.07**	307.06	618.79	249.44	**1175.29**	46.32
Unit 8	**2783.15**	339.53	663.64	298.95	**1302.12**	46.79

Further energy savings have been achieved via being clean with the re-purposing of an existing building coupled with the best construction practices and utilising recycled materials through a careful low impact strip out.

Further enhancement of the Lean principles have been the commitment to the water efficiency measures designing for 110 L per person per day as detailed above.

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Appendix 1 – Acoustic Report

CSPAcoustics

NOISE IMPACT ASSESSMENT

54 George Street, Richmond

Prepared for:
Dalesford Estates Ltd

Ref: 1633 001 JT V3

Date: 5th August 2021

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Document Revision History

Version	Reason	Date/Edits Made By:
1.0	Initial Issue	21/04/21 JT
2.0	Updated floor plans	21/04/21 JT
3.0	Updated with patron shout assessment	05/08/21 JT

1.00 Introduction

1.01 CSP Acoustics LLP has been instructed to complete a noise impact assessment (NIA) for a proposed residential development at 54 George Street, Richmond upon Thames. Figure 1 below shows the location of the proposed development and a detailed site layout is provided in Appendix B.

Figure 1: Proposed Residential Development

1.02 The site is located directly off George Street with a side entrance off Brewers Lane, which is a pedestrianised footpath. To the north west, the rear elevation overlooks the rear open-air dining area of The Britannia public house and other residential gardens and houses beyond. To the north east are the rear roof spaces of existing shops along George Street. Further retail and residential housing is located to the south west.

1.03 Planning permission is being sought for the redevelopment of the site to form a 3-storey building with retail remaining on the ground floor and 8 flats in the upper 2 storeys.

1.04 This revised report considers the impact of existing noise levels on the proposed residential development. The assessment considers noise levels against current national and local guidelines and where appropriate, recommendations are made on mitigation measures necessary to ensure an acceptable noise environment for future residents. It also includes an extended assessment of patron noise from the Britannia public house, as requested by the Environmental Health Officer.

2.00 Assessment Framework and Criteria

Planning Policy

2.01 The National Planning Policy Framework (NPPF), July 2018, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 180 of the NPPF states the following:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

2.02 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Practice Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below:

Table 1: Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum

Table 1: Noise Exposure Hierarchy			
Perception	Examples of Outcomes	Increasing Effect Level	Action
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.03 The NPPF and NPPG reinforce the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three noise policy aims, as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

2.04 The first aim of the NPSE requires that significant adverse impact should be avoided. The second aim requires that where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement, that: *"... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."*

2.05 The national policy documents do not contain any technical advice on acceptable noise levels. For this we are reliant on the nationally recognised design standards contained within the British Standard (BS) 8233:2014 and Professional Practice Guidance for new residential development, ProPG: Planning & Noise – May 2017.

Standards and Guidance

2.06 **BS 8233:2014:** Guidance on sound insulation and noise reduction for buildings establishes basic criteria for dwellings as follow:

Table 2: BS8233:2014 – "Table 4: Indoor ambient noise levels for dwellings"			
Activity	**Location**	**07:00 to 23:00 (Daytime)**	**23:00 to 07:00 (Night Time)**
Resting	Living Room	35dB, $L_{Aeq,16hrs}$	-
Dining	Dining room/ area	40dB, $L_{Aeq,16hrs}$	-
Sleeping (daytime resting)	Bedroom	35dB, $L_{Aeq,16hrs}$	30dB, $L_{Aeq,8hrs}$

2.07 For regular individual noise events with the potential to cause sleep disturbance such as vehicle pass-bys, it is stated that a guideline value may be set in terms of Single Event Level (SEL) or L_{AFmax}, depending on the character and number of events per night. No further guidance is provided with respect to an appropriate criterion which may be adopted for the assessment of such events. This assessment has therefore drawn upon the guidance detailed within the WHO: Guidelines for community noise document as summarised in the corresponding section below.

2.08 **World Health Organisation (WHO):** From research commissioned to examine community noise the WHO recommends an internal criterion to prevent sleep disturbance of less than 30dB $L_{Aeq,8hr}$ and a maximum level of 45dB L_{Amax} for a limited number of noise events. By assuming a reduction across a slightly open window of 15dB the WHO concluded that external levels should generally not exceed 45dB $L_{Aeq,8hr}$ at 1m from the facade of a dwelling and that regular external event levels should not exceed 60dB L_{Amax}. It should be noted that these are facade values.

2.09 For daytime WHO guidance recommends a maximum exposure level of 35dB $L_{Aeq,16hr}$ for indoor living areas (no L_{Amax} limit specified). By assuming a reduction across a window open for ventilation of 15dB the WHO concluded that external levels in relation to indoor use should not exceed 50dB L_{Aeq} at 1m from the facade of a dwelling.

2.10 For outdoor areas (i.e. balconies), BS 8233:2014 recommends that *"it is desirable that the external noise level does not exceed 50 dB L_{AeqT}, with an upper guideline value of 55 dB L_{AeqT}"* However, the document recognises that that these guideline values are not achievable in all circumstances, and in higher noise areas a compromise might be warranted. In such circumstances, development should be designed to achieve the lowest practicable levels in these external amenity spaces.

2.11 The Planning Practice Guidance on Noise, published on planningportal.gov.uk, gives further consideration relating to mitigating the impact of noise on residential developments and considers that noise may be partially off-set if residents of the dwellings have access to:

- A relatively quiet façade (containing windows to habitable rooms as part of their dwelling;
- A relatively quiet external amenity space for their sole use such as a balcony which is generally considered as desirable.
- A relatively quiet nearby external space for use by a number of residents as part of the amenity of their dwellings, and/or;
- A relatively quiet external, publicly accessible amenity space that is nearby (e.g. within a 5 minute walk)

2.12 **ProPG: Planning and Noise – New Residential Development**: The ProPG professional practice guidance on planning and noise has been jointly produced by the Chartered Institute of Environmental Health (CIEH), Institute of Acoustic (IOA) and Association of Noise Consultants (ANC).

2.13 The primary goal of the ProPG is to assist the delivery of sustainable development by promoting good health and well-being through the effective management of noise. The ProPG recommends a 2-stage approach; an initial noise risk assessment of the proposed development and where the results indicate that noise requires further consideration a full assessment in the form of an Acoustic Design Statement (ADS) which would include four key elements as follows:

- Element 1 – demonstrating a "Good Acoustic Design Process";
- Element 2 – observing internal "Noise Level Guidelines."
- Element 3 – Undertaking an "External Amenity Area Noise Assessment"
- Element 4 – Consideration of "Other Relevant Issues."

2.14 The advice contained within ProPG is based on the policy objectives contained within the NPPF and the objective noise guidelines within BS 8233:2014. However, the ProPG does not constitute an official government code of practice.

2.15 **London Borough of Richmond Upon Thames Council:** Discussions with the Environmental Health Department were held. Agreement to the processes highlighted above were agreed and they also highlighted that consideration needs to be given to the council's Supplementary Planning Document (SPD) - Development Control for Noise Generating and Noise Sensitive Development.

2.16 The SPD follows the same basic assessment method as highlighted in this section, but it also includes an initial noise risk assessment, which is to be undertaken before any other assessment is completed or mitigation considered. The noise risk assessment can be based on measurement or prediction (or a combination) and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future. Figure 2 summarises the Stage 1 Initial Site Noise Risk Assessment.

Noise Significance Risk	Noise Significance (without mitigation)	Indicative Noise Levels	Pre-Planning Application Advice
Negligible	No adverse noise effect	L_{Aeq}, 16hr <50dB L_{Aeq}, 8hr < 40dB	Low noise levels indicate that the development site is likely to be acceptable from a noise perspective.
Low	Increasing risk of adverse effect	L_{Aeq}, 16hr 50-63dB L_{Aeq}, 8hr 40-55dB	Noise levels in this region mean that the development site is likely to be acceptable from a noise perspective, provided that good acoustic design is followed and demonstrated in an Acoustic Design Statement which confirms how the adverse impacts of noise will be mitigated and minimised in the completed development.
Medium		L_{Aeq}, 16hr 63-69dB L_{Aeq}, 8hr 55-60dB	As noise levels increase, the site is less likely to be suitable for development from a noise perspective and planning consent is more likely to be refused unless a good acoustic design process is demonstrated in a detailed Acoustic Design Statement which confirms how adverse noise impacts will be mitigated and minimised, and which clearly demonstrates that any significant adverse noise impacts will be avoided in the completed development.
High		L_{Aeq}, 16hr >69dB L_{Aeq}, 8hr >60dB	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. The risk of refusal may be reduced by following a good acoustic design process. Applicants are strongly advised to seek expert advice and discuss the proposals in advance with the Local Authority.

Figure 2: Initial Site Noise Risk Assessment

2.17 Following release of the previously submitted noise impact assessment, there was a request for an additional noise assessment on patron noise emanating from the rear external space of the Britannia public house; but this time relating to sporadic noise. The SPD does not directly provide any specific criteria for sporadic noise events requiring maximum noise level assessment during the day, which is also the case for nationally recognised guidance documents and British Standards. Email discussions were held with the Environmental Health Office to establish a suitable assessment criterion in the absence of such guidance. These discussions are provided in Appendix C, and the additional assessment is provided in Sections 6.0 and 10.0 below.

3.00 Noise Survey Methodology

3.01 An environmental noise survey was undertaken between the 19th and 22nd March 2021 to determine the existing noise levels at the site.

3.02 Three noise measurement positions were chosen. One position was located on the façade overlooking George Street. The second position was located from the façade overlooking Brewers Lane. The third position was located at the rear of the site at roof level.

3.03 The measurement locations are shown in Figure 3, the survey results are summarised in the following sections.

3.04 Measurements were made using Norsonic 140 Sound Level Meters; these are Type 1 classified meters that were fitted with a wind shield. The equipment was operated in accordance with British Standard and ISO procedures. The equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level. Weather conditions over the course of the survey were cool, calm and dry.

3.05 Figure 3 below shows the measurement locations used in this assessment:

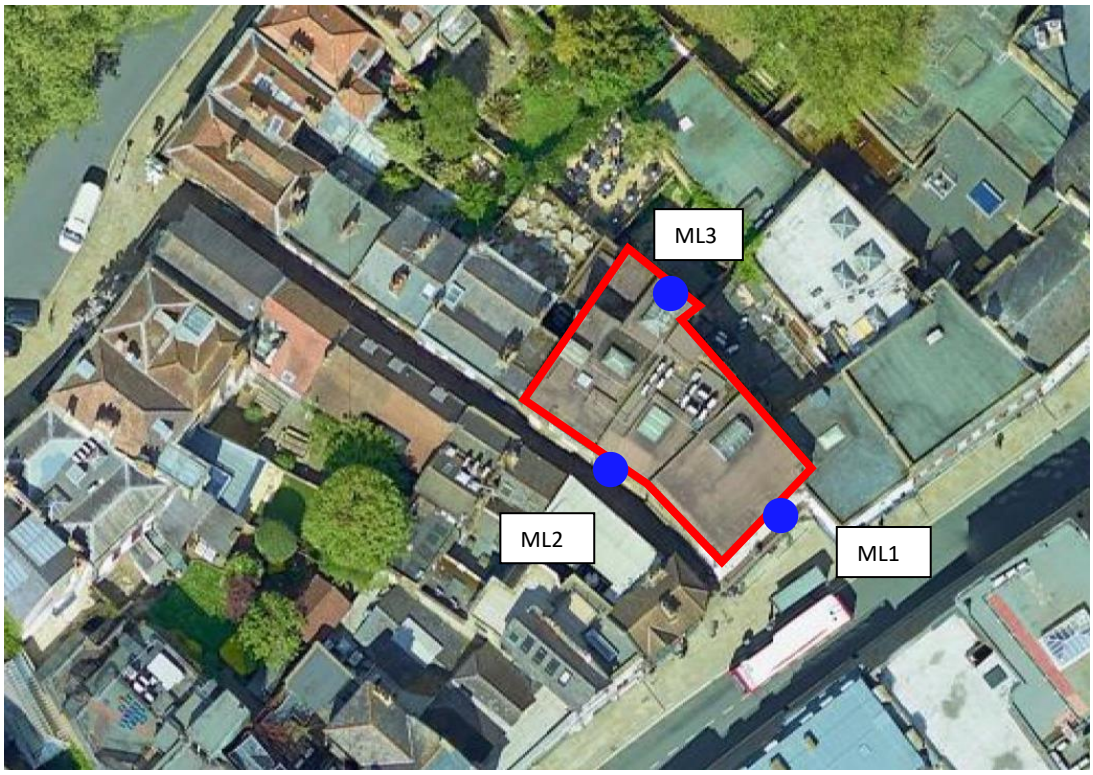


Figure 3: Noise survey locations

3.06 The meter's operating system allows for simultaneous measurement of noise over predetermined time periods, using various measurement parameters. Of interest to this assessment, the L_{eq}, L_{90} and L_{max} noise levels were recorded.

For information purposes it can be noted:

- L_{eq} is the equivalent continuous noise level, which is a method of averaging the varying noise level over the time period into a single figure value. The L_{eq} has the same sound energy as the fluctuating level over that period.
- L_{90} is the noise level exceeded for 90% of the time and is utilised in the assessment of background noise.
- L_{MAX} is the highest level within the measurement period.
- Where there is an 'A' used in the abbreviation above, such as L_{Aeq}, the 'A' stands for A-weighting and is the level corrected sound to represent what is perceived by the typical human ear.

4.00 Noise Survey Results

Location 1 - George Street

4.01 The sound level meter was positioned with the microphone projecting 1m out of a first-floor window. Equipment was operated in accordance with British Standard and ISO procedures. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator. There was no significant shift in the observed calibration level.

4.02 Measured levels are summarised below. These detail the daytime and night-time $L_{Aeq,T}$, L_{A90} and L_{AMax} levels at the measurement location:

Table 3: George Street Survey Results (Façade Level)				
Date	**Time period**	**$L_{Aeq,T}$ (dB)**	**L_{AMax} (dB)**	**$L_{A90,T}$ (dB)**
19th March 2021	Daytime T = 9 hours	68.1	--	56.7
19th/20th March 2021	Night time T = 8 hours	65.4	86.3	43.7
20th March 2021	Daytime T = 16 hours	67.7	--	56.6
20th/21st March 2021	Night time T = 8 hours	60.7	83.1	41.3
21st March 2021	Daytime T = 16 hours	66.7	--	54.4
21st/22nd March 2021	Night time T = 8 hours	61.2	82.3	41.6
22nd March 2021	Daytime T = 5 hours	68.4	--	57.6
Average Levels	**Daytime T = 16 hours**	**67.8**	**--**	**56.3**
	Night time T = 8 hours	**63.0**	**86.3**	**42.2**

4.03 The George Street Elevation overlooks a bus stop, where buses were stopping and running frequently past the site.

Location 2 – Brewers Lane

4.04 The sound level meter was positioned with the microphone projecting 1m out of a first-floor window. Equipment was operated in accordance with British Standard and ISO procedures. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator. There was no significant shift in the observed calibration level.

4.05 Measured levels are summarised below. These detail the daytime and night-time $L_{Aeq,T}$, L_{A90} and L_{AMax} levels at the measurement location:

Table 4: Brewers Lane Survey Results (Façade Level)				
Date	Time period	$L_{Aeq,T}$ (dB)	L_{AMax} (dB)	$L_{A90,T}$ (dB)
19th March 2021	Daytime T = 9 hours	60.3	--	50.3
19th/20th March 2021	Night time T = 8 hours	57.4	80.5	38.5
20th March 2021	Daytime T = 16 hours	61.0	--	51.2
20th/21st March 2021	Night time T = 8 hours	52.4	80.0	38.6
21st March 2021	Daytime T = 16 hours	59.5	--	48.3
21st/22nd March 2021	Night time T = 8 hours	53.0	77.9	37.7
22nd March 2021	Daytime T = 5 hours	60.8	--	51.3
Average Levels	**Daytime T = 16 hours**	**60.4**	**--**	**50.3**
	Night time T = 8 hours	**54.9**	**80.5**	**38.3**

4.06 The Brewers Lane Elevation overlooks a narrow pedestrianised footpath, noise from George Street was able to travel down the path, but lesser noise from pedestrians created the general noise climate here.

Location 3 – Rear Rooftop

4.07 The sound level meter was positioned with the microphone located on a tripod at approximately 1.2m above the flat roof. The position had a clear view of the rear garden areas. Equipment was operated in accordance with British Standard and ISO procedures. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator. There was no significant shift in the observed calibration level.

4.08 Measured levels are summarised below. These detail the daytime and night-time $L_{Aeq,T}$, L_{A90} and L_{AMax} levels at the measurement location:

Table 5: Rooftop Survey Results (Free Field Level)				
Date	Time period	$L_{Aeq,T}$ (dB)	L_{AMax} (dB)	$L_{A90,T}$ (dB)
19th March 2021	Daytime T = 9 hours	51.5	--	47.3
19th/20th March 2021	Night time T = 8 hours	53.3	74.0	40.3
20th March 2021	Daytime T = 16 hours	58.3	--	47.3
20th/21st March 2021	Night time T = 8 hours	48.2	76.3	39.7
21st March 2021	Daytime T = 16 hours	50.6	--	45.6
21st/22nd March 2021	Night time T = 8 hours	47.3	65.7	39.6
22nd March 2021	Daytime T = 5 hours	51.9	--	48.5
Average Levels	**Daytime T = 16 hours**	**54.4**	**--**	**47.2**
	Night time T = 8 hours	**50.4**	**76.3**	**39.9**

4.09 The rooftop location had a softer soundscape but was still controlled by road traffic noise. In the lulls, distant mechanical services plant could be distinguished.

4.10 A summary of measured noise levels are shown in Table 6. It should be noted that the reported $L_{Aeq,\ T}$ (dB) levels are the logarithmically averaged noise levels. Whereas the $L_{A90,\ T}$ (dB) levels are arithmetically averaged noise levels. The levels are rounded to the nearest whole number.

Table 6: Noise Survey Results at 54 George Street (free field)					
Measurement Location	Daytime (T = 16 hours)		Night time (T = 8 hours)		
	$L_{Aeq,\ T}$	$L_{A90,T}$	$L_{Aeq,\ T}$	L_{Amax}	$L_{A90,T}$
George Street (ML1)	65	53	60	83	39
Brewers Lane (ML2)	57	47	52	78	35
Rear Rooftop (ML3)	54	47	50	76	40

4.11 The equivalent octave band data used within the assessment is provided in Table 7.

Table 7: Octave band data for measured noise levels									
Location		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
George Street	Daytime L_{Leq}	72	65	67	63	63	61	58	59
	Night time L_{Leq}	75	62	63	60	59	58	56	58
Brewers Lane	Daytime L_{Leq}	66	62	60	58	56	53	48	47
	Night time L_{Leq}	62	58	55	53	51	50	49	62
	L_{Lmax}	83	86	81	83	72	68	67	78
Rear of Site	Daytime L_{Leq}	60	58	57	57	54	49	39	33
	Night time L_{Leq}	56	53	53	52	49	44	34	28
	L_{Lmax}	71	64	71	76	71	72	69	58

5.00 External Patron Noise Assessment

5.01 The proposed development will have flats that will face towards an open-air dining area which is connected to The Britannia public house. There are two defined areas to the rear area of The Britannia: A first-floor terrace; and a ground floor garden. The first-floor terrace has a dining area with approximately 9 tables. It is expected that this area could accommodate 4 covers per table, which equates to 36 people. The ground floor garden equally has approximately 9 tables and could typically accommodate 36 people. Therefore, on a busy night it is expected 72 patrons could be using the outside areas. The image below in Figure 4 shows this external area and the closest façade of the proposed flats.

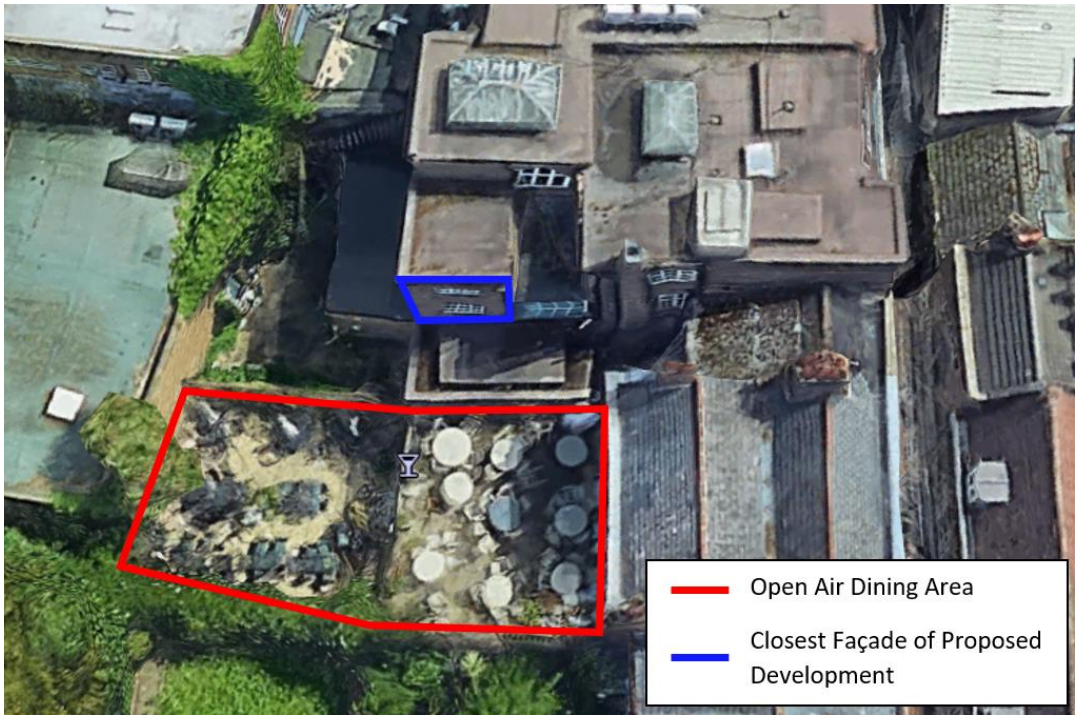


Figure 4: Open Air Dining Area

5.02 We will base the worst-case example on 72 people in total using the outside areas at once. In reality this would probably rarely occur, but for the purpose of this assessment we have made this assumption.

5.03 To quantify potential noise from people with raised voices at the external dining area, the sound pressure levels associated with a raised voice, as detailed in ANSI S3.5-1997, is considered as shown below in Table 8.

Table 8: Raised voice effort sound pressure level at 1 m in the free-field

Description	Linear sound pressure levels (dB) at Single octave band frequency (Hz)							dB(A)
	125	250	500	1k	2k	4k	8k	
Raise voice effort at 1 m	55.5	61.5	65.6	62.3	56.8	51.3	42.6	66.5

5.04 To determine the cumulative effect of multiple people using the external dining area, it is necessary to consider how many people at any one time may be speaking.

5.05 Research into the Lombard effect for groups of people [Jens Holger Rindel, "Acoustical capacity as a means of noise control in eating establishments", Joint Baltic-Nordic Acoustic Meeting, BNAM 2012, Odense, Denmark, 2012] has suggested using a typical group size of 3.5 people for every speaker.

5.06 Therefore, on the assumption of up to 72 people using the outside space at any one time this would equate to an average of 20.6 people speaking at the same time, 10.3 per outside space (terrace and garden). On this basis a sound power level is calculated according to:

$$L_{w,\,1\ person} = L_p + 20*\log_{10}(1m) + 11, \text{ and } L_{w\ 10.3\ speakers} = L_{w,\,1\ person} + 10*\log_{10}(10.3)$$

Table 9: Calculated sound powers for raised voices									
Description	Group size	Linear sound power levels (dB) at Single octave band frequency (Hz)							dBA
		125	250	500	1k	2k	4k	8k	
Raised voice effort L_w	1 person	66.5	72.5	76.6	73.3	67.8	62.3	53.6	77.5
	10.3 people	76.6	82.6	86.7	83.4	77.9	72.4	63.7	87.7

5.07 The calculations associated with the patron noise at the nearest façade of the proposed development are shown in Table 10 below.

Table 10: Calculated noise levels from the outside space with 72 people		
Description	First Floor Terrace (36 people)	Ground Floor Garden (36 people)
Source Patron Noise (Lw)	88 dBA	88 dBA
Distance correction	-14 (at 6m)	-19 (at 9m)
External amenity level (Lp)	63 dBA	58 dBA
Combined Total (free field)	**64 dBA**	

6.00 External Sporadic Patron Noise Assessment

6.01 Further to discussions with the Environmental Health Officer, a further assessment is required to provide reassurance that sporadic patron noise to the proposed development is unlikely to cause disturbance.

6.02 Please refer to Appendix C for the discussions to date regarding this additional assessment.

6.03 To enable this extended assessment, the definition of a sporadic noise event has been quantified as the noise of a person shouting in the external space of the Britannia.

6.04 The usual practice to assess sporadic and intermittent noise events like shouting is to use the L_{Amax} descriptor, which is the a-weighted maximum noise level of an event. These maximum noise level events are utilised to protect people from sleep disturbance. They are not typically applied to daytime/evening activities. As such, the L_{Amax} criteria is normally applied during the night time hours between 23:00 and 07:00. The use of this descriptor during daytime hours is ambiguous as sleep disturbance is not quantified when people are awake. However, it would provide a useful tool to gauge the possibility of disturbance from an external shouting event on somebody resting within their residence.

6.05 As the criteria is based on sleep disturbance, it is likely that a daytime equivalent would not be the same as night time, it is likely to be higher or less sensitive. In order to provide a robust assessment based on current guidelines and criteria, I would suggest the following approach: The criteria for the internal L_{Aeq} of a bedroom at night is 30 dB, and the acceptable maximum noise event level to avoid sleep disturbance is L_{Amax} 45 dB, it could be considered reasonable to add 15 dB to the internal daytime noise criteria to create a maximum noise event (L_{Amax}) level for sporadic and intermittent daytime events. Based on the nationally recognised noise limit of $L_{Aeq,T}$ 35 dB for daytime, the L_{Amax} level would become 50 dB. Based on this new criterion, an updated assessment can be completed to take into account sporadic daytime noise events including shouting.

6.06 This assessment of a L_{Amax} shouting event is based on the same reference used in Section 5.0 above, this being ANSI S3.5-1997. A person shouting is a sporadic noise event that may intermittently occur. It is unlikely that a person shouting in unison with other people would arise, unless a communal event is occurring (such as a sporting event). For the purposes of this assessment the assumption is that six people could shout at exactly the same time. Based on this assumption, the noise level of one person shouting is logarithmically summed together and then calculated to the nearest receptor. This is developed below.

6.07 To quantify the potential noise from people shouting in the external dining area, the sound pressure levels associated with a shouting voice, as detailed in ANSI S3.5-1997, is considered and shown below in Table 11.

Table 11: Sound pressure level of a person shouting at 1 m in the free-field								
Description	Linear sound pressure levels (dB) at Single octave band frequency (Hz)							dB(A)
	125	250	500	1k	2k	4k	8k	
Shouting at 1 m	59	65	74.7	79.8	75.8	68.9	58.2	82.3

6.08 To determine the cumulative effect of multiple people shouting in the outside space, it is necessary to consider how many people at any one time may be shouting. The assumption would be that up to 6 people may shout together at the same moment, 3 per external space (terrace and garden). On this basis a sound power level is calculated according to:

$L_{w,\,1\ person} = L_p + 20*\log_{10}(1m) + 11$, and $L_{w\ 3\ shouts} = L_{w,\,1\ person} + 10*\log_{10}(3)$

Table 12: Calculated sound powers for shouting									
Description	Group size	Linear sound power levels (dB) at Single octave band frequency (Hz)							dBA
		125	250	500	1k	2k	4k	8k	
Shouting L_w	1 person	70.0	76.0	85.7	90.8	86.8	79.9	69.2	93.3
	3 people	74.8	80.8	90.5	95.6	91.6	84.7	74.0	98.0

6.09 The calculations associated with the patron noise at the nearest façade of the proposed development are shown in Table 13 below.

Table 13: Calculated noise levels from the outside space with 6 people shouting		
Description	First Floor Terrace (3people)	Ground Floor Garden (3 people)
Source Patron Shouting Noise (Lw)	98 dBA	98 dBA
Distance correction	-14 (at 6m)	-19 (at 9m)
External amenity level (Lp)	73 dBA	68 dBA
Combined Total (free field)	**74 dBA**	

6.10 The predicted noise level is 74dB outside the nearest façade of the proposed development (free field). This translates to an internal level of 62dB L_{Amax} with windows open for ventilation. Therefore, a scheme of noise mitigation will be necessary to reduce this noise level internally (see Section 10.0).

7.00 Existing Mechanical Service Plant

7.01 It was noted during an earlier application from the EHO about their concern of a/c equipment on the adjoining lower roof. This has been identified and is shown below in Figure 5.

Figure 5: Plant on Neighbouring Lower Roof

7.02 The picture shows three condenser units and two rain hoods. One of these hoods was being used to enable pipework to enter the building and was sealed with expandable foam. The other hood is considered to be a ventilation outlet. Due to its size, it is only considered to be a small extractor fan rather than commercial extract. Therefore, it will not likely create a perceptible level of noise when compared to the condenser units themselves.

7.03 The condenser units have been identified as Daikin units. The exact models were not distinguishable, but very similar models (if not the same) have been identified. The assessment is based on 2x Daikin RXS71 units and 1x Daikin RXS50 unit.

7.04 The proposed development will have windows overlooking the flat roof where these units are sited. The closest window has been estimated to be approximately 3 metres from the units. Table 14 shows the estimated noise levels from the three a/c units.

Table 14: Calculated noise levels from the a/c units on the neighbouring lower roof	
Description	**Noise Level**
Daikin RXS71 (Lw)	66 dBA per unit
Daikin RXS50 (Lw)	62 dBA per unit
Combined total of 3 units (Lw)	69.8 dBA
Distance to nearest receiver	3 metres
External level (Lp) (free field)	**52.3 dBA**

7.05 This level is based on the units running at full duty, which is only likely to occur during the day. It is not expected they will operate at full duty through the night.

8.00 Stage 1 - Initial Site Noise Risk Assessment

8.01 The first item to assess is the initial site noise risk assessment. Tables 6, 10 and 14 provide the estimated noise levels impacting upon the site. The table below compares these to the criteria from Figure 2.

Table 15: Calculated Site Noise Risk Assessment				
Façade Location	**Noise source**	**Time Period**	**Noise Level**	**Noise Significance Risk**
George Street	Road traffic and pedestrian	Day	65	Medium
		Night	60	Medium
Brewers Lane	Road traffic and pedestrian	Day	57	Low
		Night	52	Low
Rear of Site	Environment	Day	54	Low
		Night	50	Low
	Open Air Dining Area	Day	64	Medium
	Neighbouring a/c units	Day	52	Low
		Night	<52	Low

8.02 The initial site noise risk assessment defines the noise significance risk of 'Low' and 'Medium' as follows:

- 'Low' – "*Noise levels in this region mean that the development site is likely to be acceptable from a noise perspective, provided that good acoustic design is followed and demonstrated in an Acoustic Design Statement which confirms how the adverse impacts of noise will be mitigated and minimised in the completed development.*"

- 'Medium' – "*As noise levels increase, the site is less likely to be suitable for development from a noise perspective and planning consent is more likely to be refused unless a good acoustic design process is demonstrated in a detailed Acoustic Design Statement which confirms how adverse noise impacts will be mitigated and minimised, and which clearly demonstrates that any significant adverse noise impacts will be avoided in the completed development.*"

8.03 Based on this assessment, the table shows that noise from George Street and patron noise from the neighbouring open air dining area need to be fully addressed. The low-level risks will also be considered in this report.

9.00 Noise Assessment - Acoustic Design Statement

9.01 Generally, there is a hierarchy of noise control that should be considered in all cases, and the layout should demonstrate that the following logical process, which would represent good design, has been followed as far as possible:

- Maximise the spatial separation of noise source(s) and receptor(s);
- Using existing topography and existing structures to screen the proposed development site from significant sources of noise;
- Incorporating noise barriers as part of the scheme to screen the proposed site from significant sources of noise;
- Using the layout of the scheme to reduce noise propagation across the site;
- Using the orientation of buildings to reduce the noise exposure of noise sensitive rooms;
- Using the building envelope to mitigate noise to acceptable levels.

9.02 The advice in ProPG acknowledges that where noise-sensitive developments are proposed in noisy locations there is a limit to the extent to which good acoustic design can be achieved and that it may not always be possible to achieve acoustic standards with windows open or accepting that noise levels in parts of the outdoor amenity areas may not be optimal. In such cases suitable living conditions, in line with the guidance in BS 8233:2014, can still be achieved by using the building envelope to control noise levels.

9.03 The development site is a refurbishment of an existing building and is constrained within its own site boundary. In terms of noise, the location of the site restricts the opportunities to reduce the impact of noise through the use of noise barriers, and layout of the scheme.

Stage 2 - Internal Design Noise Levels

9.04 It is expected that design noise limits contained in BS8233:2014 (as repeated in para. 2.06) are achieved internally. The assessment is based on occupants having the ability to open windows for ventilation. A partially open window typically reduces external noise by 15 dB. By taking this into account the internal noise levels would be as follows:

Table 16: Calculated Site Noise Risk Assessment				
Façade Location	**Noise source**	**Time Period**	**Internal Noise Level**	**BS8233 Criteria**
George Street	Road traffic and pedestrian	Day	53	35
		Night	48	30
Brewers Lane	Road traffic and pedestrian	Day	45	35
		Night	40	30
Rear of Site	Environment	Day	42	35
		Night	38	30
	Open Air Dining Area	Day	52	35
	Neighbouring a/c units	Day	40	35
		Night	<40	30

9.05 It can be seen that the external noise levels associated with the surrounding noise sources will exceed the allowable internal noise levels and so it would be necessary to have windows closed to achieve reasonable noise levels in accordance with BS 8233:2014.

9.06 Noise mitigation will be required to ensure that noise levels remain acceptable. As a matter of course, thermal double glazing would be provided to meet the thermal requirements of the Building Regulations and the specification of this can be upgraded to mitigate noise by a sufficient amount to ensure internal noise levels are within the guideline values.

9.07 To enable windows to be closed, alternative means of ventilation shall be provided i.e. acoustic trickle vents, through-wall ventilators.

9.08 This is discussed further in Section 9.0 - Mitigation.

Stage 3 – Design Noise Levels for External Amenity Spaces

9.09 Flats inherently have little or no private outdoor amenity space leading directly from the dwelling. However, as part of the proposal, the developer is looking to include integral covered balcony areas, or wintergardens, for some of the flats at the rear. This external area will provide the occupants of the flats some desirable outdoor amenity space, although this would be affected by noise from the open-air dining area of the adjacent public house The Britannia (when it is in operation).

9.10 It is understood the conditioned operational times of The Britannia's external areas are as follows:

- The upstairs dining area must close by 9.30pm. The doors must be kept closed at 9.30pm, except for fire escape.
- The downstairs beer garden must close and be cleared of patrons by 11.00pm.

This shows that both external areas are daytime only activities and the closest area, the upstairs dining area, closes earlier.

9.11 The external noise level due to the open-air dining area is expected to be approximately 64 dBA. The balcony area / wintergarden will be contained within the internal footprint of the existing building. See below in Figure 6 a snip of the relevant floor plan of the first floor flat 01.

Figure 6: Snip of floor plan showing balcony area

9.12 With the existing windows removed (and enlarged where appropriate, to satisfy daylight requirements) it is expected that the noise level in the balcony areas would reduce by approximately 5 dB due to the screening effect offered by the remaining façade. This would reduce the level down to 59 dBA.

9.13 WHO guidance states that serious annoyance may occur if the $L_{Aeq,16h}$ in outdoor amenity areas is greater than 55dB or moderate annoyance may occur if the noise levels is greater than 50dB. BS 8233 recognises that "*it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$, which would be acceptable in noisier environments".* BS 8233 then states "*it is also recognised that these guideline values are not achievable in all circumstances where development may be desirable".*

9.14 It is recommended that openable windows are fitted to the façade openings, effectively creating a wintergarden. Then it can be left up to the discretion of the occupant to control the amount of noise ingress into the balcony area. With a partially open window, the noise level would drop to 49 dBA inside the balcony area, with further attenuation possible if fully closed. It can also be fully opened as the typical noise level at the rear (without noise from The Britannia) has be estimated to be approximately 49 dBA (54 – 5 = 49) from the general environment.

10.00 Mitigation

10.01 Noise mitigation will be required to lessen the impact of external noise. Due to the limitations at the proposed development, the only practical mitigation approach would be to close windows to ensure that internal noise levels comply with BS8233 criteria.

10.02 The mitigation advice is based on the proposed site layout as seen in Appendix B. Should this layout change significantly it may need to be reassessed.

10.03 The influence of the existing noise environment on the proposed development site has been determined using the assessed daytime and night time average noise levels set out in the various sections above. The noise levels are considered for each façade in turn. The L_{Amax} levels are typically the controlling factor at night, and these will be considered in terms of noise impact to bedrooms.

10.04 Levels of sound insulation performance required have been determined using the method set in Appendix G of BS8233:2014. This method determines internal noise levels likely to arise within a room using the façade incident noise level and the composite sound insulation performance of the building envelope.

10.05 The required sound insulation performance for windows and ventilators for the proposed flats, based on external noise sources, are provided in Table 17. These show the worst-case noise levels impacting upon the façade listed.

Table 17: Acoustic performance specification for windows and ventilators

Façade Location	Most Sensitive Room and Time Period	External Noise level dB	Internal Noise		Glazing Type Rw dB	Ventilators D_{new} dB
			$L_{Aeq,T}$	L_{Amax}		
George Street	Living Rooms - Daytime	68 L_{Aeq}	35 dB	--	38	35
Brewers Lane	Bedrooms – Night time	83 L_{Amax}	--	45 dB	43	55
	Living Rooms - Daytime	57 L_{Aeq}	35 dB	--	33	35
Rear – North East	Bedrooms – Night time	78 L_{Amax}	--	45 dB	38	46
Rear – North West (Overlooking Britannia's Terrace)	Bedrooms – Night time	78 L_{Amax}	--	45 dB	38	46
	Living Rooms - Daytime	64 L_{Aeq}	35 dB	--	33	35

10.06 Sound insulation performances summarised for windows and vents in Table 17 are given in terms of single figure performances. It is recommended that where selecting windows and vents, they must also provide the minimum octave band sound insulation performances set out in Table 18.

Table 18: Minimum Sound Insulation performance (R) of windows and vents of the proposed development in dB							
Glazing							
R_W Performance dB	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**
43	29	30	34	40	43	48	54
38	22	26	27	34	40	38	46
33	16	20	19	29	38	36	45
Vents							
D_{new} Performance dB	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**
55	40	47	46	49	56	66	75
46	31	35	42	41	47	52	60
35	32	32	36	36	35	34	35

10.07 With reference to Table 15, the following construction is typically given with respect to the following details:

- 43dB R_w glazing – can typically be achieved with a double glazing configuration of 12/15/8.8, which is 12mm glazing, 15mm airgap and 8.8mm laminate glazing
- 38dB R_w glazing – can typically be achieved with a double glazing configuration of 6/12/10, which is 6mm glazing, 12mm airgap and 10mm glazing
- 33dB R_w glazing – can typically be achieved with a double glazing configuration of 6/12/6, which is 6mm glazing, 12mm airgap and 6mm glazing
- 55 dB D_{new} Vent – can typically be achieved with a high performance acoustic through wall trickle vent, such as the Greenwood MA3051.
- 46 dB D_{new} Vent – can typically be achieved with a high performance acoustic through wall trickle vent, such as the Greenwood AAB4000.
- 35 dB D_{new} Vent – can typically be achieved with a basic acoustic trickle vent.

10.08 The chosen window and vent supplier must provide a sound insulation test certificate which demonstrates the specified performance shown in Table 15 and 16 can be achieved.

10.09 The required sound insulation performances can typically be achieved by trickle ventilation or through wall ventilators from the following suppliers:

https://www.greenwood.co.uk/acoustic
https://www.titon.com/uk/products/ventilation-systems/
http://www.passivent.com/
https://www.renson.eu/en-gb

10.10 In regard to the external sporadic patron noise assessment, it should be noted that when the recommend scheme of acoustic protection from the glazing and vents is applied, the predicted internal noise level inside the worst effected flat is estimated to be L_{Amax} 36 dB for the bedroom and L_{Amax} 40 dB for the living room. If this is compared to the criteria discussed in Section 6.0, which is to be no higher than L_{Amax} 50 dB, these results are seen to be 14 dB and 10 dB below this maximum noise level, respectively. Furthermore, when compared to the night time limit for bedrooms of L_{Amax} 45 dB, this is 9 dB below that limit.

10.11 Therefore, it is considered this is a positive indication of minimal annoyance originating from sporadic noise events located within the external area of the Britannia public house.

11.00 Stage 4 – Assessment of Other Relevant Issues

11.01 The final element of this report is an assessment of other relevant issues, including compliance with relevant national and local policy; the magnitude and extent of compliance with ProPG; likely occupants of the development; unintended adverse consequences resulting from the acoustic design and wider planning objectives.

Compliance with relevant national and local policy

11.02 In terms of noise sensitive development, the main aims of the NPPF is the avoidance of significant adverse effects and the mitigation and reduction of any adverse impacts to a minimum. As discussed in Section 2.0 of this report, the current nationally recommended internal noise levels for dwellings are given in BS 8233:2014 'Guidance on Sound Insulation & Noise Reduction for Buildings.' These guideline values are based on the WHO Guidelines for Community Health. The World Health Organisation guidance is referenced in the NPSE.

11.03 The WHO guideline values are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would result in any psychological, physiological or sociological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL) and therefore exceedance of the guideline values cannot be considered to be Significant adverse effects (SOAEL).

11.04 As shown above, as a result of the proposed mitigation measures, internal noise levels will meet or improve upon the guidelines in BS 8233:2014. It is therefore concluded that internal noise levels will not cause significant adverse impacts to future residents in accordance with the policy aims of the NPPF.

Likely occupant of the development

11.05 With regard to the likely occupants of the development; new residents are likely to choose the site based on its location and close proximity to the town centre, local amenities and open spaces. As such they would reasonably expect a certain level of noise from roads and the active urban environment. Provided compliant internal noise levels can be achieved, the occupants can decide on whether to let the urban noise environment in via open windows or choose to close these for a controlled restful internal ambiance.

Wider Planning Objectives

11.06 The scheme has been designed taking into account the advice from the London Borough of Richmond upon Thames in relation to previous schemes. The evolution of the design of the scheme and the wider planning objectives discussed within the Design Access Statement and other planning documents are to be submitted with the application.

12.00 Conclusion

12.01 CSP Acoustics have been appointed to undertake a noise impact assessment for a proposed residential development at 54 George Street, Richmond upon Thames. This report includes a revision, as required by the Environmental Health Officer, to include an assessment of sporadic noise, such as shouting, originating from the outside areas of the Britannia public house.

12.02 The revised scope and approach of the assessment has been agreed in consultation with London Borough of Richmond upon Thames and has been completed considering both local and national planning policy. The assessment has also drawn upon applicable environmental noise guidance documents and British Standards.

12.03 Comprehensive surveys have been carried out at locations representative of the proposed residential flats.

12.04 Taking into account the above and having assessed the main noise impacts onto the development against national standards, it is concluded that mitigation measures can be incorporated into the design to ensure acceptable internal noise levels within the proposed residential development are in line with national and local policy aims.

12.05 The assessment concludes that mitigation will be required to ensure that the internal noise levels meet or are below those stated within BS 8233. Alternative ventilation in the form of acoustic trickle vents and acoustic glazing will provide sufficient mitigation against road traffic noise, patron noise, mechanical services noise plant noise and the general noise environment.

12.06 The additional assessment of sporadic noise, such as patrons shouting, has been completed using referenced source levels. Provided the recommended scheme of acoustic mitigation is employed, it has been shown that the criteria established within this report would be achieved.

CSPAcoustics

Report Author:

James Tee
BSc (Hons) PgDip MIOA
Senior Acoustic Consultant

Checked By:

Brian Smith
BSc BArch RIBA RIAS MaPS
Partner

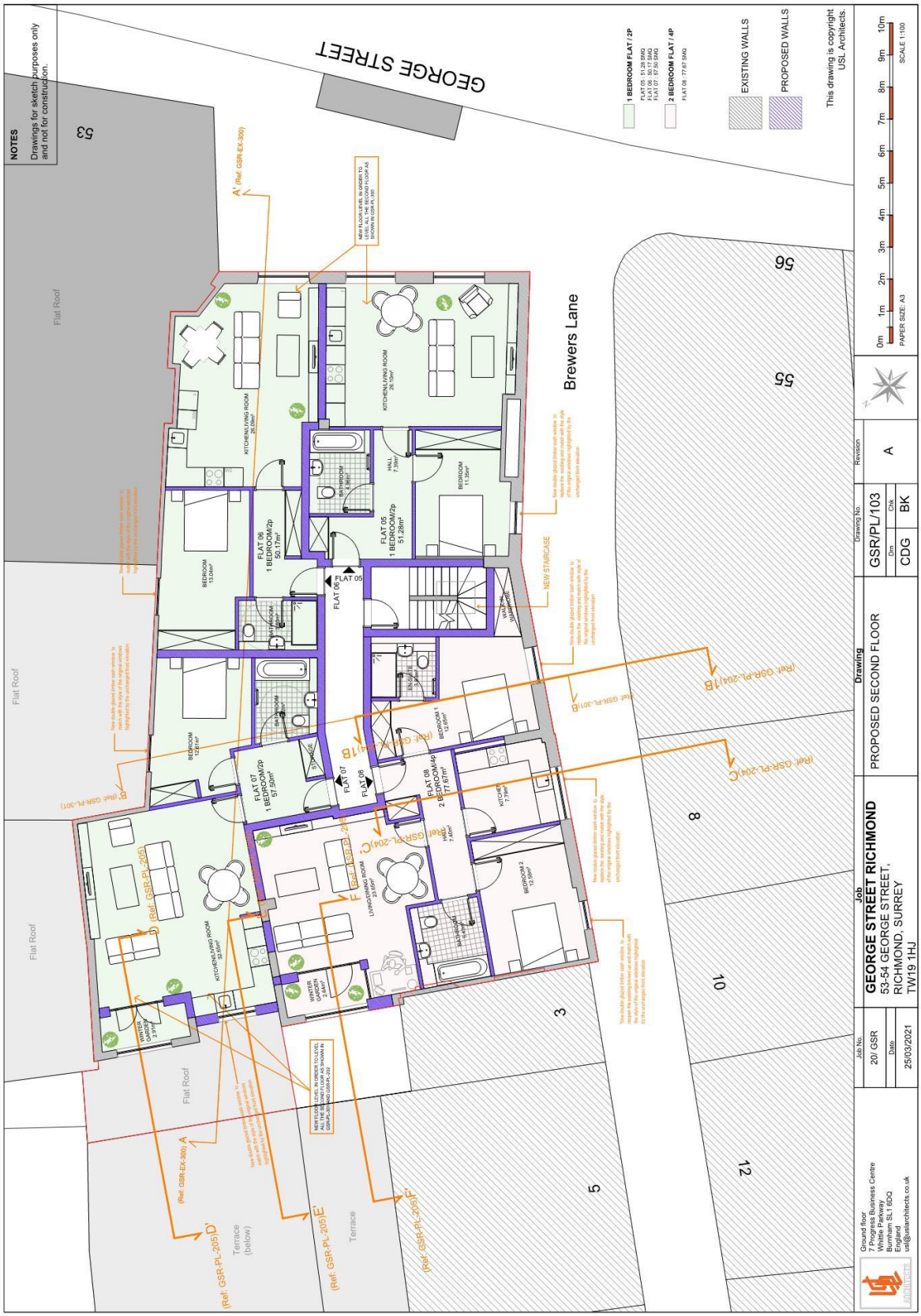
Appendix A: Acoustic Glossary

Term	Description
Acoustic environment	Sound from all sound sources as modified by the environment
Ambient Noise	Totally encompassing sound at a given location, usually composed of sound from many sources near and far
Background Noise	The lowest noise level present in the absence of any identifiable noise sources. This is usually represented by the L_{A90} measurement index.
Break-in	Noise transmission into a structure from outside
Break-out	Noise transmission from inside a structure to the outside
dB (decibel)	Defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	Level of sound across the audible spectrum with a frequency filter to compensate for the varying sensitivity of the human ear to sound at different frequencies at a lower SPL
Façade Level	A sound field determined at a distance of 1m in front of a building façade.
Free-field Level	A sound field measured at a point away from reflective surfaces other than the ground
Frequency (Hz)	Number of cycles of a wave in one second measured in Hertz.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants
$L_{Aeq,T}$	$L_{aeq,T}$ is defined as the equivalent continuous "A"-weighted Sound Pressure Level in dB over a given period of time.
L_{Amax}	Maximum A - weighted sound pressure level recorded over the measurement period. Usually has a time constraint (L_{afmax}, L_{asmax})
Measurement time interval, T	Total time over which measurements are taken
Noise	Unwanted sound.
Noise-sensitive receptors (NSRs)	Any occupied buildings outside the assessment location used as a dwelling (including gardens), place of worship, educational establishment, hospital or similar institution, or any other property likely to be adversely affected by an increase in noise level
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Percentile level $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for N% of a specified time period
Rating level, $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound

Term	Description
Residual sound level, Lr = $L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T
Sound power level, LWA	Ten times the logarithm to the base 10 of the ratio of the sound power radiated by a sound source to the reference sound power, determined by use of frequency-weighting network "A"
Sound pressure level	Is the Root Mean Squared value of the instantaneous sound level over a period of time expressed in decibels, usually measured with an appropriate frequency weighting
Specific sound level, Ls = $L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r
Specific sound source	The sound source which is being assessed
Third octave band	Octave bands sub-divided into three parts, equal to 23% of the centre frequency

CSPAcoustics

Appendix B: Proposed Site Layout


GEORGE STREET
Brewers Lane
NOTES
Drawings for sketch purposes only and not for construction.
1 BEDROOM FLAT / 2P
2 BEDROOM FLAT / 4P
EXISTING WALLS
PROPOSED WALLS
This drawing is copyright USL Architects.
SCALE 1:100
PAPER SIZE: A3
Job
GEORGE STREET RICHMOND
53-54 GEORGE STREET,
RICHMOND, SURREY
TW19 1HJ
Drawing
PROPOSED SECOND FLOOR
Drawing No.
GSR/PL/103
Revision
A
Job No.
20/ GSR
Date
25/03/2021
Ground floor
7 Progress Business Centre
Whittle Parkway
Burnham SL1 6DQ
England
usl@uslarchitects.co.uk
Flat Roof
Terrace (below)
NEW STAIRCASE

Appendix C: Post report email discussions with Environmental Health Office, which incited this revised report

From: Hedley Pugh <Hedley.Pugh@merton.gov.uk>
Sent: 27 July 2021 19:34
To: James Tee <jamest@cspacoustics.co.uk>
Cc: Davies, Jack <Jack.Davies@RichmondandWandsworth.gov.uk>
Subject: FW: 1635 - 54 George Street, Richmond (21/1521/FUL) - NIA Response

Hello James,

Sorry for the delay in responding – I work part time which on occasion can lead to slight delays.

Please see confirmation below for additional information and for expediency I have copied Jack Davies Planning Officer (All correspondence should be sent to him).

Regards

Hedley

Dr Hedley Pugh
Principal Environmental Health officer
(P/T Thursdays and Fridays)
Civic Centre, London Road, Morden, Surrey, SM4 5DX
www.merton.gov.uk

From: James Tee <jamest@cspacoustics.co.uk>
Sent: 21 July 2021 15:39
To: Hedley Pugh <Hedley.Pugh@merton.gov.uk>
Cc: cspacoustics@emailmyjob.com
Subject: 1635 - 54 George Street, Richmond (21/1521/FUL) - NIA Response

Dear Dr. Pugh,

Re: Planning application number: 21/1521/FUL

I am the acoustic consultant working on behalf of the applicant for the proposed residential development at 54 George Street, Richmond upon Thames, and compiled the supporting Noise Impact Assessment (NIA). I have been made aware you have reviewed my report and provided comments in relation to this proposal. These comments have since been passed to me, which I repeat below for ease of reference:

From an EH perspective the main issue is whether or not the relationship between the proposed dwellings and the existing businesses, and in particular The Britannia at 5 Brewers Lane (although consideration should be given to cumulative effects from other premises), would be acceptable with regard to the effect of noise and disturbance on living conditions for future occupiers of the dwellings.

In terms of National Policy, Paragraph 180 of the Framework is clear that developments should mitigate and reduce to a minimum the potential adverse impacts arising from noise from new development and avoid noise giving rise to significant adverse impacts on health and quality of life. Further, Paragraph 182 also makes clear that decisions should integrate effectively with existing businesses and where the operation of an existing business could have a significant adverse effect on new development, the applicant (or 'agent of change') should provide suitable mitigation before the development is completed.

Planning Practice Guidance (PPG) sets out further detailed guidance, including relating to the agent of change principle.
Avoiding noisy locations in the first place is recognised as a mitigation measure for noise sensitive developments in Planning Practice Guidance (PPG). PPG further indicates that the 'agent of change' will need to take into account not only the current activities that may cause a nuisance, but also those activities that businesses or other facilities are permitted to carry out, even if they are not occurring at the time of the application being made.

I note within the Application submission the Noise Impact Assessment prepared by CSP Acoustics (CSPA) ref. 1633 001 JT V2 dated 21st April 2021 which includes detail of criteria provided within BS8233:2014 Guidance on Sound insulation and noise reduction for buildings. The criteria is based upon the recommendations of the World Health Organization, specifically, WHO Guidelines on Community Noise, 1999, which restrict LAeq,T guideline values to steady continuous noise only.

I note within the neighbourhood responses the following:

'Britannia – The major source of human noise is from the Britannia and this can be particularly loud in fine weather and/or during sporting events or hen parties with group shouting or singing'.

Thus patron noise on such occasions cannot be described as continuous with the criteria presented from BS8233;2014 underestimating the potential impact upon any future occupiers of the proposals. Whilst the CSPA assessment cites research into the Lombard effect for groups of people the reference refers to conversation and therefore does accord to shouts and screams corresponding to the events highlighted above.

The application of criteria relating to LAeq,T (T = 16 hours day time) is an energy average of the varying sound level over time and I remain concerned the approach, as with any averaging process, has the effect of smoothing out peaks and troughs. As such it is not truly representative of the noise generated from sudden rises in adult voices from shouting, screaming and laughing, common sounds when watching sports events, hen parties or other similar events, which have the potential to stand out rather than represent the 'average' sound level. With the extended period presented within the CSPA assessment I am unable to determine if it is possible to adequately mitigate the short term effects identified and would recommend refusal on such grounds.

My concerns are exacerbated given the additional controls available to those of the Planning Regime namely, the Environmental Protection Act 1990 in respect of statutory nuisance and Licensing Act 2003 in respect of the licensing objectives with particular reference to public nuisance. In the event statutory nuisance and/or a breach of the Licensing objectives were established the Britannia could potentially be open to formal action which would not accord with the objectives in respect of 'the agent of change'.

In response to the above, my comments are as follows:

The WHO's document 'Guidelines for Community Noise', 1999, is the basis for most legislation on noise in the UK. The British Standard BS8233:2014 is based upon the research and conclusions made within the WHO's document. It has been utilised throughout the country to establish a baseline criteria to help protect the majority of people from the critical effects of noise on sleep and annoyance. The document is based on using LAeq,T for continuous noise and if the noise is not continuous, the LAmax is used. The LAmax descriptor is utilised in the document to assess noise events that are sporadic and intermittent. These maximum noise level events are utilised in the document to protect people from sleep disturbance, and are not usually applied to daytime/evening activities. However, it is not to say this cannot be done. Although if it were applied generally to every residential development, then chances are every town/city/urban environment would not comply with the standards. So, some context would need to be given to why an assessment would be undertaken where night time criteria is applied to daytime periods. Firstly, a noise level criterion would need to be agreed upon. Based on the criteria for the internal LAeq of a bedroom at night of 30 dB, and the acceptable maximum noise event level of LAmax 45 dB to avoid sleep disturbance, it could be considered reasonable to add 15 dB to the LAeq for the internal daytime noise to create a maximum noise event LAmax level for specific intermittent events. Based on the daytime recommend noise limit of LAeq,T of 35 dB, the LAmax level would become 50 dB. Based on this, I have revised the calculation and can give you a brief on the outcome of this added assessment in this email. – Please could you provide further detail.

For this LAmax assessment, I have equally used the same reference source for the measured sound level of a person shouting as I used for a raised voice, this being ANSI S3.5-1997. The theory behind using the measured noise level of a person shouting, is that this is a sporadic event that may occur from time to time, it is unlikely that a shout in unison with others would occur unless a communal event is occurring (such as a sporting event). Nevertheless, I have taken the assumption that six people could shout at exactly the same time. Based on this assumption, where the noise level of one person shouting is logarithmically summed together and then calculated to the nearest receptor, and using the same process as the raised voice assessment, the predicted noise level is 74dB outside the nearest façade of the proposed development (free field). This translates to an internal level of 62dB LAmax. When windows are closed, and the window specification is as per the recommendations in NIA report, the predicted internal noise level inside the worst effected flat is estimated to be LAmax 36 dB for the bedroom and LAmax 40 dB for the living room. This is 14 dB and 10 dB, respectively, below the considered daytime maximum for such an event, and additionally is 9 dB below the night time limit for the bedroom. This is not considered to be an indication of annoyance from patron noise originating from the outdoor area of the Britannia public house.

In regard to the assessment of patron noise as an LAeq,T, the assessment process does not utilise the predicted worst case noise from the outdoor areas from a narrow time period and then average this over a full 16hr day; for example, smoothing out a 2 hour period of noise over a 16 hour period. It is quite the opposite, the assessment is looking at the worst case peak noise period and extending this noise (unchanged) over for a full 16 hour period i.e. theoretically having peak noise levels occurring from 7am until 11pm, without respite. This is not going to occur, but shows the severity the assessment has taken to this noise source with reference to the WHO document. Hence the assessment of LAeq,T for patron noise is considering the peak noise levels of the outdoor areas at maximum capacity and comparing this to the WHO guidelines.

More generally, the Britannia Pub identifies itself as a refined Gastro Pub, it is not a sports bar type establishment. The outdoor first floor roof terrace is reserved for outdoor dining and the garden provides a more casual outdoor space. The pub is not likely going to attract a unruly group of sports fans or a raucous hen party. Nonetheless, the above assessment does account for such a situation. It should be reminded that the Britannia is located in an existing residential area, with existing residential use in close proximity. As such, the pub has found that to satisfy previous concerns, it has to be conscientious to its surroundings. In this respect, the pub has previously agreed to the following conditions in terms of its outside space:

THE BRITANNIA, 5 BREWERS LANE, RICHMOND

The following conditions were volunteered by the Applicant:
(1) The upstairs patio must close by 9.30pm. The doors must be kept closed at 9.30pm, except for fire escape.
(2) The downstairs beer garden must close and be cleared of patrons by 11.00pm.
(3) Staff members must carry out periodic noise checks during the times that functions are held.

This would indicate that noise from Britannia's outdoor area is of concern to its owners and they want to be neighbourly, and to this end noise is currently being monitored to ensure complaints from the existing residential receptors are minimised. This process would undoubtably benefit the proposed development too.

I hope these comments assist you in the understanding of the noise assessment and provide the added detail you were looking for to aid in alleviating your concerns. If you would like the additional LAmax assessment to be included into a revised NIA report, please do let me know. Please could you undertake this and submit revised report. Should you have any further queries or comments, please do not hesitate to contact me. Your earliest reply would be much appreciated, as I understand the applicant is currently working to the deadline of the 23rd July.

Regards,

James Tee
BSc (Hons) MIOA
Senior Acoustic Consultant
CSP Acoustics LLP

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29 Eagle Street
Craighall Business Park
Glasgow
G4 9XA
+44(0)141 428 3906

Part of the Wellwood Leslie Group

Original comments received from the Environmental Health Office via the Planning Officer, dated 8th July 2021:

From an EH perspective the main issue is whether or not the relationship between the proposed dwellings and the existing businesses, and in particular The Britannia at 5 Brewers Lane (although consideration should be given to cumulative effects from other premises), would be acceptable with regard to the effect of noise and disturbance on living conditions for future occupiers of the dwellings.

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My concerns are exacerbated given the additional controls available to those of the Planning Regime namely, the Environmental Protection Act 1990 in respect of statutory nuisance and Licensing Act 2003 in respect of the licensing objectives with particular reference to public nuisance. In the event statutory nuisance and/or a breach of the Licensing objectives were established the Britannia could potentially be open to formal action which would not accord with the objectives in respect of 'the agent of change'.

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01382 731813

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CRAIGHALL BUSINESS PARK
GLASGOW
G4 9XA
01414 283 906

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info@cspacoustics.co.uk

CSPAcoustics

Appendix 2 – External Wall Treatment

U-value calculation by BRE U-value Calculator version 2.04a - Printed on 05 Oct 2021 at 09:37

Filename: Metin - SQ Wall OPT A 0.18 U-value.uva (File saved: 05 Oct 2021 09:37)

Element type: Wall - Masonry solid wall with internal insulation - Calculation Method: BS EN ISO 6946

Metin - SQ Wall OPT A 0.18 U-value
1 Layer SuperQuilt
42.5mm Insulated Plasterboard
2 x 25mm Battens

Layer	d (mm)	λ layer	λ bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	42.5	R-value			1.700		42.5mm Insulated Plasterboard
2	25	R-value[1]	0.130	0.0630	0.740	0.192	25mm Batten
3	7	R-value	R-value	0.0120	1.520	0.670	SuperQuilt
4	25	R-value[2]	0.130	0.0630	0.740	0.192	25mm Batten
5	400	0.560			0.714		400mm Brick
					0.040		Rse
	500 mm (total wall thickness)				5.584		

[1]Calculated with specified emissivity of 0.02
[2]Calculated with specified emissivity of 0.02

Total resistance: Upper limit: 5.496 Lower limit: 5.336 Ratio: 1.030 Average: 5.416 m²K/W

U-value (uncorrected) 0.185

U-value corrections

Air gaps in layer 2	ΔU = 0.000	(Level 0)
Fixings in layer 2	ΔU = 0.000	(4.00 per m², 10.0 mm² cross-section, λ = 50.0)

Total ΔU 0.000

U-value (corrected) 0.185 (0.1846)
U-value (rounded) 0.18 W/m²K

Calculated By;
SuperQuilt-Insulation.co.uk, Callywhite Lane, Derbyshire, S18 2XP
0114 323 0045, Sales@SuperQuilt-Insulation.co.uk, www.superquilt-insulation.co.uk

U-value calculation
by BRE U-value Calculator version 2.04a

Element type: Wall - Masonry solid wall with internal insulation
Calculation Method: BS EN ISO 6946

WU013
1 Layer SuperQuilt
37.5mm Insulated Plasterboard

Layer	d (mm)	λ layer	λ bridge	Fraction	R layer	R bridge	Description
					0.130		Rsi
1	37.5	R-value			1.450		37.5mm Insulated Plasterboard
2	25	R-value[1]	0.130	0.0630	0.740	0.192	25mm Batten
3	7	R-value	R-value	0.0120	1.520	0.670	SuperQuilt
4	25	R-value[2]	0.130	0.0630	0.740	0.192	25mm Batten
5	225	0.190	0.940	0.0670	1.184	0.239	225mm Block
6	22	1.000			0.022		Render (cement, sand)
					0.040		Rse
	342 mm (total wall thickness)				5.826		

[1]Calculated with specified emissivity of 0.02
[2]Calculated with specified emissivity of 0.02

Total resistance: Upper limit: 5.664 Lower limit: 5.331 Ratio: 1.062 Average: 5.497 m²K/W

U-value (uncorrected) 0.182

U-value corrections
Air gaps in layer 2 ΔU = 0.000 (Level 0)
Fixings in layer 2 ΔU = 0.000 (4.00 per m², 10.0 mm² cross-section, λ = 50.0)

Total ΔU 0.000

U-value (corrected) 0.182
U-value (rounded) 0.18 W/m²K

Calculated by:
SuperQuilt Insulation
E-mail: Technical@SuperQuilt-Insulation.com

Dry Lining

Fixing Instructions

Vertical counter battens, minimum 25mm by 38mm battens are fixed to the wall at 400mm centres. Battens must always be placed at the top and bottom of the wall and around the perimeter of doors and windows.

SuperQuilt is applied directly from the roll either vertically or horizontally depending on the wall height, pulled tight and stapled onto the battens at minimum 300mm centres.

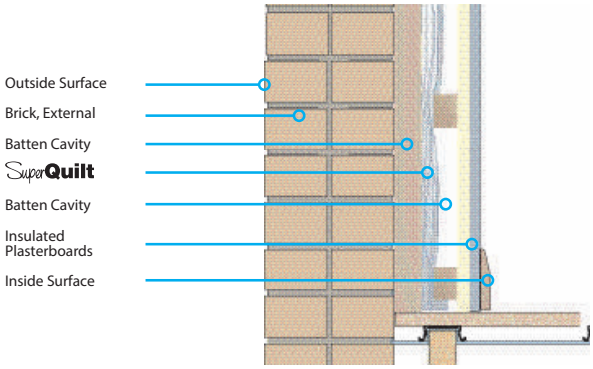
SuperQuilt should be overlapped at each joint by approx. 50mm and stapled onto the battens, the joins should be sealed using 75mm ThermaSeal Foil Tape.

Counter battens are fixed to the wall battens through the material at 600mm centres.

The plasterboard is fixed over the SuperQuilt and onto the battens in the usual manner.

If there is a concern regarding condensation because of the installation of an insulating vapour barrier, please supply full build up information on email to our technical team and they can carry out a condensation risk analysis for you.

U-Value Combined Method (W/m²K)			0.28
	Thickness (mm)	Conductivity (W/mK)	Resistance (m²K/W)
Outside Surface	-	-	0.040
Brick, External	100.00	0.770	0.292
Cavity	50.00	-	0.180
Block	100.00	1.130	0.89
Batten Cavity	38.00	-	0.740
SuperQuilt	14.00		1.52
Batten Cavity	38.00		0.740
Insulated Plasterboard	30.00	-	0.560
Inside Surface	-	-	0.130



U-Value table

*For custom calculations please send request to Sales@Multifoil-Insulation.com

Description	25mm Batten	38mm Batten
SuperQuilt and Solid Wall	0.34 W/m ²k	0.29 W/m ²k
SuperQuilt, Solid Wall and 30mm Insulated Plasterboard EPS	0.29 W/m ²k	0.26 W/m ²k
SuperQuilt, Solid Wall and 40mm Insulated Plasterboard EPS	0.27 W/m ²k	0.24 W/m ²k
SuperQuilt, Solid Wall and SuperQuilt	0.22 W/m ²k	0.19 W/m ²k
SuperQuilt and Cavity Wall un-insulated	0.33 W/m ²k	0.28 W/m ²k
SuperQuilt, Cavity Wall un-insulated & 30mm Ins. Plasterboard EPS	0.28 W/m ²k	0.25 W/m ²k
SuperQuilt, Cavity Wall un-insulated & 40mm Ins. Plasterboard EPS	0.26 W/m ²k	0.23 W/m ²k
SuperQuilt, Cavity Wall un-insulated & SuperQuilt	0.22 W/m ²k	0.18 W/m ²k
SuperQuilt and Cavity Wall Insulated	0.25 W/m ²k	0.22 W/m ²k
SuperQuilt, Cavity Wall Insulated & 30mm Ins. Plasterboard EPS	0.23 W/m ²k	0.21 W/m ²k
SuperQuilt, Cavity Wall Insulated & 40mm Ins. Plasterboard EPS	0.22 W/m ²k	0.20 W/m ²k
SuperQuilt, Cavity Wall Insulated & SuperQuilt	0.18 W/m ²k	0.16 W/m ²k

Appendix 3 – Daylight / Sunlight Brief

BRIEFING NOTE

From:	**Iceni Projects**
Date:	**April 2021**
Title:	**54 George Street, Richmond, TW9 1HJ | Daylight/Sunlight Note**

1. This document provides an overview of the results of the Daylight/Sunlight/Overshadowing (DSO) Assessment undertaken for 54 George Street, Richmond, TW9 1HJ.

Methodology

BRE Guide: Site Layout for Daylight and Sunlight

2. The Building Research Establishment (BRE) Guide 'Site Layout Planning for Daylight and Sunlight: a guide to good practice, by P J Littlefair 2011 sets out standards for calculating the daylight and sunlight availability both within buildings and open spaces. The BRE Guide gives advice on interior daylighting recommendations, based on British Standard BS 8206 Part 2 and the CIBSE Lighting Guide LG10 Daylighting and Window Design.

3. The daylight and sunlight availability within the proposed building has been calculated according to the standards set out within the BRE Guide. It is worth noting that the guidance figures stated within the BRE Guide are useful in providing a target for designers, consultants and planners, however they should be seen as purely advisory. Acceptable daylight and sunlight levels, for instance, vary significantly depending on site context. Dense urban areas are likely to experience a greater constraint on natural lighting available when compared with suburban and rural locations. For this reason, within urban centres, a higher degree of obstruction is often unavoidable. Appendix F of the BRE Guide suggests that alternative values are often more appropriate for urban areas.

Daylight

4. The BRE guidelines use the Average Daylight Factor calculation (ADF) for the assessment of internal daylight levels. The ADF is a measure of internal daylight illuminance to the outside illuminance expressed as a percentage. The level of daylight considered acceptable for a given room has been determined based on the BS 8206-2 Code of Practice for Daylighting. These ADF standards are as follows:

   - 1.0% for residential bedrooms
   - 1.5% for living rooms
   - 2.0% for kitchens or living rooms with kitchens

Sunlight

5. Sunlight availability is assessed in terms of Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH). APSH refers to the long-term average number of hours within

a year in which direct sunlight reaches the unobscured ground. WPSH refers to the long-term average number of hours within the winter months (21 September to 21 March) in which direct sunlight reaches the unobscured ground. Rooms are considered adequately sunlit if at least one main window facing within 90 degrees due south receives 25% of annual probable sunlight hours during the winter months.

6. To note, the BRE sunlight assessment is only relevant to living rooms with at least one main window facing within 90 degrees due south. Despite this, care should be taken to ensure that other habitable space, including kitchens and bedrooms, receive a reasonable level of sunlight.

Proposed Building Internal Daylight and Sunlight

7. All habitable rooms with windows located on the southern façade of the proposed building have been assessed using the Average Daylight Factor (ADF). These rooms comprise:

   - the living-kitchen-dining (LKD) room and one bedroom of Flat 1, located at the first floor level;
   - the LKD of Flat 7; and
   - the living-dining (LD) room of Flat 8, both located at the second floor level.

8. Daylight performance has been assessed in tandem with acoustic analysis to limit noise ingress into the proposed apartments.

9. The acoustic analysis recommends the use of acoustic glazing to ensure internal noise levels are acceptable. As a result, the light transmission of the proposed glazing is likely to be in the region of 70%, and this has therefore been assumed for this analysis.

10. The rear exterior facade will be made up of the enlarged openings, suitably designed to prevent overlooking but allow daylight penetration. Windows to these openings will be necessary to prevent noise ingress into the balconies. They will be fitted with 180° hinges delivering fully internally opening windows to ensure there is no loss of daylight or sunlight and are presumed open in this analysis. The results of this assessment are shown in the table below:

Dwelling Reference	Floor	Room	Room Use	Room ADF (%)	Target ADF (%)	Comments
Flat 1	First	R1	LKD	1.6	1.5	Meets BRE recommended criteria
		R2	Bedroom	1.6	1.0	
Flat 7	Second	R1	LKD	1.5	1.5	
Flat 8		R1	LD	1.6	1.5	

11. The results above indicate that all four habitable spaces tested will achieve the levels of internal daylight that are compliant with the BRE recommended criteria when utilising acoustic glazing.

12. It is therefore intended that acoustic glass, with an assumed light transmission of at least 70% will be provided for the windows on the building thermal line serving these four rooms. The openings to the enclosed balconies will be glazed but openable, as detailed above, therefore ensuring the light transmission of the glazing provided is maintained at 70%.

13. Based on the results presented here, this option will ensure that all four of the rooms tested will achieve the recommended level of internal daylight, in line with the BRE guidance.

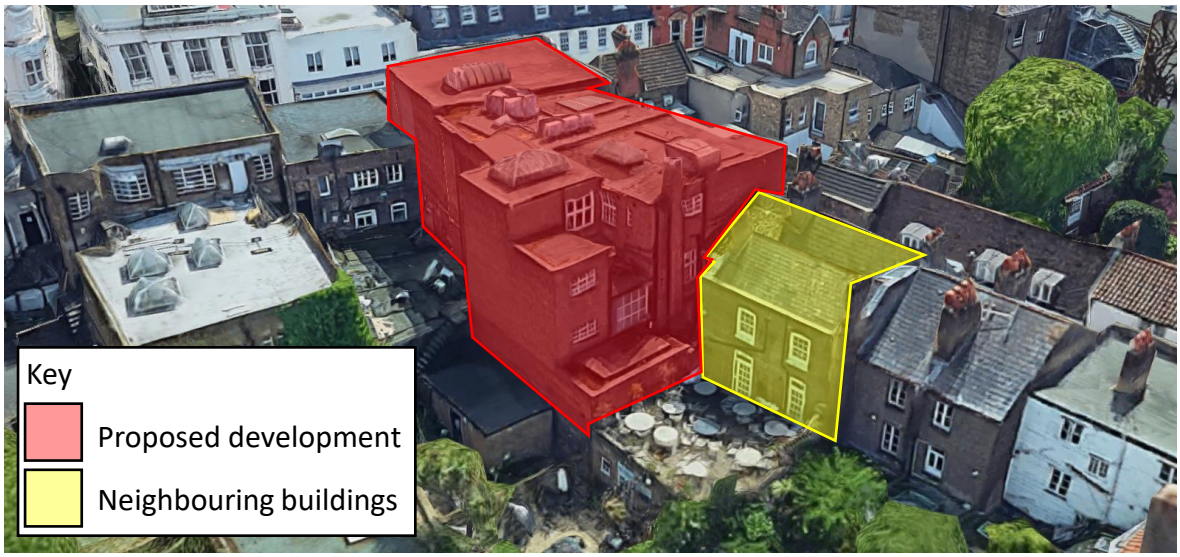
14. In addition, the south-facing windows that serve the proposed living room spaces of Flats 1, 7 and 8 have been assessed in terms of access to sunlight. These windows have been assessed using the Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH) measures. The results of this assessment are shown in the table below.

Dwelling Reference	Floor	Room	Room Use	Maximum APSH Achieved	Target APSH	Maximum WPSH Achieved	Target WPSH	Comments
Flat 1	First	R1	LKD	35	25	5	5	Meets BRE recommended criteria
Flat 7	Second	R1	LKD	44	25	12	5	
Flat 8		R1	LD	15	25	3	5	Below BRE recommended criteria

15. The living room spaces of Flats 1 and 7 are both found to be served by at least one main south-facing window that achieves the recommended level of sunlight.

16. The level of sunlight found to be received by the main south-facing window of Flat 8 is below the BRE recommended target. This results from a combination of the use of enclosed balconies, which are required for the mitigation of overlooking from and to the pub garden terrace located to the south of the building, as well as the presence of the existing buildings to the south of the proposed development along Brewers Lane.

17. The windows serving the identified room of Flat 8 face directly onto the existing buildings located to the south west of the proposed development site, as shown in the image below. The proposed development site is highlighted in red in the image below, whilst the neighbouring buildings onto which the identified windows face are highlighted in yellow.



18. Due to the proximity of the existing buildings to the proposed windows serving the identified rooms, much of the view from these windows is obstructed by the massing of the buildings located to the south west. It should be noted, however, that the level of sunlight achieved within this room is considered to be consistent with those associated with urban locations, in line with BRE guidance. Therefore, it is considered that the proposed design, which employs enclosed balconies, will ensure that the potential for overlooking both from and into the pub garden terrace is minimised as far as possible, whilst also ensuring that acceptable levels of sunlight are achieved within the proposed habitable spaces.

19. Based on the results outlined above, it can be concluded that the proposed scheme will achieve acceptable levels of internal daylight and sunlight, in line with levels expected for dwellings located within an urban context.

Appendix 4 – SAP Summary & Calculations

Summary Information

Property Reference: 444577 Flat 1
Survey Reference: 001
Property: George Street, Richmond

Issued on Date: 22.Oct.2020
Prop Type Ref:

SAP Rating: 69 C **CO2 Emissions (t/year):** 2.78 **DER:** 35.52 Pass **Reduction:** 1.1% **FEE:** 49.2 **ZC8:** 0.00
Environmental: 71 C **General Requirements Compliance:** Pass **TER:** 35.93 **HLP:** 1.19 **Energy cost:** £ 1094

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	46.54	85.23	3.56

7.0 Living Area	36.11
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	165.68	153.45

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	17.44

10.1 Party Ceilings

Description	Construction	Element	Kappa	Area
Party Ceiling	Other		0	85.23

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	85.23

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	North West	None	0	No	0	0	0	6.44	0
Opening 2	Solid Door - Door	External Wall	South West	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	North East	None	0	No	0	0	0	2.01	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	4.65	0.037	Yes
Independently assessed	E3 Sill	4.65	0.033	Yes
Independently assessed	E4 Jamb	10.90	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	46.54	0.063	Yes
Independently assessed	E16 Corner (normal)	28.48	0.038	No
Independently assessed	E17 Corner (inverted - internal area greater than external area)	17.80	-0.029	No
Independently assessed	E18 Party wall between dwellings	7.12	0.086	Yes
Independently assessed	P1 Party wall - Ground floor	4.90	0.092	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 7
  - Total number of L.E.L. fittings: 7
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: SAPTable
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: No
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.
- Fuel Type
- Main Heating: Electricity BEE Direct-acting boiler

TestMethod	
SAP Code	191
Efficiency (SAP Table) %	100
In Winter	
In Summer	
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	Dual
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	
Cylinder In Heated Space	Yes
Independent Time Control	
Insulation Type	Foam
Insulation Thickness	80
Cylinder Volume	150
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	

Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 1
Survey Reference: 002
Property: George Street, Richmond

Issued on Date: 29.Oct.2020
Prop Type Ref:

SAP Rating: 83 B **CO2 Emissions (t/year):** 1.31 **DER:** 16.52 Pass **Reduction:** 22.6% **FEE:** 49.2 **ZC8:** 0.00
Environmental: 87 B **General Requirements Compliance:** Pass **TER:** 21.33 **HLP:** 1.19 **Energy cost:** £ 401

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	46.54	85.23	3.56

7.0 Living Area	36.11
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	165.68	153.45

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	17.44

10.1 Party Ceilings

Description	Construction	Element	Kappa	Area
Party Ceiling	Other		0	85.23

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	85.23

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	North West	None	0	No	0	0	0	6.44	0
Opening 2	Solid Door - Door	External Wall	South West	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	North East	None	0	No	0	0	0	2.01	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	4.65	0.037	Yes
Independently assessed	E3 Sill	4.65	0.033	Yes
Independently assessed	E4 Jamb	10.90	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	46.54	0.063	Yes
Independently assessed	E16 Corner (normal)	28.48	0.038	No
Independently assessed	E17 Corner (inverted - internal area greater than external area)	17.80	-0.029	No
Independently assessed	E18 Party wall between dwellings	7.12	0.086	Yes
Independently assessed	P1 Party wall - Ground floor	4.90	0.092	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 7
  - Total number of L.E.L. fittings: 7
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: Database
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: Yes
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.: 16661
- Fuel Type: Mains gas
- Main Heating: Mains gas BGW Post 98 Combi condens. with auto ign.

TestMethod	
SAP Code	104
Efficiency (Split Efficiences) %	
Efficiency (Split Efficiences) %	
In Winter	89.7
In Summer	87
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	None
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	60001
Brand Model	Zenex, GasSaver
Details	Year: + current Applicable Fuel: 1 Boiler Types: RCSK Heat Store Volume: 0 PV module: 0
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	

Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 2
Survey Reference: 001
Property: George Street, Richmond

Issued on Date: 22.Oct.2020
Prop Type Ref:

SAP Rating: 71 C **CO2 Emissions (t/year):** 1.67 **DER:** 46.15 Pass **Reduction:** 10.1% **FEE:** 54.8 **ZC8:** 0.00
Environmental: 73 C **General Requirements Compliance:** Pass **TER:** 51.33 **HLP:** 1.49 **Energy cost:** £ 694

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	30.12	38.43	3.56

7.0 Living Area	33.87
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	107.23	97.51

10.1 Party Ceilings

Description	Construction	Element	Kappa	Area
Party Ceiling	Other		0	38.43

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	38.43

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South West	None	0	No	0	0	0	5.94	0
Opening 2	Solid Door - Door	External Wall	North East	None	0	No	0	0	0	3.78	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	4.50	0.037	Yes
Independently assessed	E3 Sill	2.70	0.033	Yes

Independently assessed	E4 Jamb	13.00	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	30.12	0.063	Yes
Independently assessed	E16 Corner (normal)	14.24	0.038	No
Independently assessed	E17 Corner (inverted - internal area greater than external area)	7.12	-0.029	No
Independently assessed	E18 Party wall between dwellings	3.56	0.086	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 5
  - Total number of L.E.L. fittings: 5
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: SAPTable
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: No
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.
- Fuel Type
- Main Heating: Electricity BEE Direct-acting boiler
- TestMethod
- SAP Code: 191
- Efficiency (SAP Table) %: 100
  - In Winter
  - In Summer
- Model Name

Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	Dual
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	
Cylinder In Heated Space	Yes
Independent Time Control	
Insulation Type	Foam
Insulation Thickness	80
Cylinder Volume	150
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	

32.0 Thermal Store	None
Thermal Store Pipework	within a single casing

33.0 Photovoltaic Unit
- Apportioned KWh/Year

34.0 Wind Turbines
- Terrain Type: Urban
- Wind Turbines
- Count
- Apportioned Kwh/year
- Rotor Diameter
- Hub Height

35.0 Small-scale Hydro
- Electricity Generated
- Description
- Apportioned kWh/Year

Recommendations
- None

Further measures to achieve even higher standards
- None

Summary Information

Property Reference: 444577 Flat 2
Survey Reference: 002
Property: George Street, Richmond

Issued on Date: 29.Oct.2020
Prop Type Ref:

SAP Rating: 81 B **CO2 Emissions (t/year):** 0.79 **DER:** 21.59 Pass **Reduction:** 28.5% **FEE:** 54.8 **ZC8:** 0.00
Environmental: 87 B **General Requirements Compliance:** Pass **TER:** 30.20 **HLP:** 1.49 **Energy cost:** £ 279

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	30.12	38.43	3.56

7.0 Living Area	33.87
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	107.23	97.51

10.1 Party Ceilings

Description	Construction	Element	Kappa	Area
Party Ceiling	Other		0	38.43

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	38.43

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South West	None	0	No	0	0	0	5.94	0
Opening 2	Solid Door - Door	External Wall	North East	None	0	No	0	0	0	3.78	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	4.50	0.037	Yes
Independently assessed	E3 Sill	2.70	0.033	Yes

Independently assessed	E4 Jamb	13.00	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	30.12	0.063	Yes
Independently assessed	E16 Corner (normal)	14.24	0.038	No
Independently assessed	E17 Corner (inverted - internal area greater than external area)	7.12	-0.029	No
Independently assessed	E18 Party wall between dwellings	3.56	0.086	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 5
  - Total number of L.E.L. fittings: 5
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: Database
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: Yes
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.: 16661
- Fuel Type: Mains gas
- Main Heating: Mains gas BGW Post 98 Combi condens. with auto ign.
- TestMethod
- SAP Code: 104
- Efficiency (Split Efficiences) %
- Efficiency (Split Efficiences) %
  - In Winter: 89.7
  - In Summer: 87

Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	None
Combi store type	

27.0 Community Heating

Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating

Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	60001
Brand Model	Zenex, GasSaver
Details	Year: + current Applicable Fuel: 1 Boiler Types: RCSK Heat Store Volume: 0 PV module: 0
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel

Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	

Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 3
Survey Reference: 001
Property: George Street, Richmond

Issued on Date: 22.Oct.2020
Prop Type Ref:

SAP Rating: 75 C **CO2 Emissions (t/year):** 1.54 **DER:** 38.29 Pass **Reduction:** 0.1% **FEE:** 41.2 **ZC8:** 0.00
Environmental: 77 C **General Requirements Compliance:** Pass **TER:** 38.33 **HLP:** 1.14 **Energy cost:** £ 645

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	4
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	15.36	43.17	3.56

7.0 Living Area	34.84
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	54.68	46.90

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	52.04

10.1 Party Ceilings

Description	Construction	Element	Kappa	Area
Party Ceiling	Other		0	43.17

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	43.17

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.96			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South East	None	0	No	0	0	0	4.00	0
Opening 2	Solid Door - Door	External Wall	South West	None	0	No	0	0	0	3.78	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	3.40	0.037	No
Independently assessed	E3 Sill	1.60	0.033	Yes
Independently assessed	E4 Jamb	9.20	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	15.36	0.063	Yes
Independently assessed	E16 Corner (normal)	7.12	0.038	Yes
Independently assessed	E17 Corner (inverted - internal area greater than external area)	3.56	-0.029	No
Independently assessed	E18 Party wall between dwellings	14.24	0.086	No
Independently assessed	P1 Party wall - Ground floor	14.62	0.092	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 4
  - Total number of L.E.L. fittings: 4
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: SAPTable
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: No
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.
- Fuel Type
- Main Heating: Electricity BEE Direct-acting boiler

TestMethod	
SAP Code	191
Efficiency (SAP Table) %	100
In Winter	
In Summer	
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	Dual
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	
Cylinder In Heated Space	Yes
Independent Time Control	
Insulation Type	Foam
Insulation Thickness	80
Cylinder Volume	150
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	

Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 3
Survey Reference: 002
Property: George Street, Richmond

Issued on Date: 29.Oct.2020
Prop Type Ref:

SAP Rating: 82 B **CO2 Emissions (t/year):** 0.75 **DER:** 18.42 Pass **Reduction:** 19.2% **FEE:** 41.2 **ZC8:** 0.00
Environmental: 89 B **General Requirements Compliance:** Pass **TER:** 22.81 **HLP:** 1.14 **Energy cost:** £ 275

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	4
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	15.36	43.17	3.56

7.0 Living Area	34.84
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	54.68	46.90

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	52.04

10.1 Party Ceilings

Description	Construction	Element	Kappa	Area
Party Ceiling	Other		0	43.17

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	43.17

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.96			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South East	None	0	No	0	0	0	4.00	0
Opening 2	Solid Door - Door	External Wall	South West	None	0	No	0	0	0	3.78	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	3.40	0.037	No
Independently assessed	E3 Sill	1.60	0.033	Yes
Independently assessed	E4 Jamb	9.20	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	15.36	0.063	Yes
Independently assessed	E16 Corner (normal)	7.12	0.038	Yes
Independently assessed	E17 Corner (inverted - internal area greater than external area)	3.56	-0.029	No
Independently assessed	E18 Party wall between dwellings	14.24	0.086	No
Independently assessed	P1 Party wall - Ground floor	14.62	0.092	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 4
  - Total number of L.E.L. fittings: 4
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: Database
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: Yes
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.: 16661
- Fuel Type: Mains gas
- Main Heating: Mains gas BGW Post 98 Combi condens. with auto ign.

TestMethod	
SAP Code	104
Efficiency (Split Efficiences) %	
Efficiency (Split Efficiences) %	
In Winter	89.7
In Summer	87
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	None
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	60001
Brand Model	Zenex, GasSaver
Details	Year: + current Applicable Fuel: 1 Boiler Types: RCSK Heat Store Volume: 0 PV module: 0
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	

Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 4
Survey Reference: 001
Property: George Street, Richmond

Issued on Date: 22.Oct.2020
Prop Type Ref:

SAP Rating: 76 C **CO2 Emissions (t/year):** 1.60 **DER:** 33.78 Pass **Reduction:** 8.0% **FEE:** 40.5 **ZC8:** 0.00
Environmental: 77 C **General Requirements Compliance:** Pass **TER:** 36.73 **HLP:** 1.27 **Energy cost:** £ 668

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	20.13	50.07	3.56

7.0 Living Area 24.91

8.0 Thermal Mass Parameter Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	71.66	56.91

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	34.60

10.1 Party Ceilings

Description	Construction	Element	Kappa	Area
Party Ceiling	Other		0	50.07

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	50.07

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South East	None	0	No	0	0	0	8.00	0
Opening 2	Solid Door - Door	External Wall	North West	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	South West	None	0	No	0	0	0	2.97	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	6.35	0.037	Yes
Independently assessed	E3 Sill	4.55	0.033	No
Independently assessed	E4 Jamb	18.60	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	20.13	0.063	Yes
Independently assessed	E16 Corner (normal)	7.12	0.038	No
Independently assessed	E18 Party wall between dwellings	7.12	0.086	No
Independently assessed	P1 Party wall - Ground floor	9.72	0.092	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: Yes
- Night Ventilation: No
- Air change rate: 6.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 5
  - Total number of L.E.L. fittings: 5
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: SAPTable
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: No
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.
- Fuel Type
- Main Heating TestMethod: Electricity BEE Direct-acting boiler
- SAP Code: 191

Efficiency (SAP Table) %	100
In Winter	
In Summer	
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	Dual
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	
Cylinder In Heated Space	Yes
Independent Time Control	
Insulation Type	Foam
Insulation Thickness	80
Cylinder Volume	150
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	

Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 4
Survey Reference: 002
Property: George Street, Richmond

Issued on Date: 29.Oct.2020
Prop Type Ref:

SAP Rating: 83 B **CO2 Emissions (t/year):** 0.77 **DER:** 16.07 Pass **Reduction:** 26.5% **FEE:** 40.5 **ZC8:** 0.00
Environmental: 89 B **General Requirements Compliance:** Pass **TER:** 21.87 **HLP:** 1.27 **Energy cost:** £ 278

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	20.13	50.07	3.56

7.0 Living Area	24.91
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	71.66	56.91

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	34.60

10.1 Party Ceilings

Description	Construction	Element	Kappa	Area
Party Ceiling	Other		0	50.07

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	50.07

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South East	None	0	No	0	0	0	8.00	0
Opening 2	Solid Door - Door	External Wall	North West	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	South West	None	0	No	0	0	0	2.97	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	6.35	0.037	Yes
Independently assessed	E3 Sill	4.55	0.033	No
Independently assessed	E4 Jamb	18.60	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	20.13	0.063	Yes
Independently assessed	E16 Corner (normal)	7.12	0.038	No
Independently assessed	E18 Party wall between dwellings	7.12	0.086	No
Independently assessed	P1 Party wall - Ground floor	9.72	0.092	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: Yes
- Night Ventilation: No
- Air change rate: 6.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 5
  - Total number of L.E.L. fittings: 5
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: Database
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: Yes
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.: 16661
- Fuel Type: Mains gas
- Main Heating: Mains gas BGW Post 98 Combi condens. with auto ign.
- TestMethod
- SAP Code: 104

Efficiency (Split Efficiences) %	
Efficiency (Split Efficiences) %	
In Winter	89.7
In Summer	87
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	None
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	60001
Brand Model	Zenex, GasSaver
Details	Year: + current Applicable Fuel: 1 Boiler Types: RCSK Heat Store Volume: 0 PV module: 0
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	

n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 5
Survey Reference: 001
Property: George Street, Richmond

Issued on Date: 22.Oct.2020
Prop Type Ref:

SAP Rating: 71 C **CO2 Emissions (t/year):** 1.92 **DER:** 40.39 Pass **Reduction:** 5.8% **FEE:** 54.0 **ZC8:** 0.00
Environmental: 73 C **General Requirements Compliance:** Pass **TER:** 42.87 **HLP:** 1.58 **Energy cost:** £ 784

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	20.13	50.07	3.94

7.0 Living Area	24.91
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	79.31	64.56

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	38.30

10.0 External Roofs

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, insulated flat roof	0.20		9	50.07	50.07

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	50.07

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South East	None	0	No	0	0	0	8.00	0
Opening 2	Solid Door - Door	External Wall	North West	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	South West	None	0	No	0	0	0	2.97	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	6.35	0.037	Yes
Independently assessed	E3 Sill	4.55	0.033	No
Independently assessed	E4 Jamb	18.60	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	20.13	0.063	Yes
Independently assessed	E14 Flat roof	20.13	0.06	Yes
Independently assessed	E16 Corner (normal)	7.88	0.038	Yes
Independently assessed	E18 Party wall between dwellings	7.88	0.086	Yes
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	9.72	0.09	No

18.0 Pressure Testing	Yes
Designed q50	4.50
Property Tested ?	
As Built q50	
Same As Designed ?	
19.0 Mechanical Ventilation	
Mechanical Ventilation System Present	No
Approved Installation	
Windows open in hot weather	Windows fully open
Cross ventilation possible	No
Night Ventilation	No
Air change rate	4.00
Mechanical Ventilation data Type	
Type	
MV Reference Number	
Configuration	
MVHR Duct Insulated	
Manufacturer SFP	
Duct Type	
MVHR Efficiency	
Wet Rooms	
Brand, Model	

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System	No
22.0 Lighting	
Internal	
Total number of light fittings	5
Total number of L.E.L. fittings	5
Percentage of L.E.L. fittings	100.00
External	
External lights fitted	No
Light and motion sensors	
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	SAPTable
Description	
Percentage of Heat	100.00
Main Heating 2	None
Description	
Percentage of Heat	
Community Heating	
Secondary Heating	
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery System 1	No
Waste Water Heat Recovery System 2	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	Electricity BEE Direct-acting boiler

TestMethod	
SAP Code	191
Efficiency (SAP Table) %	100
In Winter	
In Summer	
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	Dual
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	
Cylinder In Heated Space	Yes
Independent Time Control	
Insulation Type	Foam
Insulation Thickness	80
Cylinder Volume	150
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	

Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 5
Survey Reference: 002
Property: George Street, Richmond

Issued on Date: 29.Oct.2020
Prop Type Ref:

SAP Rating: 82 B **CO2 Emissions (t/year):** 0.90 **DER:** 18.76 Pass **Reduction:** 26.0% **FEE:** 54.0 **ZC8:** 0.00
Environmental: 87 B **General Requirements Compliance:** Pass **TER:** 25.36 **HLP:** 1.58 **Energy cost:** £ 304

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	20.13	50.07	3.94

7.0 Living Area	24.91
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	79.31	64.56

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	38.30

10.0 External Roofs

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, insulated flat roof	0.20		9	50.07	50.07

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	50.07

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South East	None	0	No	0	0	0	8.00	0
Opening 2	Solid Door - Door	External Wall	North West	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	South West	None	0	No	0	0	0	2.97	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	6.35	0.037	Yes
Independently assessed	E3 Sill	4.55	0.033	No
Independently assessed	E4 Jamb	18.60	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	20.13	0.063	Yes
Independently assessed	E14 Flat roof	20.13	0.06	Yes
Independently assessed	E16 Corner (normal)	7.88	0.038	Yes
Independently assessed	E18 Party wall between dwellings	7.88	0.086	Yes
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	9.72	0.09	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 5
  - Total number of L.E.L. fittings: 5
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: Database
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: Yes
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.: 16661
- Fuel Type: Mains gas
- Main Heating: Mains gas BGW Post 98 Combi condens. with auto ign.

TestMethod	
SAP Code	104
Efficiency (Split Efficiences) %	
Efficiency (Split Efficiences) %	
In Winter	89.7
In Summer	87
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	None
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	60001
Brand Model	Zenex, GasSaver
Details	Year: + current Applicable Fuel: 1 Boiler Types: RCSK Heat Store Volume: 0 PV module: 0
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	

Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 6
Survey Reference: 001
Property: George Street, Richmond

Issued on Date: 22.Oct.2020
Prop Type Ref:

SAP Rating: 71 C **CO2 Emissions (t/year):** 1.78 **DER:** 44.26 Pass **Reduction:** 1.4% **FEE:** 52.1 **ZC8:** 0.00
Environmental: 73 C **General Requirements Compliance:** Pass **TER:** 44.87 **HLP:** 1.35 **Energy cost:** £ 734

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	15.36	43.17	3.94

7.0 Living Area	34.84
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	60.52	52.74

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	56.66

10.0 External Roofs

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, insulated flat roof	0.12		9	43.17	43.17

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	43.17

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South East	None	0	No	0	0	0	4.00	0
Opening 2	Solid Door - Door	External Wall	South West	None	0	No	0	0	0	3.78	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	3.40	0.037	No
Independently assessed	E3 Sill	1.60	0.033	Yes
Independently assessed	E4 Jamb	9.20	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	15.36	0.063	Yes
Independently assessed	E14 Flat roof	15.36	0.06	Yes
Independently assessed	E16 Corner (normal)	7.88	0.038	Yes
Independently assessed	E17 Corner (inverted - internal area greater than external area)	3.94	-0.029	No
Table K1 - Default	E18 Party wall between dwellings	0.09	0.12	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	14.38	0.09	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 4
  - Total number of L.E.L. fittings: 4
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: SAPTable
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: No
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.
- Fuel Type

Main Heating	Electricity BEE Direct-acting boiler
TestMethod	
SAP Code	191
Efficiency (SAP Table) %	100
In Winter	
In Summer	
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	Dual
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	
Cylinder In Heated Space	Yes
Independent Time Control	
Insulation Type	Foam
Insulation Thickness	80
Cylinder Volume	150
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	

Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 6
Survey Reference: 002
Property: George Street, Richmond

Issued on Date: 29.Oct.2020
Prop Type Ref:

SAP Rating: 81 B **CO2 Emissions (t/year):** 0.85 **DER:** 20.85 Pass **Reduction:** 21.4% **FEE:** 52.1 **ZC8:** 0.00
Environmental: 87 B **General Requirements Compliance:** Pass **TER:** 26.51 **HLP:** 1.35 **Energy cost:** £ 295

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	15.36	43.17	3.94

7.0 Living Area	34.84
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	60.52	52.74

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	56.66

10.0 External Roofs

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, insulated flat roof	0.12		9	43.17	43.17

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	43.17

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South East	None	0	No	0	0	0	4.00	0
Opening 2	Solid Door - Door	External Wall	South West	None	0	No	0	0	0	3.78	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	3.40	0.037	No
Independently assessed	E3 Sill	1.60	0.033	Yes
Independently assessed	E4 Jamb	9.20	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	15.36	0.063	Yes
Independently assessed	E14 Flat roof	15.36	0.06	Yes
Independently assessed	E16 Corner (normal)	7.88	0.038	Yes
Independently assessed	E17 Corner (inverted - internal area greater than external area)	3.94	-0.029	No
Table K1 - Default	E18 Party wall between dwellings	0.09	0.12	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	14.38	0.09	No

18.0 Pressure Testing	Yes
Designed q50	4.50
Property Tested ?	
As Built q50	
Same As Designed ?	
19.0 Mechanical Ventilation	
Mechanical Ventilation System Present	No
Approved Installation	
Windows open in hot weather	Windows fully open
Cross ventilation possible	No
Night Ventilation	No
Air change rate	4.00
Mechanical Ventilation data Type	
Type	
MV Reference Number	
Configuration	
MVHR Duct Insulated	
Manufacturer SFP	
Duct Type	
MVHR Efficiency	
Wet Rooms	
Brand, Model	

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System	No
22.0 Lighting	
Internal	
Total number of light fittings	4
Total number of L.E.L. fittings	4
Percentage of L.E.L. fittings	100.00
External	
External lights fitted	No
Light and motion sensors	
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	Database
Description	
Percentage of Heat	100.00
Main Heating 2	None
Description	
Percentage of Heat	
Community Heating	
Secondary Heating	
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	Yes
Waste Water Heat Recovery System 1	No
Waste Water Heat Recovery System 2	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	16661
Fuel Type	Mains gas

Main Heating	Mains gas BGW Post 98 Combi condens. with auto ign.
TestMethod	
SAP Code	104
Efficiency (Split Efficiences) %	
Efficiency (Split Efficiences) %	
In Winter	89.7
In Summer	87
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	None
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	60001
Brand Model	Zenex, GasSaver
Details	Year: + current Applicable Fuel: 1 Boiler Types: RCSK Heat Store Volume: 0 PV module: 0
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel

Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 7
Survey Reference: 001
Property: George Street, Richmond

Issued on Date: 22.Oct.2020
Prop Type Ref:

SAP Rating: 65 D **CO2 Emissions (t/year):** 2.57 **DER:** 43.77 Pass **Reduction:** 0.2% **FEE:** 61.3 **ZC8:** 0.00
Environmental: 68 D **General Requirements Compliance:** Pass **TER:** 43.86 **HLP:** 1.46 **Energy cost:** £ 1018

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	31.29	62.96	3.94

7.0 Living Area	37.87
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	123.28	111.05

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	53.58

10.0 External Roofs

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, insulated flat roof	0.12		9	62.96	62.96

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	62.96

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	North West	None	0	No	0	0	0	6.44	0
Opening 2	Solid Door - Door	External Wall	South West	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	North East	None	0	No	0	0	0	2.01	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	7.60	0.037	Yes
Independently assessed	E3 Sill	5.80	0.033	No
Independently assessed	E4 Jamb	18.60	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	31.29	0.063	Yes
Independently assessed	E14 Flat roof	31.29	0.06	Yes
Independently assessed	E16 Corner (normal)	19.70	0.038	No
Independently assessed	E17 Corner (inverted - internal area greater than external area)	11.82	-0.029	No
Independently assessed	E18 Party wall between dwellings	7.88	0.086	Yes
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	4.90	0.09	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 5
  - Total number of L.E.L. fittings: 5
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: SAPTable
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: No
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.
- Fuel Type

Main Heating	Electricity BEE Direct-acting boiler
TestMethod	
SAP Code	191
Efficiency (SAP Table) %	100
In Winter	
In Summer	
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	Dual
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	
Cylinder In Heated Space	Yes
Independent Time Control	
Insulation Type	Foam
Insulation Thickness	80
Cylinder Volume	150
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	

Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 7
Survey Reference: 002
Property: George Street, Richmond

Issued on Date: 29.Oct.2020
Prop Type Ref:

SAP Rating: 81 B **CO2 Emissions (t/year):** 1.19 **DER:** 20.08 Pass **Reduction:** 22.4% **FEE:** 61.3 **ZC8:** 0.00
Environmental: 85 B **General Requirements Compliance:** Pass **TER:** 25.89 **HLP:** 1.46 **Energy cost:** £ 368

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	31.29	62.96	3.94

7.0 Living Area	37.87
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	123.28	111.05

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	53.58

10.0 External Roofs

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, insulated flat roof	0.12		9	62.96	62.96

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	62.96

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	North West	None	0	No	0	0	0	6.44	0
Opening 2	Solid Door - Door	External Wall	South West	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	North East	None	0	No	0	0	0	2.01	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	7.60	0.037	Yes
Independently assessed	E3 Sill	5.80	0.033	No
Independently assessed	E4 Jamb	18.60	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	31.29	0.063	Yes
Independently assessed	E14 Flat roof	31.29	0.06	Yes
Independently assessed	E16 Corner (normal)	19.70	0.038	No
Independently assessed	E17 Corner (inverted - internal area greater than external area)	11.82	-0.029	No
Independently assessed	E18 Party wall between dwellings	7.88	0.086	Yes
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	4.90	0.09	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows fully open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 4.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				2
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 5
  - Total number of L.E.L. fittings: 5
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: Database
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: Yes
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.: 16661
- Fuel Type: Mains gas

Main Heating	Mains gas BGW Post 98 Combi condens. with auto ign.
TestMethod	
SAP Code	104
Efficiency (Split Efficiences) %	
Efficiency (Split Efficiences) %	
In Winter	89.7
In Summer	87
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	None
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	60001
Brand Model	Zenex, GasSaver
Details	Year: + current Applicable Fuel: 1 Boiler Types: RCSK Heat Store Volume: 0 PV module: 0
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel

Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 8
Survey Reference: 001
Property: George Street, Richmond

Issued on Date: 22.Oct.2020
Prop Type Ref:

SAP Rating: 66 D **CO2 Emissions (t/year):** 2.97 **DER:** 38.80 Pass **Reduction:** 1.6% **FEE:** 56.4 **ZC8:** 0.00
Environmental: 69 C **General Requirements Compliance:** Pass **TER:** 39.43 **HLP:** 1.45 **Energy cost:** £ 1162

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	36.35	81.84	3.94

7.0 Living Area	27.73
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	143.22	131.00

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	32.39

10.0 External Roofs

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, insulated flat roof	0.20		9	81.84	81.84

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	81.84

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South West	None	0	No	0	0	0	5.90	0
Opening 2	Solid Door - Door	External Wall	North East	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	North West	None	0	No	0	0	0	2.54	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	7.10	0.037	No
Independently assessed	E3 Sill	5.30	0.033	Yes
Independently assessed	E4 Jamb	19.40	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	36.35	0.063	Yes
Independently assessed	E14 Flat roof	36.35	0.06	Yes
Independently assessed	E16 Corner (normal)	3.94	0.038	No
Independently assessed	E17 Corner (inverted - internal area greater than external area)	7.88	-0.029	No
Independently assessed	E18 Party wall between dwellings	15.76	0.086	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	8.22	0.09	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows half open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 2.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 8
  - Total number of L.E.L. fittings: 8
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: SAPTable
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: No
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.
- Fuel Type

Main Heating	Electricity BEE Direct-acting boiler
TestMethod	
SAP Code	191
Efficiency (SAP Table) %	100
In Winter	
In Summer	
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	Dual
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	
Cylinder In Heated Space	Yes
Independent Time Control	
Insulation Type	Foam
Insulation Thickness	80
Cylinder Volume	150
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	

Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Summary Information

Property Reference: 444577 Flat 8
Survey Reference: 002
Property: George Street, Richmond

Issued on Date: 29.Oct.2020
Prop Type Ref:

SAP Rating: 82 B **CO2 Emissions (t/year):** 1.38 **DER:** 17.86 Pass **Reduction:** 23.4% **FEE:** 56.4 **ZC8:** 0.00
Environmental: 85 B **General Requirements Compliance:** Pass **TER:** 23.33 **HLP:** 1.45 **Energy cost:** £ 414

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: Raymond McGurk, Tel: 0141 375 1480 Surveyor ID: e192-0001
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	South West
1.0 Property Type	Flat, End-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2020
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Internal Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	36.35	81.84	3.94

7.0 Living Area	27.73
8.0 Thermal Mass Parameter	Simple calculation - Low

9.0 External Walls

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Wall	Timber framed wall (one layer of plasterboard)	0.18		9.00	143.22	131.00

9.1 Party walls

Description	Construction	Element	Kappa	Area
Party Wall	Other		0.00	32.39

10.0 External Roofs

Description	Construction	U-Value	Element	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, insulated flat roof	0.20		9	81.84	81.84

11.1 Party Floors

Description	Construction	Element	Kappa	Area
Party Floor	Other		0	81.84

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Window	BFRC data	Window	Double glazed			0.86			1.20
Door	BFRC data	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
Opening 1	Window - Window	External Wall	South West	None	0	No	0	0	0	5.90	0
Opening 2	Solid Door - Door	External Wall	North East	None	0	No	0	0	0	3.78	0
Opening 3	Window - Window	External Wall	North West	None	0	No	0	0	0	2.54	0

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	No
17.0 Thermal Bridging	Calculate Bridges
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	7.10	0.037	No
Independently assessed	E3 Sill	5.30	0.033	Yes
Independently assessed	E4 Jamb	19.40	0.031	Yes
Independently assessed	E7 Intermediate floor between dwellings (in blocks of flats)	36.35	0.063	Yes
Independently assessed	E14 Flat roof	36.35	0.06	Yes
Independently assessed	E16 Corner (normal)	3.94	0.038	No
Independently assessed	E17 Corner (inverted - internal area greater than external area)	7.88	-0.029	No
Independently assessed	E18 Party wall between dwellings	15.76	0.086	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	8.22	0.09	No

18.0 Pressure Testing: Yes
- Designed q50: 4.50
- Property Tested ?
- As Built q50
- Same As Designed ?

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: No
- Approved Installation
- Windows open in hot weather: Windows half open
- Cross ventilation possible: No
- Night Ventilation: No
- Air change rate: 2.00
- Mechanical Ventilation data Type
- Type
- MV Reference Number
- Configuration
- MVHR Duct Insulated
- Manufacturer SFP
- Duct Type
- MVHR Efficiency
- Wet Rooms
- Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 8
  - Total number of L.E.L. fittings: 8
  - Percentage of L.E.L. fittings: 100.00
- External
  - External lights fitted: No
  - Light and motion sensors

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: Database
  - Description
  - Percentage of Heat: 100.00
- Main Heating 2: None
  - Description
  - Percentage of Heat
- Community Heating
- Secondary Heating
- Water Heating: Main Heating 1
- Flue Gas Heat Recovery System: Yes
- Waste Water Heat Recovery System 1: No
- Waste Water Heat Recovery System 2: No
- Solar Panel: No

25.0 Main Heating 1
- Database Ref. No.: 16661
- Fuel Type: Mains gas

Main Heating	Mains gas BGW Post 98 Combi condens. with auto ign.
TestMethod	
SAP Code	104
Efficiency (Split Efficiences) %	
Efficiency (Split Efficiences) %	
In Winter	89.7
In Summer	87
Model Name	
Manufacturer	
Controls	CBI Time and temperature zone control
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	
Boiler Compensator	None
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	None
Combi store type	

27.0 Community Heating	
Space Community Heating	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	

28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	

29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	No
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	60001
Brand Model	Zenex, GasSaver
Details	Year: + current Applicable Fuel: 1 Boiler Types: RCSK Heat Store Volume: 0 PV module: 0
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes insulation	
In Airing Cupboard	

31.0 Solar Panel

Solar Panel Area	
Area Type	
Panel Type	
n0, a1, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	within a single casing
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Suite S3
Flemington House
110 Flemington Street
Glasgow
G21 4BF

Tel : 0141 375 1480

GEORGE STREET, RICHMOND.

In order to achieve the 40% reduction in CO2 emissions, we have included in the SAPs :-

- **Low energy lighting.**
- **High performance thermal envelope.**
- **Boilers to have heat recovery with time and temperature zone control, room thermostats and TRV's with delayed start thermostat and enhanced load compensator.**
- **Lower air permeability**
- **Low-E (BFRC) double glazed windows.**

The figures below show the DER (Dwelling Emission Rates) for the flats as and enhanced.

	AS	ENHANCED	REDUCTION
Flat 1	35.93	21.33	40.63%
Flat 2	51.33	30.20	41.16%
Flat 3	38.33	22.81	40.49%
Flat 4	36.73	21.87	40.45%
Flat 5	42.87	25.36	40.84%
Flat 6	44.87	26.51	40.91%
Flat 7	43.86	25.89	40.97%
Flat 8	39.43	23.33	40.78%

To ascertain the reduction in emissions, the following should be applied.
[(1-(ENHANCED ÷ AS) x100] This will give you the overall % reduction

4 BIODIVERSITY

4.1 Minimising the threat to biodiversity from new buildings, lighting, hard surfacing and people

a. Does your development involve the loss of an ecological feature or habitat, including a loss of garden or other green space? (Indicate if yes) -2

If so, please state how much in sqm? sqm

b. Does your development involve the removal of any tree(s)? (Indicate if yes)

If so, has a tree report been provided in support of your application? (Indicate if yes)

c. Does your development plan to add (and not remove) any tree(s) on site? (Indicate if yes)

d. Please indicate which features and/or habitats that your development will incorporate to improve on site biodiversity:

Pond, reedbed or extensive native planting	*6*	Area provided:	sqm
An extensive green roof	*5*	Area provided:	sqm
An intensive green roof	*4*	Area provided:	sqm
Garden space	*4*	Area provided:	sqm
Additional native and/or wildlife friendly planting to peripheral areas	*3*	Area provided:	sqm
Additional planting to peripheral areas	*2*	Area provided:	sqm
A living wall	*2*	Area provided:	sqm
Bat boxes	*0.5*		
Bird boxes	*0.5*		
Swift boxes	*0.5*		
Other	*0.5*		

e. Does your development use at least 70% of available roof plate as green/brown roof 1

Policy LP 17 requires 70%

Subtotal 0

Please give any additional relevant comments to the Biodiversity Section below

5 FLOODING AND DRAINAGE

5.1 Mitigating the risks of flooding and other impacts of climate change in the borough

a. Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) -2

Have you submitted a Flood Risk Assessment? (Indicate if yes)

b. Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick all that apply)

Store rainwater for later use	*5*
Use of infiltration techniques such as porous surfacing materials to allow drainage on-site	*3*
Attenuate rainwater in ponds or open water features	*4*
Store rainwater in tanks for gradual release to a watercourse	*3*
Discharge rainwater directly to watercourse	*2*
Discharge rainwater to surface water drain	*1*
Discharge rainwater to combined sewer	*0*

Have you submitted a Drainage Statement (Indicate if yes)

See Policy LP 21 and Draft London Plan SL 13

c. Please give the change in area of permeable surfacing which will result from your development proposal: sqm

Please provide details of the permeable surfacing below *please represent a loss in permeable area as a negative number*

Subtotal 0

Please give any additional relevant comments to the Flooding and Drainage Section below

6 IMPROVING RESOURCE EFFICIENCY

6.1 Reduce waste generated and amount disposed of by landfill though increasing level of re-use and recycling

a. Will demolition be required on your site prior to construction? *[Points will only be awarded if 10% or greater of demolition waste is reused/recycled]* 1

If so, what percentage of demolition waste will be reused in the new development? 90 %

What percentage of demolition waste will be recycled? %

b. Does your site have any contaminated land? 1

Have you submitted an assessment of the site contamination? 2

Are plans in place to remediate the contamination? 2

Have you submitted a remediation plan? 1

Are plans in place to include composting on site? 1

c. Will a waste management plan and facilities be in place in line with Policy LP24

6.2 Reducing levels of water waste

a. Will the following measures of water conservation be incorporated into the development? (Please tick all that apply):

Fitting of water efficient taps, shower heads etc	*1*
Use of water efficient A or B rated appliances	*1*
Rainwater harvesting for internal use	*4*
Greywater systems	*4*
Fit a water meter	*1*

Subtotal 3

Please give any additional relevant comments to the Improving Resource Efficiency Section below

7	ACCESSIBILITY	
7.1	**Ensure flexible adaptable and long-term use of structures**	
a.	**If the development is residential,** will it meet the requirements of the nationally described space standard for internal space and layout?	*1*
	If the standards are not met, in the space below, please provide details of the functionality of the internal space and layout	
AND		
b.	**If the development is residential**, will it meet Building Regulation Requirement M4 (2) 'accessible and adaptable dwellings'?	*2*
	If this is not met, in the space below, please provide details of any accessibility measures included in the development.	
	For major residential developments, are 10% or more of the units in the development to Building Regulation Requirement M4 (3) 'wheelchair user dwellings'?	*1*
OR		
c.	**If the development is non-residential,** does it comply with requirements included in Richmond's Local Plan LP1, LP28.B, LP30 & LP45	*2*
	Please provide details of the accessibility measures specified in the Local Plan that will be included in the development	

Subtotal **1**

Please give any additional relevant comments to the Design Standards and Accessibility Section below

LBRUT Sustainable Construction Checklist- Scoring Matrix for *New Construction* **(Non-Residential and domestic refurb)**

TOTAL ***40***

Score	Rating	Significance
84 or more	*A+*	Project strives to achieve highest standard in energy efficient sustainable development
75-83	*A*	Makes a major contribution towards achieving sustainable development in Richmond
56-74	*B*	Helps to significantly improve the Borough's stock of sustainable developments
40-55	*C*	Minimal effort to increase sustainability beyond general compliance
39 or less	*FAIL*	Does not comply with SPD Policy

LBRUT Sustainable Construction Checklist- Scoring Matrix for New Construction **Residential new-build**

Score	Rating	Significance
85 or more	A++	Project strives to achieve highest standard in energy efficient sustainable development
68-84	*A+*	Project strives to achieve higher standard in energy efficient sustainable development
59-67	*A*	Makes a major contribution towards achieving sustainable development in Richmond
39-58	*B*	Helps to significantly improve the Borough's stock of sustainable developments
24-38	*C*	Minimal effort to increase sustainability beyond general compliance
23 or less	*FAIL*	Does not comply with SPD Policy

Authorisation:

I herewith declare that I have filled in this form to the best of my knowledge

Signature _____ **Date** _____

Appendix 6 – BREEAM Statement

BREEAM Domestic Refurbishment

Pre-Assessment Report

Proposed Residential Conversion – 54 George St, TW9 1HJ.

ENVIRONMENTAL AND
SUSTAINABILITY CONSULTANTS

encon associates

Report Reference Number: A5058

Document Control

Date of first Issue	Revision	Date of Revision	Issued By	Checked by
12 April 2021	-	-	GM	MB

Contents

1 Executive Summary

Encon Associates Limited have been appointed by Dalesford Estates Ltd to undertake a BREEAM Domestic Refurbishment Pre-Assessment to evaluate the proposed residential conversion at 54 George St, London against the BREEAM Domestic Refurbishment methodology. The project consists of an existing building converted to 8No new dwellings.

This BREEAM Domestic Refurbishment Pre-Assessment report has been undertaken based on a full BREEAM Pre-Assessment webinar meeting completed by Glenn Miles of Encon Associates Limited who is a qualified and licensed BREEAM assessor on the 25th March 2021. The attendees of the Pre-Assessment meeting and their roles within the project are listed below:

- Glenn Miles/Encon Associates Ltd – BREEAM Assessor and Design Stage AP
- Metin Gurpinar/Dalesford Estates Limited – Client and Contractor
- Chiara Del Giudice/USL Architects - Architect

This BREEAM Domestic Refurbishment Pre-Assessment report highlights that the proposed development 54 George Street, London could meet a BREEAM **Excellent Level of 76.11%** if the scheme were to be formally assessed against the BREEAM Domestic Refurbishment methodology.

2 Introduction

This BREEAM Domestic Refurbishment Pre-Assessment report summarises the buildings performance against the BREEAM Domestic Refurbishment methodology to establish its BREEAM rating in line with planning requirements in support of a full planning application.

The BREEAM Domestic Refurbishment scheme is a performance based assessment method and certification scheme for refurbished buildings. The primary aim of BREEAM is to mitigate the life cycle impacts of refurbished buildings on the environment in a robust and cost effective manner. This is achieved through integration and use of the scheme by clients and their project teams at key stages in the design and construction process. This enables the client, through the BREEAM Assessor and the BRE Global certification process, to measure, evaluate and reflect the performance of their building against best practice in an independent and robust manner. This performance is quantified by a number of individual measures and associated criteria stretching across a range of nine environmental issues which is ultimately expressed as a single certified BREEAM rating.

3 Pre-Assessment Results Summary

IES TaP
GREEN BUILDING RATINGS ONLINE

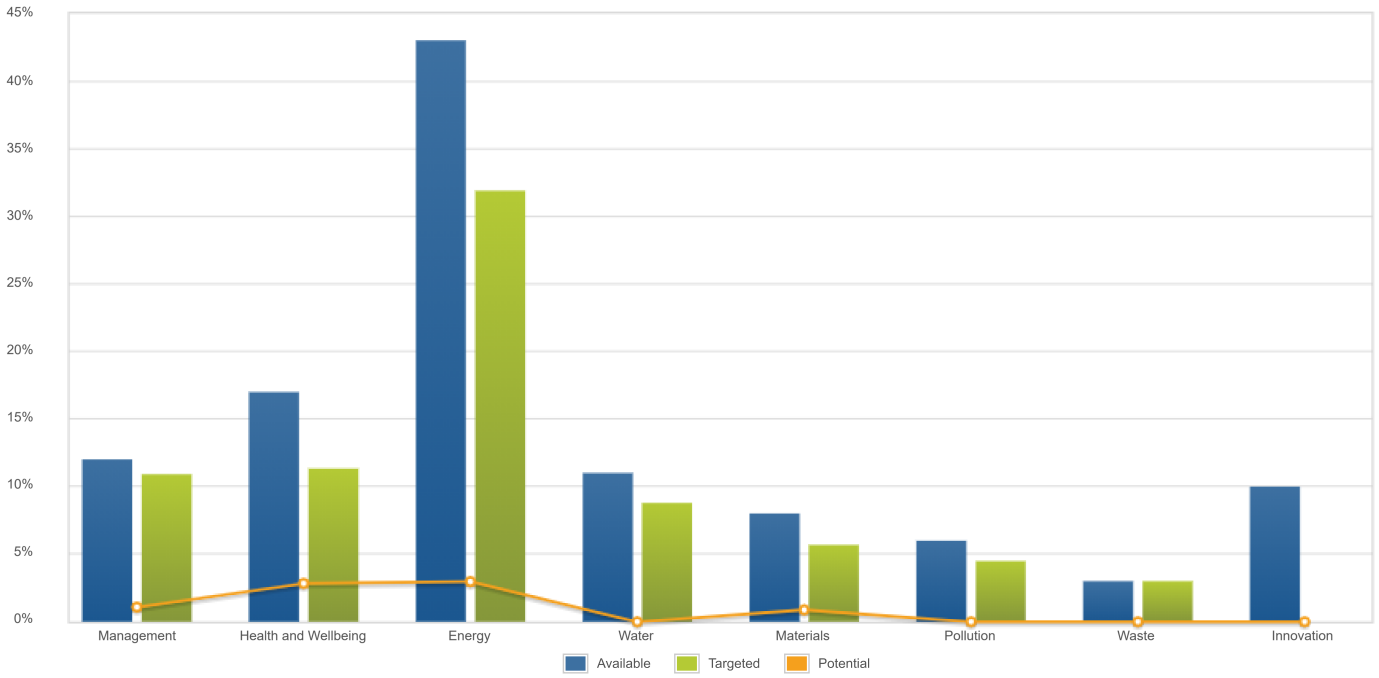
encon associates

Section Summary

Project:	A5058 - 54 George Street TW9 1HJ
Report:	Pre-Assessment Stage
Design Target:	Excellent - 76.11%
Potential Rating:	Excellent - 83.89%

Section	Available		Targeted		Potential	
	Credits	Percent	Credits	Percent	Credits	Percent
Management	11	12%	10	10.91%	1	1.09%
Health and Wellbeing	12	17%	8	11.33%	2	2.83%
Energy	29	43%	21.5	31.88%	2	2.97%
Water	5	11%	4	8.8%	0	0%
Materials	45	8%	32	5.69%	5	0.89%
Pollution	8	6%	6	4.5%	0	0%
Waste	5	3%	5	3%	0	0%
Innovation	10	10%	0	0%	0	0%
Total	**125**	**110.00%**	**86.5**	**76.11%**	**10**	**7.78%**

Performance by Section



4 Pre-Assessment Results Criteria Summary

IES TaP
GREEN BUILDING RATINGS ONLINE

encon associates

Criteria Summary

Project:	A5058 - 54 George Street TW9 1HJ
Report:	Pre-Assessment Stage
Design Target:	Excellent - 76.11%
Potential Rating:	Excellent - 83.89%

Management	Compliance Requirements	Available		Targeted		Potential	
Man 01: Home Users Guide	**Three credits** Provision of a home users guide: Where a Home User Guide containing the information listed in the 'User Guide Contents List' has been produced and supplied to all homes.	3	3.27%	3	3.27%	0	0%
Glenn Miles (Encon Associates): **<u>BREEAM Pre-Assessment Meeting 25/03/21</u>** • Three credits targeted • Home user guide to be completed							
Man 02: Responsible Construction Practices	For this issue large scale projects and small scale projects are assessed under different criteria. Up to 2 credits may be awarded with an innovation credit available for exemplary performance as follows: **Two Credits - Large Scale Projects** Where either option 1 or 2 is adopted as follows: **1.** Option 1 - Where the principal contractor has used the Considerate Constructors Scheme (CCS) as detailed in CN1. Credits are awarded depending on the CCS Code of Considerate Practice score achieved, as outlined in Table - 10 **2.** Option 2 - Where the principal contractor has used a compliant alternative scheme as detailed in CN4. Credits are awarded on the level of compliance with the aternative compliant scheme, as outlined in Table - 1 **Two Credits - Small Scale Projects** **3.** Where the requirements of criterion 1 or 2 has been met OR **4.** Where the principle contractor addresses all mandatory items in Checklist A-4; Small Scale Refurbishment: Responsible Construction Practices, credits are as follows: **a.** Where 50% optional items in Checklist A-4; Small Scale Refurbishment: Responsible Con-struction Practices, have been addressed, one credit can be awarded **b.** Where 80% optional items in Checklist A-4; Small Scale Refurbishment: Responsible Construction Practices, have been addressed, two credits can be awarded. **Exemplary Credit Requirements** Where either option 1 or 2 (Table 4-1) is adopted as follows: **5.** Option 1 - Where the principle contractor has been certified under the Considerate Constructors Scheme (CCS) and reaches the level required for the innovation credit. **6.** Option 2 - Where the principle contractor has used an alternative scheme which addresses all of the items (optional and mandatory) on the relevant checklist (Checklist A-2; Considerate Constructors Scheme and Checklist A-4; Small Scale Refurbishment: Responsible Construction Practices, for large scale and Checklist A-4; Small Scale Refurbishment: Responsible Construction Practices for small scale).	2	2.18%	2	2.18%	0	0%
Glenn Miles (Encon Associates): **<u>BREEAM Pre-Assessment Meeting 25/03/21</u>** • Two credits targeted • Scheme classed as large Scale • Registration with CCS and achieve a score of 35+ with a score of seven in each section required.							

Man 03: Construction Site Impacts	For this issue large and small scale projects are assessed under different criteria. Up to one credit may be awarded for this issue as follows: **One Credit: Large Scale Projects** **1.** Where there is evidence to demonstrate that 2 or more of the sections a-e in Appendix A: Man 03 are completed. **One credit: Small Scale Projects** **2.** Where there is evidence to demonstrate that 2 or more of the sections a-d in Checklist A-6 are completed.	1	1.09%	1	1.09%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Credit targeted • Scheme classed as large Scale • All timber to be sourced from suppliers capable of providing FSC/PEFC certification • Full monitoring of Construction site impacts to be undertaken (See Man 03 credits for full details)							
Man 04: Security	Up to two credits may be awarded for this issue as follows: **One Credit - secure windows and doors** **1.** Where retained external doors and accessible windows comply with the minimum security requirements as set out in CN6 **2.** Where the following newly added features are appropriately certified: **a.** External door sets **b.** Windows **Two Credits - Secured by design** **3.** Where the principles and guidance of Secured by Design Section 2 – Physical Security are complied with. **4.** A suitably qualified security consultant such as the Police Architectural Liaison Officer (ALO) or Crime prevention design advisor (CPDA) is consulted at the design stage and their recommendations are incorporated into the refurbishment specification.	2	2.18%	1	1.09%	1	1.09%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • First credit targeted. • It was advised that Secured by Design windows will be installed. • Individual alarms will be installed for each property and intercoms. • It was advised that a Secured by Design or a Security Needs Assessment has not been carried out to date. • **Glenn Miles (Encon Associates)** to provide Security Needs Assessment proposals. • Second credit marked as potential.							
Man 05: Protection and Enhancement of Ecological Features	**One Credit - Protecting ecological features** **1.** Where a site survey is carried out by a member of the project team or a Suitably Qualified Ecologist (SQE) to determine the presence of ecological features. **2.** Where protected species have been identified as present on site, the relevant Statutory Nature Conservation Organisation (SNCO) has been notified and protected species have been adequately protected **3.** Where all existing features of ecological value (including any of those listed in CN1) on the refurbishment site potentially affected by the works, are maintained and adequately protected during refurbishment works. **Exemplary performance requirements – ecological enhancement** The following outlines the exemplary level criteria to achieve an innovation credit for this BREEAM issue: **4.** Where a Suitably Qualified Ecologist has been appointed to recommend appropriate ecological features that will positively enhance the ecology of the site and where the developer adopts all general ecological recommendations and 30% of additional recommendations.	1	1.09%	1	1.09%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- Credit targeted.
- A review of site information shows plot 100% hard standing.
- At this stage it is assumed that the site is of low ecological value with no ecological features requiring protection.
- Ecological survey to be completed by the design team prior to works start.

Man 06: Project Management	Up to two credits may be awarded for this issue along with the opportunity for an additional two innovation credits as follows: **First credit - Project Roles and Responsibilities** **1.** Where all of the project team are involved in the project decision making and individual and shared roles and responsibilities are assigned in accordance with CN1 and CN2 as follows: **a.** For small scale projects, the project manager writes a project implementation plan and holds an initiation meeting to assign individual and shared responsibilities amongst the project team including all trades on site: **b.** For large scale projects, the project manager assigns individual and shared responsibilities across the following key design and refurbishment stages: **i.** Planning and Building control notification **ii.** Design **iii.** Refurbishment **iv.** Commissioning and handover **v.** Occupation **Second credit - Handover and Aftercare** **2.** Where a handover meeting is arranged **3.** Where 2 or more of items a-c have been committed to determine project success: **a.** A site inspection within 3 months of occupation. **b.** Conduct post occupancy interviews with building occupants or a survey via phone or posted information within 3 months of occupation. **c.** Longer term after care e.g. a helpline, nominated individual or other appropriate system to support building users for at least the first 12 months of occupation. **Exemplary Credit requirements** Up to two innovation credits are available as follows: **One credit – Early Design Input** **4.** Where a BREEAM Accredited Professional (AP) has been appointed to oversee key stages within the project at an early stage, prior to the production of a refurbishment specification. Or **5.** for small scale projects where a BREEAM Accredited Professional (AP) or BREEAM Domestic Refurbishment Assessor has been appointed to oversee key stages within the project at an early stage, prior to the production of a refurbishment specification. Note: The appointment of a BREEAM Domestic Refurbishment Assessor early in the project may be the most appropriate option for small scale projects where the appointment of an AP (accredited professional) may not always be feasible. **One credit - Thermographic Surveying and Airtightness Testing** **6.** Where Thermographic surveying and Airtightness testing have been carried out at both pre and post refurbishment stages. **7.** Where an improved air tightness target has been set at design stage and testing demonstrates that this has been achieved post refurbishment.	2	2.18%	2	2.18%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- It is assumed that project team responsibilities have been set at an early stage, therefore first credit targeted.
- Second credit targeted. Contractor/Client to ensure handover and aftercare provided in line with BREEAM requirements.

Management Totals	**11**	**12.00%**	**10**	**10.91%**	**1**	**1.09%**

Health and Wellbeing	Compliance Requirements	Available		Targeted		Potential	
Hea 01: Daylighting	Up to two credits may be awarded for this issue as follows: **First credit - maintaining good daylighting** **1.** For existing dwellings and change of use projects (e.g. conversions): **a.** The refurbishment results in a neutral impact on the dwellings daylighting levels in the kitchen, living room, dining room and study with “no” answered for all questions in Appendix A: Hea 01 , parts 1 and 2 (for existing dwellings) or parts 3 and 4 (for change of use e.g. con-versions). **2.** Where the property is being extended: **a.** new spaces achieve minimum daylighting levels See Criteria CN1 **b.** the extension does not significantly reduce daylighting levels in the kitchen, living room, dining room or study of neighbouring properties **Second credit - minimum daylighting** **3.** The dwelling achieves minimum daylighting levels in the kitchen, living room, dining room and study See Criteria CN1	2	2.83%	0	0%	2	2.83%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • It was advised that a daylight simulation has been completed and all rooms except two meet the requirements. • Credit marked as potential until daylight simulation provided for review.							
Hea 02: Sound Insulation	The following demonstrates compliance (up to four credits may be awarded): **Up to four credits are awarded - achieving and going beyond national Regulations** Credits are awarded depending on the type of dwelling and whether they are subject to sound testing as follows: **Properties where sound testing has been carried out:** **1.** Where sound testing has been carried out and where the dwelling meets or goes beyond Regulations, up to four credits may be awarded according to the sound insulation credit requirements as shown in Table - 12: sound insulation credit requirements. **Properties where sound testing is not feasible (see CN4 and CN5) and not required by the appointed Building Control body:** **2.** Where existing separating walls and floors are designed to meet the requirements of Building Regulations with compliant construction details, two credit can be awarded (CN6). **3.** Where a Suitably Qualified Acoustician (SQA) provides recommendations for the specification of all existing separating walls and floors, confirming in their professional opinion that they have the potential to meet or exceed, the sound insulation credit requirements. Where these recommendations are implemented up to four credits may be awarded as shown in Table - 12: sound insulation credit requirements. **Historic Buildings** **4.** Where the dwelling is a Historic Building and sound testing results demonstrate existing separating walls and floor meet the Historic Building credit requirements, up to four credits may be awarded as shown in Table - 12: sound insulation credit requirementstable (insulation credits for historical buildings) and described in CN10. **5.** Where criteria 2 and 3 is achieved using Table 12 OR **6.** Where the dwelling achieves criterion 1 or 7 or 8. **Detached Properties** **7.** Where the dwelling is a detached property with no separating walls or floors, four credits should be awarded **Properties with separating walls or floors only between non habitable rooms** **8.** Where existing separating walls or floors only occur between non habitable rooms and where testing is not required by the appointed building control body, four credits should be awarded, see CN3.	4	5.67%	4	5.67%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Four credits targeted. • Part E acoustic testing will be completed in line with the Building Regulations. • It was advised that high levels of acoustic detailing will be provided to show a significant improvement over sound requirements.							

Hea 03: Volatile Organic Compounds	**One credit—avoiding the use of VOCs** **1.** Where all decorative paints and varnishes used in the refurbishment have met the requirement in Table - 14. **2.** Where at least five of the eight remaining product categories listed have met the testing require-ments and emission levels for Volatile Organic Compound (VOC) emissions against the relevant standards identified in Table - 14. **3.** Where five or less products are specified within the refurbishment, all must meet the require-ments in order to achieve this credit.	1	1.42%	1	1.42%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Credit targeted. • Consideration should be made to VOC's when specifying products. • Architect responsible for specification in line with the BREEAM requirements. • It was advised that Dulux paints will be used throughout and this paint meets the VOC testing requirements. • **Glenn Miles (Encon Associates)** to provide credit specific details for adoption.							
Hea 04: Inclusive Design	The following demonstrates compliance (up to two credits may be awarded): **One credit—minimum accessibility** **1.** An access expert or suitably qualified member of the design team (CN6) has completed section 1 of Appendix A: Hea 04 , accessibility template with evidence provided of the measures imple-mented in the refurbishment a. The access statement demonstrates reasonable provision to provide accessibility to the dwelling covering section 1 of Checklist A-8 in accordance with CN3 and CN4. **Two credits—advanced accessibility** **2.** An access expert or suitably qualified member of the design team (CN6) has completed sections 1 and 2 of Appendix A: Hea 04 with evidence provided of the measures implemented in the refurbishment a. The access statement demonstrates reasonable provision to provide accessibility to the dwelling covering sections 1 and 2 of Checklist A-8 in accordance with CN3 and CN4. **Exemplary performance requirements—lifetime homes and Part M** The following outlines the exemplary level criteria to achieve an innovation credit for this BREEAM issue: **3.** One innovation credit can be awarded where an access expert suitably qualified member of the design team (CN6) has completed sections 1, 2 and 3 of Appendix A: Hea 04, access statement template with evidence provided of the measures implemented in the refurbishment a. The access statement demonstrates reasonable provision to meet sections 1, 2 and 3 of Checklist A-8 in accordance with CN3 and CN4.	2	2.83%	0	0%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Credit not targeted. • A suitably qualified professional has not been consulted in terms of Lifetime Homes OR Inclusive Design and it is not anticipated this will be completed. • A review of the existing building shows restricted design parameters and it is thought the criteria could not be met.							
Hea 05: Ventilation	**One credit—minimum ventilation requirements** One credit can be awarded where the following whole dwelling is brought up to the following ventilation requirements: **1.** A minimum level of background ventilation is provided (with trickle ventilators or other means of ventilation) for all habitable rooms, kitchens, utility rooms and bathrooms compliant with section 7, Building Regulations Approved Document Part F, 2010 **2.** A minimum level of extract ventilation is provided in all wet rooms (e.g. kitchen, utility and bathrooms), compliant with section 5, Building Regulations Approved Document Part F 2010. **3.** A minimum level of purge ventilation is provided in all habitable rooms and wet rooms, compli-ant with section 7, Building Regulations Approved Document Part F, 2010. **4.** The building is a historic building (CN4) and meets the requirements for Historic Buildings below. **Two credits—advanced ventilation** Two credits can be awarded where: **5.** Ventilation is provided for the dwelling that meets the requirements of Section 5 of Building Reg-ulations Part F in full **6.** Where the building is a historic building and meets the requirements for Historic Buildings (CN4).	2	2.83%	2	2.83%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- All minimum ventilation will be completed in line with Building Regulations Part F, therefore first credit can be achieved.
- The second credit is targeted as compliance in full against Building Regulations Part F will be achieved.
- It was advised that trickle vents will be provided and full extract ventilation to be provided in kitchens and bathrooms.

Hea 06: Safety	One credit may be awarded for this issue as follows: **One Credit—fire and carbon monoxide (CO) detection and alarm systems** Where a compliant fire detection and fire alarm system is provided in accordance with compliance notes 2-8. **1.** Where the dwelling is provided with a compliant fire detection and alarm system in accordance with relevant compliance notes 2-9 **2.** Where the dwelling is supplied with mains gas or where any other form of fossil fuel is used within the building (e.g. coal), a compliant fire and carbon monoxide detector and alarm system is provided in accordance with compliance notes 2-9. **2.** Where the project involves electrical re-wiring the power supply for the smoke alarm and compli-ant carbon monoxide alarm systems are derived from the dwellings main electricity supply in accordance with CN5. Please see CN9 for compliance where properties are undertaking electrical rewiring. **3.** Where the project does not involve electrical re-wiring the power supply for the smoke alarm and carbon monoxide alarm systems are derived from a battery supply.	1	1.42%	1	1.42%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- Credit targeted.
- All dwellings will be installed with fire, CO2 and smoke detectors in line with Building Regulations.

Health and Wellbeing Totals	**12**	**17.00%**	**8**	**11.33%**	**2**	**2.83%**

<table>
<tr><th>Energy</th><th>Compliance Requirements</th><th colspan="2">Available</th><th colspan="2">Targeted</th><th colspan="2">Potential</th></tr>
<tr><td>Ene 01: Improvement in Energy Efficiency</td><td>Up to 6 credits are awarded – improving the dwellings Energy Efficiency Rating (EER)

1. Where the refurbishment results in an improvement to the dwellings Energy Efficiency Rating, in accordance with CN2.

Table - 16: EER improvement credit benchmarks.

<table>
<tr><th>Credits</th><th>Improvement in EER</th></tr>
<tr><td>0.5</td><td>≥5</td></tr>
<tr><td>1.0</td><td>≥9</td></tr>
<tr><td>1.5</td><td>≥13</td></tr>
<tr><td>2.0</td><td>≥17</td></tr>
<tr><td>2.5</td><td>≥21</td></tr>
<tr><td>3.0</td><td>≥26</td></tr>
<tr><td>3.5</td><td>≥31</td></tr>
<tr><td>4.0</td><td>≥36</td></tr>
<tr><td>4.5</td><td>≥42</td></tr>
<tr><td>5.0</td><td>≥48</td></tr>
<tr><td>5.5</td><td>≥54</td></tr>
<tr><td>6.0</td><td>≥60</td></tr>
</table>
</td><td>6</td><td>8.9%</td><td>1.5</td><td>2.22%</td><td>0</td><td>0%</td></tr>
<tr><td colspan="8">Glenn Miles (Encon Associates):

<u>BREEAM Pre-Assessment Meeting 25/03/21</u>

• At this stage no energy modelling has been completed, however this will be completed at detailed design stage.
• Two credits have been targeted as a reasonable assumption based on the absence of SAP calculations at this stage. It is understood that extensive refurbishment is being completed.

<u>Post Meeting Note 25/03/21</u>

• Design Stage SAP calculations have been provided.
• A review of the SAP calculations show an improvement of the EER of 14 which equates to 1.5 credit which results in a credit reduction of 0.5</td></tr>
</table>

<table>
<tr>
<td>Ene 02: Energy Efficiency Rating Post Refurbishment</td>
<td>
Up to 4 credits are awarded – EER Post Refurbishment

1. Where as a result of refurbishment, the dwelling meets a minimum Energy Efficiency Rating, cred-its can be awarded

Table - 18: Minimum EER credit benchmarks.
<table>
<tr><th>Credits</th><th>EER post refurbishment</th><th>Minimum requirements</th></tr>
<tr><td>0.5</td><td>≥50</td><td>BREEAM Pass level requires a minimum EER of 50</td></tr>
<tr><td>1</td><td>≥55</td><td>BREEAM Good level requires a minimum EER of 58</td></tr>
<tr><td>1.5</td><td>≥60</td><td></td></tr>
<tr><td>2</td><td>≥65</td><td>BREEAM Very Good level requires a minimum EER of 65</td></tr>
<tr><td>2.5</td><td>≥70</td><td>BREEAM Excellent level requires a minimum EER of 70</td></tr>
<tr><td>3</td><td>≥75</td><td></td></tr>
<tr><td>3.5</td><td>≥80</td><td>BREEAM Outstanding level requires a minimum EER of 81</td></tr>
<tr><td>4</td><td>≥85</td><td></td></tr>
</table>
Exemplary performance requirements

The following outlines the exemplary level criteria to achieve an innovation credit for this BREEAM issue:

2. One innovation credit can be awarded where the assessed dwellings achieve an EER post refur-bishment of ≥90, equivalent to an Energy Performance Certificate band A

3. Two innovation credits can be awarded where the assessed dwelling achieves an EER post refur-bishment of ≥100
</td>
<td>4</td><td>5.93%</td><td>4</td><td>5.93%</td><td>0</td><td>0%</td>
</tr>
<tr>
<td colspan="7">
Glenn Miles (Encon Associates):

<u>BREEAM Pre-Assessment Meeting 25/03/21</u>

At this stage no energy modelling has been completed, however this will be completed at detailed design stage.
Three and a half credits have been targeted as a reasonable assumption based on the absence of SAP calculations at this stage. It is understood that extensive refurbishment is being completed.

<u>Post Meeting Note 25/03/21</u>

Design Stage SAP calculations have been provided.
A review of the SAP calculations show an EER of 87 which equates to 4 credits which results in a credit improvement of 0.5

</td>
</tr>
<tr>
<td>Ene 03: Primary Energy Demand</td>
<td></td>
<td>7</td><td>10.38%</td><td>7</td><td>10.38%</td><td>0</td><td>0%</td>
</tr>
<tr>
<td colspan="7">
Glenn Miles (Encon Associates):

<u>BREEAM Pre-Assessment Meeting 25/03/21</u>

At this stage no energy modelling has been completed, however this will be completed at detailed design stage.
Two credits have been targeted as a reasonable assumption based on the absence of SAP calculations at this stage. It is understood that extensive refurbishment is being completed.

<u>Post Meeting Note 25/03/21</u>

Design Stage SAP calculations have been provided.
A review of the SAP calculations show Primary Energy Demand of 81kwh/m2 which results in a credit score of seven credits, therefore and increase of four credits.

</td>
</tr>
</table>

Ene 04: Renewable Technologies	**One credit:** **1.** Where at least 10% of the dwellings Primary Energy Demand per annum is supplied by low or zero carbon technologiesAND **2.** Where the dwelling has reduced energy demand prior to the specification of renewable technologies with a maximum Primary Energy Demand as follows: **a.** For detached, semi-detached, bungalows and end terraces: 250 kWh/m2/year b. Mid terraces and flats: 220 kWh/m2/year **Two credits:** **3.** Where for mid to high rise flats at least 15% of each dwellings Primary Energy Demand per annum is supplied by low or zero carbon technologies **4.** Where for dwellings other than mid to high rise flats at least 20% of each dwellings Primary Energy Demand per annum is supplied by low or zero carbon technologiesAND **5.** Where the dwelling has reduced energy demand prior to the specification of renewable technologies with a maximum Primary Energy Demand as follows: **a.** For detached, semi-detached, bungalows and end terraces: 250 kWh/m2/year b. Mid terraces and flats: 220 kWh/m2/year	2	2.97%	0	0%	2	2.97%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Credit not targeted at this stage. • PV is likely to be installed under Phase 2 plans.							
Ene 05: Energy Labelled White Goods	**First credit – Fridges, freezers and fridge-freezers** **1.** Fridges and freezers or fridge-freezers are recognised by the Energy Saving Trust Recommended labelling scheme, carrying the Energy Saving Trust Recommended Label OR **2.** Where no white goods are provided to the dwelling(s) but the EU Energy Efficiency Labelling Scheme Information Leaflet is provided to each dwelling **Second credit – washing machines, dishwashers, tumble dryers and washer dryers** **3.** Washing machines and dishwashers are recognised by the Energy Saving Trust Recommended labelling scheme, carrying the Energy Saving Trust Recommended Label AND EITHER **4.** Washer dryers and tumble dryers have a B rating under the EU Energy Efficiency Labelling Scheme (where a washer dryer is provided, it is not necessary to also provide a washing machine) OR **5.** Where a washer dryer or tumble dryer is not provided, the EU Energy Efficiency Labelling Scheme Information Leaflet is provided to each dwelling	2	2.97%	2	2.97%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Two credits targeted. • The minimum recommended EU labelled fridge, freezers, washing machines and tumble dryer to be fitted. EU Energy labelling to also be provided. • It was advised that A+ rated fridge freezers will be provided and washing machine/Dishwasher with maximum B ratings.							
Ene 06: Drying Space	**One credit** **1.** An adequate, secure internal or external space with posts and footings, or fixings holding: **a.** 1-2 bedrooms: 4m+ of drying line b. 3+ bedrooms: 6m+ of drying line	1	1.48%	1	1.48%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Credit targeted. • Drying lines to be provided via Brabantia type pull out drying lines in bathrooms and balconies where present. • All bathrooms to have sufficient ventilation requirements.							

Ene 07: Lighting	**One credit – External lighting** **1.** Where Energy Efficient Space lighting (including lighting in communal areas) and Energy Efficient Security lighting is providedOR **2.** Where Energy Efficient Space lighting (including lighting in communal areas) and no Security Lighting is provided **One credit - Internal Lighting** **3.** One credit is awarded where the energy required for internal lighting is minimised through the provision of a maximum average wattage across the total floor area of the dwelling of 9 watts/m2	2	2.97%	2	2.97%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Two credit targeted. • All lighting for the development will be LED. • Individual space lighting will be controlled via PIR and photocells. • No dedicated security lighting is provided. • Internal lighting is expected to meet <9w/m2							
Ene 08: Energy Display Devices	**One credit** **1.** Where current electricity consumption data is displayed to occupants by a compliant energy dis-play devices OR **2.** Where current primary heating fuel consumption data is displayed to occupants by a compliant Energy Display Devices. **Two credits** **3.** Where current electricity AND primary heating fuel consumption data are displayed to occupants by a compliant correctly specified Energy Display Devices. OR **4.** Where electricity is the primary heating fuel and current electricity consumption data are displayed to occupants by a compliant Energy Display Devices. **Exemplary Performance** The following outlines the exemplary level criteria to achieve an innovation credit for this BREEAM issue: **5.** Where criterion 3 or 4 have been achieved. **6.** Where any specified Energy Display Devices is capable of recording consumption data.	2	2.97%	2	2.97%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Two credits targeted. • It was advised that Energy display devices will be installed within the properties as part of the clients standard fit out.							
Ene 09: Cycle Storage	**One credit:** **1.** Where individual or communal compliant cycle storage is provided for the following number of cycles: a. Studios or 1 bedroom dwellings – storage for 1 cycle for every two dwellings b. 2 and 3 bedroom dwellings – storage for 1 cycle per dwelling c. 4 bedrooms and above – storage for 2 cycles per dwelling **Two credits:** **2.** Where individual or communal compliant cycle storage is provided for the following number of cycles: b. Studios or 1 bedroom dwellings – storage for 1 cycle per dwelling c. 2 and 3 bedroom dwellings – storage for 2 cycles per dwelling d. 4 bedrooms and above – storage for 4 cycles per dwelling	2	2.97%	2	2.97%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- Two credits targeted.
- Basement cycle storage is to be provided for 14 spaces secure and well lit.
- Dwellings to include -
- 6No 1 bed=Requiring 3 spaces
- 1No 1 bed=Requiring 2 spaces
- 1No studio=Requiring 1 space.
- Total space requirement is 6 spaces, therefore compliance is met for two credits.
- **Note:** Cycle storage will need to meet security and lighting compliance.

Ene 10: Home Office	**One Credit:** **1.** Where sufficient space and services have been provided which allow the occupants to set up a home office in a suitable room with adequate ventilation	1	1.48%	0	0%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- Credit not targeted.
- Some office provision would be in living rooms which would not meet compliance.

Energy Totals	**29**	**43.00%**	**21.5**	**31.88%**	**2**	**2.97%**

Water	Compliance Requirements	Available		Targeted		Potential	
Wat 01: Internal Water Use		3	6.6%	2	4.4%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • It is anticipated that dwellings will be designed in line with Building minimum Regulations Part G. • Two Credits have been assumed as targeted as an Excellent rating is required, therefore 118 litres/person/day maximum water use. • Water flows and fittings to be finalised at Detailed Design stage.							
Wat 02: External Water Use	**One credit** **1.** Where a compliant rainwater collection system for external/internal irrigation use has been provided to dwellings. OR **2.** Where dwellings have no individual or communal garden space	1	2.2%	1	2.2%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Credit targeted. • No planting requirements or space provision, therefore credit targeted by default.							
Wat 03: Water Meter	**One credit** **1.** Where an appropriate water meter for measuring usage of mains potable water has been provided to dwelling/s in accordance with CN1 or CN2	1	2.2%	1	2.2%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Credit targeted. • Pulsed water meter to be provided to each property.							
Water Totals		**5**	**11.00%**	**4**	**8.80%**	**0**	**0.00%**

Materials	Compliance Requirements	Available		Targeted		Potential	
Mat 01: Environmental Impact of Materials		25	4.44%	18	3.2%	5	0.89%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- Full specifications are not available at this stage.
- Evaluation of the major building elements highlights that the following credits could be targeted based on material assumptions

- Roof - Existing, no changes to be made **- A rating**

- External Walls - Existing Walls, no changes to be made **- A rating**

- External Walls - New Extension to be built with fully reclaimed bricks **- A rating**

- Upper Floor - Existing floor, no changes to be made **- A rating**

- Internal walls to be metal stud with plasterboard

- Windows - 50% windows to be replaced with energy efficient timber sash units. 50% to remain existing **- A rating**

- Based on the above a predicted score of 18/25 is assumed.
- Credit to be further reviewed at Detailed Design Stage.

Mat 02: Responsible Sourcing of Materials		12	2.13%	6	1.07%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- Architect and contractor to ensure that all materials are responsibly sourced.
- The majority of the materials indicated are recycled or can be responsibly sourced.
- Assumed six credits from twelve at this stage.
- Credit to be further reviewed at Detailed Design stage.

Mat 03: Insulation	Up to 8 credits may be awarded for this issue as follows: **Pre-requisite** Any new insulation specified for use within the following building elements must be assessed: **1.** External walls **2.** Ground floor **3.** Roof **4.** Building services **4 Credits - Embodied Impact** **1.** Where the Insulation Index for new insulation used in the buildings is ≥2 and is calculated using the BREEAM Domestic Refurbishment Mat 03 Insulation Calculator with reference to CN1, CN2 and CN3. **2.** Where Green Guide ratings, required by the BREEAM Domestic Refurbishment Mat 03 Insulation Calculator are determined using the Green Guide to specification tool. **4 Credits - Responsible Sourcing** **3.** Where ≥ 80% of the new thermal insulation used in the building elements is responsibly sourced	8	1.42%	8	1.42%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- Only internal rockwool RWA45 type insulation assumed for partition elements which is responsibly sourced to BES6001.
- Isover glass fibre to be used for services.
- Therefore full credits assumed.
- If alternative insulation is to be used this should be responsibly sourced.

Materials Totals	**45**	**8.00%**	**32**	**5.69%**	**5**	**0.89%**

Pollution	Compliance Requirements	Available		Targeted		Potential	
Pol 01: Nitrogen Oxide Emissions	**Up to 3 credits – Low NOx space heating and hot water systems** **1.** Credits are awarded on the basis of NOx emissions arising from the operation of space heating and hot water systems for each refurbished dwelling as follows: a. One credit where the dry NOx emissions of space heating and hot water systems are ≤100 mg/kWh (NOx class 4 boiler). b. Two credits where the dry NOx emissions of space heating and hot water systems are ≤70 mg/kWh (NOx class 5 boiler). c. Three credits where the dry NOx emissions of space heating and hot water systems are ≤40 mg/kWh	3	2.25%	3	2.25%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • Three credits targeted • Ultra low NOx condensing combi boiler has been assumed (Valiant Ecotec) which will have a NOx value of <40mg							
Pol 02: Surface Water Runoff	**One Credit – neutral impact on surface water** **1.** Where any new hard standing areas are permeable, this must include all new pavements, driveways and where applicable public rights of way, car parks and non-adoptable roads (e.g. community scale refurbishment projects). **2.** Where the building is being extended onto any previously permeable surfaces, or an impermeable surface that drains onto a permeable surface (e.g. paving slabs set on concrete that drained onto soft landscaped areas) the additional run-off for rainfall depths up to 5 mm caused by the area of the extension must be managed on site using appropriate Sustainable Drainage Systems (SuDS) such as Soakaways. **3.** Any calculations necessary to demonstrate that criterion 2 will be achieved should be carried out by an Appropriately Qualified Professional (AQP) seeCN6. **OR Two Credits – reducing run-off from site: basic** **4.** Where criteria 1, 2 and 3 have been achieved. **5.** Where all run-off from the roof for rainfall depths up to 5 mm, have been managed on site using source control methods (e.g. through infiltration, soakaways etc.). This should include runoff from all existing and new parts of the roof. **6.** Where required, an appropriately qualified professional should be used to design an appro-priate drainage strategy for the site, ensuring criterion 1 is achieved **OR Three Credits – reducing run-off from site: advanced** **7.** An appropriately qualified professional should be used to design an appropriate drainage strategy for the site. **8.** Where run-off as a result of the refurbishment is managed on site using source control achieving the following requirements: **a.** The peak rate of run-off as a result of the refurbishment for the 1 in 100 year event has been reduced by 75% from the existing site. b. The total volume of run-off discharged into the watercourses and sewers as a result of the refurbishment, for a 1 in 100 year event of 6 hour duration has been reduced by 75% c. An allowance for climate change must be included for all of the above calculations, in accordance with the current best practice (PPS25, 2010) **Exemplary level requirements** The following outlines the exemplary level requirements to achieve an innovation credit for this BREEAM issue. **9.** Where all run-off from the developed site is managed on site using source control. The following must be achieved to confirm compliance: **a.** The peak rate of run-off as a result of the refurbishment for the 1 in 1 year event is reduced to zero. b. The peak rate of run-off as a result of the refurbishment for the 1 in 100 year event is reduced to zero. c. There is no volume of run-off discharged into the watercourses and sewers as a result of the refurbishment, for a 1 in 100 year event of 6 hour duration. d. An allowance for climate change must be included for all of the above calculations, in accord-ance with current best practice (PPS25, 2010). **10.** Where an appropriately qualified professional has been employed to provide the above cal-culations and design an appropriate drainage strategy for the site, ensuring all above criteria are achieved	3	2.25%	1	0.75%	0	0%
Glenn Miles (Encon Associates): **BREEAM Pre-Assessment Meeting 25/03/21** • One credit targeted. • A neutral change to the surface water run off is expected as no works are being completed to change the permeable/impermeable surfaces for the site. • Surface water to connect to existing drains.							

Pol 03: Flooding	**Two Credits - low flood risk or flood mitigation** **Minimum standards** **1.** A minimum of two credits must be achieved for this issue at the Excellent and Outstanding levels **Option 1 – Low flood risk** **2.** Where a Flood Risk Assessment (FRA) has been carried out and the assessed dwellings are defined as having a low annual probability of flooding. **Option 2 – Medium/High Flood Risk** **3.** Where a Flood Risk Assessment (FRA) has been carried out and the assessed dwellings are defined as having a medium or high annual probability of flooding. **4.** Two credits are awarded where as a result of the dwellings floor level or measures to keep water away the dwelling is defined as achieving avoidance from flooding by following Checklist A-10; Decision Strategy Flow Chart. **5.** Where avoidance is not possible, two credits are achieved where a full flood resilience/resistance strategy is implemented for the dwellings in accordance with recommendations made by a Suitably Qualified Building Professional	2	1.5%	2	1.5%	0	0%
Glenn Miles (Encon Associates): **<u>BREEAM Pre-Assessment Meeting 25/03/21</u>** • A review of the EA flood maps based on postcode TW91HJ indicates that the site is situated in flood zone 1. • Two credits targeted.							
Pollution Totals		**8**	**6.00%**	**6**	**4.50%**	**0**	**0.00%**

Waste	Compliance Requirements	Available		Targeted		Potential	
Was 01: Household Waste	**First credit – Recycling facilities** **1.** One credit can be awarded where the dwelling complies with one of the scenarios detailed in Table - 31 below: Refer to supporting documents for Table - 31: Recycling storage requirements **Second credit – Composting Facilities** Dwellings with significant external private space - all of the following are met: **2.** Where a composting service or facility is provided for green/garden waste **3.** Where a composting service or facility is provided for kitchen waste **4.** Where an interior container is provided for kitchen composting waste of at least seven litres Dwellings without significant external private space - all of following are met: **5.** Where a composting service or facility is provided for kitchen waste **6.** Where an interior container is provided for kitchen composting waste of at least seven litres	2	1.2%	2	1.2%	0	0%

Glenn Miles (Encon Associates):

BREEAM Pre-Assessment Meeting 25/03/21

- Two credit targeted.
- It was advised that a triple bin system will be installed in the dwellings along with provision for composting.
- A centralised bin store will be provided with 2No 360l bins for recycling, 1No Eurobin for general waste and 240l bin for composting.

Was 02: Refurbishment Site Waste Management	Credits are awarded depending on the scale and the estimated cost of refurbishment. Up to three credits may be awarded for this issue along with the opportunity for an innovation credit as follows: **Projects up to £100k: three credits are awarded:** 1. Where waste generated through the refurbishment process is managed in accordance with Appendix A: Was 02 **Projects up to £300k: three credits are awarded:** 2. Where a compliant Level 1; Site Waste Management Plan See Criteria (SWMP) is in place in accord-ance with CN3. **Projects over £300k: up to three credits are available:** **First credit – management plan** **3.** Where a compliant Level 2; SWMP is in place in accordance with CN4 **Second credit – good practice waste benchmarks** **4.** Where the first credit has been achieved **5.** Where Non-hazardous construction waste generated by the dwellings refurbishment meets or exceeds the resource efficiency benchmark in accordance with CN7 **6.** Where the amount of waste generated against £100,000 of project value is recorded in the SWMP **7.** Where a pre-refurbishment audit of the existing building is completed in accordance withCN10 **8.** Where the demolition is included as part of the refurbishment programme, then the audit should also cover demolition materials **Third credit – best practice waste benchmarks** **9.** Where the first two credits have been achieved **10.** Where Non-hazardous demolition waste generated by the dwellings refurbishment meets or exceeds the refurbishment & demolition waste diversion benchmarks in accordance with CN8 **Exemplary Level Requirements** **Projects less than £100k** **11.** Where a compliant Level 1; Site Waste Management Plan (SWMP) is in place in accordance withCN3 **Projects up to £300k** **12.** Where a compliant Level 2; SWMP is in place in accordance withCN4 **13.** Where Non-hazardous construction waste generated by the dwellings refurbishment meets or exceeds the resource efficiency benchmarks in accordance with CN7 **14.** The percentage of non-hazardous construction waste and demolition waste (where applicable) generated by the project has been diverted from landfill and meets or exceeds the refur-bishment & demolition waste diversion benchmarks in accordance with CN8 **Projects over £300k** **15.** Where non-hazardous construction waste generated by the dwellings refurbishment meets or exceeds the exemplary level resource efficiency benchmark in accordance with CN11 **16.** Where Non-hazardous demolition waste generated by the dwellings refurbishment meets or exceeds the exemplary level diversion benchmarks in accordance with CN12	3	1.8%	3	1.8%	0	0%
Glenn Miles (Encon Associates): **<u>BREEAM Pre-Assessment Meeting 25/03/21</u>** • Three credits targeted. • Credit value >£300k • The main contractor to adopt a full SWMP in line with their statutory requirements and waste benchmarks indicated with the BREEAM manual.							
Waste Totals		**5**	**3.00%**	**5**	**3.00%**	**0**	**0.00%**

Innovation	Compliance Requirements	Available		Targeted		Potential	
Inn 01: Innovation	Up to a maximum of 10 credits available in aggregate from a combination of the following: **Exemplary level requirements in existing BREEAM issues** 1. Where the building demonstrates exemplary performance by meeting defined exemplary level performance criteria in one or more of following BREEAM assessment issues: a. Ene 2 Energy Efficiency Rating (2 credits available) b. Ene 8 Display Energy Devices (1 credit available) c. Wat 1 Internal Water Use (1 credit available) d. Was 2 Refurbishment Site Waste Management (1 credit available) e. Pol 2 Surface Water Run-off (1 credit available) f. Man 2 Responsible Construction Practices (1 credit available) g. Man 5 Proection and Enhancement of Ecological Value (1 credit available) h. Man 6 Project Management (2 credits available) i. Hea 4 Inclusive Design (1 credit available) Once innovation credit can be awarded for each individual BREEAM issue exemplary performance level complied with. Please refer to the relevant BREEAM issue within this Scheme Document for the exemplary level performance assessment criteria. **Approved Innovations** One innovation credit can be awarded for each innovatoin application approved by BRE Global, where the building complies with the criteria defined within the Approved Innovation application form.	10	10%	0	0%	0	0%
Man 02: Responsible Construction Practices		1	1%	0	0%	0	0%
Man 05: Protection and Enhancement of Ecological Value		1	1%	0	0%	0	0%
Man 06: Project Management		2	2%	0	0%	0	0%
Hea 04: Inclusive Design		1	1%	0	0%	0	0%
Ene 02: Energy Efficiency Rating		2	2%	0	0%	0	0%
Ene 08: Display Energy Divices		1	1%	0	0%	0	0%
Wat 01: Internal Water Use		1	1%	0	0%	0	0%
Pol 02: Surface Water Run-off		1	1%	0	0%	0	0%
Was 02: Refurbishment Site Waste Management		1	1%	0	0%	0	0%
Innovation Totals (Up to a maximum of 10 credits)		**10**	**10.00%**	**0**	**0.00%**	**0**	**0.00%**

Overall Totals	**125**	**110.00%**	**86.5**	**76.11%**	**10**	**7.78%**

5 Assessor Declaration

This Pre-Assessment report has been prepared by Encon Associates Ltd based on a full webinar Pre-Assessment meeting completed 25th March 2021.

Signed for and on behalf of Encon Associates

Glenn Miles BREEAM Accredited Assessor and Professional (BREEAM AP 0137)

Director

Encon Associates Limited