

Sustainability & Energy Statement Kingston Bridge House, Hampton Wick. KT1 4AG

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23rd October 2020





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Executive Summary

This Sustainability and Energy Statement considers the sustainability issues relating to the proposed conversion and extension of Kingston Bridge House, Hampton Wick to provide a total of 89, Studio, 1, 2 & 3-bedroom apartments.

The Statement sets out the commitments of the applicant to the site and the targets that will be applied to the development. The site is located in a sustainable location close to existing facilities and infrastructure and will provide homes to meet local need.

Throughout the design process, the applicant and design team members have given careful consideration to the sustainability issues relating to the site, and how these can be enhanced in a marketable and feasible manner. As a result, this Statement demonstrates that the development meets relevant sustainability criteria and in a number of areas exceeds them.

The fabric standards of the building exceed the requirements of the Building Regulations. The proposed development has insufficient energy demand and quantum of development to sustain a communal heating system, which would result in significant unnecessary additional management costs. A communal heating system is not financially viable for the site.

The methodology used has been based upon the emerging policy in the new London Plan (and provided in 'Energy Assessment Guidance' published by the Mayor of London in October 2018) and uses the carbon factors for gas and electricity proposed for SAP 10.

In order to demonstrate the energy efficiency of the building a set of SAP calculations have been prepared for the 'Be Lean' scenario based on the use of gas boilers to each apartment. This is not the proposed strategy but purely demonstrates the reduction from the 'Be Lean' condition.

The Regulations Compliance Reports for this option are attached as Appendix 1 and the 'Be Lean' GLA spreadsheet based on the SAP 10 carbon factors are is attached as Appendix 2.

It is proposed to install Vaillant aroSTOR air source heat pump hot water cylinders into each of the apartments. The 'Be Clean' SAP 10 spreadsheet is attached as Appendix 4, which uses the energy demand calculations from the SAP calculations (attached as Appendix 3) to calculate the total site emissions.

In order to maximise the reduction in emissions it is also proposed to install a photovoltaic array of 155 x 400W photovoltaic panels (62.0 kW). A Roof Plan showing the indicative layout of the panels is attached as Appendix 5.



The reductions in emissions can be summarised as follows:

	Total Emissions	% Reduction
	T CO ₂ per year	
Be Lean		
Baseline (Building Regulations TER) – based on gas	75.274	
Be Lean - after energy efficiency (DER) – based on gas	63.667	15.42%
Be Clean		
Baseline (Building Regulations TER) – based on electricity	74.429	
Emissions – after ASHP hot water cylinders (Be Clean)	48.704	34.56%
Be Green		
Emissions – after renewable technologies (Be Green)	35.529	52.26%

The residual emissions are 35.529 tonnes and therefore, using the carbon offset charge the payment should be **£63,952** ($35.529 \times £1,800$).

The London Borough of Richmond upon Thames Sustainable Construction Checklist is attached as Appendix 6.



1.0 Introduction

This report has been commissioned by the Westcombe Group and provides a Sustainability and Energy Statement for the extension and conversion of Kingston Bridge House, Hampton Wick to create 89, Studio, 1, 2 & 3-bedroom apartments.

The description of development is;

'Erection of two-storey and single-storey extensions to the roof, an infill extension at ground floor level, façade improvements and change of use of the building to provide 89 residential units with associated landscaping, parking/refuse provision, and external alterations.'

The report describes the methodology used in assessing the development and the initiatives proposed.

The alterations to the building have been designed and will be constructed to reduce energy demand and carbon dioxide emissions.

The objective is to reduce the energy demand to an economic minimum by making investments in the parts of the building that has the greatest impact on energy demand and are the most difficult and costly to change in the future, namely the building fabric.

Once a cost-effective structure has been designed, low-carbon and renewable technologies have been considered for installation to provide heat and/or electricity.

The following hierarchy has been followed:

- Lean reduce demand and consumption
- Clean increase energy efficiency
- Green provide low carbon renewable energy sources

The report has been prepared by Ivan Ball of Bluesky Unlimited who are sustainability consultants.



2.0 Planning Policy Context

National Policy

The UK Government published its sustainable development strategy in 1999 entitled "A better quality of life: A strategy for sustainable development in the UK". This sets out four main objectives for sustainable development in the UK.

- Social progress that recognises the needs of everyone.
- Effective protection of the environment.
- Prudent use of natural resources.
- Maintenance of high stable levels of economic growth and employment.

Sustainable Communities: Building for the Future, known colloquially as the Communities Plan was published in 2003. The Plan sets out a long-term programme of action for delivering sustainable communities in both urban and rural areas. It aims to tackle housing supply issues in parts of the country, low demand in other parts and the quality of our public spaces. The Communities Plan describes sustainable communities as: Active, inclusive and safe, well run, environmentally sensitive, well designed and built, well connected, thriving, well served and fair for everyone.

The most relevant national planning policy guidance on sustainability is set out in:

National Planning Policy Framework - 2019

Paragraph 148 states;

"The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure."



Regional and Local Policies

The Development Plan comprises the London Plan (2016) and the London Borough of Richmond Local Plan (2018).

London Plan, published March 2016 – the following policies are relevant to the application:

Policy 5.2 – Minimising carbon dioxide emissions *

- A Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:
 - 1 Be lean: use less energy
 - 2 Be clean: supply energy efficiently
 - 3 Be green: use renewable energy
- B The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

Residential and Non-residential buildings:

Year

Improvement on 2013 Building Regulations

2013 – 2016 35 per cent

- C Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.
- D As a minimum, energy assessments should include the following details:
 - a calculation of the energy demand and carbon dioxide emissions covered by the Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations (see paragraph 5.22) at each stage of the energy hierarchy
 - *b* proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services
 - c proposals to further reduce carbon dioxide emissions through the use of decentralised energy where feasible, such as district heating and cooling and combined heat and power (CHP)
 - d proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.
- *E* The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.



Policy 5.3 – Sustainable design and construction

- A The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.
- B Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.
- C Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:
 - a. minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)
 - b. avoiding internal overheating and contributing to the urban heat island effect
 - c. efficient use of natural resources (including water), including making the most of natural systems both within and around buildings
 - d. minimising pollution (including noise, air and urban runoff)
 - e. minimising the generation of waste and maximising reuse or recycling
 - f. avoiding impacts from natural hazards (including flooding)
 - g. ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions
 - h. securing sustainable procurement of materials, using local supplies where feasible, and
 - *i.* promoting and protecting biodiversity and green infrastructure.

Policy 5.6 – Decentralised energy in development proposals

- A Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems.
- *B* Major development proposals should select energy systems in accordance with the following hierarchy:
 - 1 Connection to existing heating or cooling networks
 - 2 Site wide CHP network
 - 3 Communal heating and cooling.
- C Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are identified, proposals should be designed to connect to these networks.

Policy 5.7 – Renewable Energy

B Within the framework of the energy hierarchy (Policy 5.2), major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.



Policy 5.15 – Water Use and Supplies

- *B* Development should minimise the use of mains water by:
 - a incorporating water saving measures and equipment
 - *b designing residential development so that mains water consumption would meet a target* of 105 litres or less per head per day

Sustainable Design and Construction SPG – April 2014

The SPG provides Guidance on how schemes should comply with the London Plan and this Sustainability Statement has been prepared in accordance with the Guidance provided.

London Borough of Richmond

The London Borough of Richmond adopted its Local Plan on the 3rd July 2018 and this supersedes the Core Strategy (2009) and the Development Management Plan (2011).

The following policy is of particular relevance to the topic area of this Statement and has been edited for clarity and relevance to the application in question.

Local Plan (2018)

Policy LP 22 - Sustainable Design and Construction

A. Developments will be required to achieve the highest standards of sustainable design and construction to mitigate the likely effects of climate change. Applicants will be required to complete the following:

- Development of 1 dwelling unit or more, or 100sqm or more of non-residential floor space (including extensions) will be required to complete the Sustainable Construction Checklist SPD. A completed Checklist has to be submitted as part of the planning application.
- 2. Development that results in a new residential dwelling, including conversions, change of use, and extensions that result in a new dwelling unit, will be required to incorporate water conservation measures to achieve maximum water consumption of 110 litres per person per day for homes (including an allowance of 5 litres or less per person per day for external water consumption).
- 3. New non-residential buildings over 100sqm will be required to meet BREEAM 'Excellent' standard.

Reducing Carbon Dioxide Emissions

B. Developers are required to incorporate measures to improve energy conservation and efficiency as well as contributions to renewable and low carbon energy generation. Proposed developments are required to meet the following minimum reductions in carbon dioxide emissions:

1. All new major residential developments (10 units or more) should achieve zero carbon standards in line with London Plan policy.



- 2. All other new residential buildings should achieve a 35% reduction.
- 3. All non-residential buildings over 100sqm should achieve a 35% reduction. From 2019 all major non-residential buildings should achieve zero carbon standards in line with London Plan policy.

Targets are expressed as a percentage improvement over the target emission rate (TER) based on Part L of the 2013 Building Regulations.

C. This should be achieved by following the Energy Hierarchy:

- 1. Be lean: use less energy
- 2. Be clean: supply energy efficiently
- 3. Be green: use renewable energy

Decentralised Energy Networks

D. The Council requires developments to contribute towards the Mayor of London target of 25% of heat and power to be generated through localised decentralised energy (DE) systems by 2025. The following will be required:

1. All new development will be required to connect to existing DE networks where feasible. This also applies where a DE network is planned and expected to be operational within 5 years of the development being completed.

Applicants are required to consider the installation of low, or preferably ultra-low, NOx boilers to reduce the amount of NOx emitted in the borough.

Local opportunities to contribute towards decentralised energy supply from renewable and low-carbon technologies will be encouraged where appropriate.

* The London Plan will be revised in 2020/21. In addition, Part L of the Buildings Regulations will be revised in 2021 and the carbon emissions factors will be revised significantly compared to the current Part L (2013).

Consequentially the Mayor of London published Energy Assessment Guidance in October 2018, which requires the use of the current SAP methodology (2013) to calculate energy demand but the carbon emissions factors proposed for Part L 2020 are to be applied to the energy demand.

Whilst primarily intended for referrable schemes the GLA have allowed the Boroughs to decide whether they apply the Guidance to all developments.



3.0 Assessment Methodology

The baseline carbon dioxide emissions from the building has been established using agreed building specifications and detailed planning drawings and SAP calculations have been prepared for a representative range of apartments, which provide an assessment of the total emissions from the site.

Emission Factors

The CO₂ emission factors, where applicable, used throughout this report have been taken from the emerging Building Regulation Approved Document L - 2021.

	kg CO₂/kWh	
Mains gas	0.210	
Grid supplied and displaced electricity	0.233	



4.0 Proposal

The proposal is for extension and conversion of an existing building to create 89, Studio, 1, 2 and 3bedroom apartments.

The accommodation schedule in detail is;

Unit Type	Number	Area	Total Area
		m²	m²
Studio apartment	7	39.8	278.6
1-Bedroom apartment	8	50.0	400.0
1-Bedroom apartment	8	50.3	402.4
1-Bedroom apartment	8	51.2	409.6
1-Bedroom apartment	8	51.5	412.0
1-Bedroom apartment	1	55.6	55.6
1-Bedroom apartment	7	55.9	391.3
1-Bedroom apartment	5	60.5	302.5
1-Bedroom apartment	2	65.2	130.4
1-Bedroom apartment	1	65.5	65.5
2-Bedroom apartment	8	61.4	491.2
2-Bedroom apartment	1	63.4	63.4
2-Bedroom apartment	5	63.9	319.5
2-Bedroom apartment	3	65.2	195.6
2-Bedroom apartment	1	67.9	67.9
2-Bedroom apartment	5	74.9	374.5
3-Bedroom apartment	5	83.0	415.0
3-Bedroom apartment	1	86.7	86.7
3-Bedroom apartment	5	89.0	445.0
Total	89		5,306.7



5.0 Energy Efficiency

5.1 Demand Reduction (Be Lean)

Design

The energy performance of a building is affected by its design, construction and use and whilst occupant behaviour is beyond the remit of this statement, better design and construction methods can significantly reduce the life cycle emissions of a building and assist the occupant to reduce consumption.

Sustainable design is not just about incorporating renewable technologies; buildings should be designed at the outset to provide suitable environmental conditions for the occupants whilst also consuming as little energy as practical. It is possible to exceed Building Regulations requirements (Part L - 2013) through demand reduction measures alone, which typically include a combination of passive design measures (e.g. building design and efficient building fabric) and active design measures (e.g. variable speed motors).

Passive Design Measures

The passive design measures proposed include;

Passive Solar Gain

Passive measures include allowing for natural ventilation and exposed thermal mass coupled with high levels of insulation, air tightness and the control of solar gain.

The proposal is for the extension and conversion of an existing building and therefore the orientation of the window and door opening is largely fixed within the existing building. However, the apartments benefit from an orientation towards; (i) northeast, (ii) southwest, (iii) northwest or (iv) southeast.

All apartments will benefit from access to direct sunlight at some point throughout the day and there are no units with a solely northerly aspect.

Natural Daylighting

The orientation and the size of the windows have been optimised to maximise the amount of natural daylight and therefore reduce the demand for artificial lighting.

Efficient Building Fabric

Building Envelope

U-values of the building envelope must meet Building Regulations Part L standards and further improvements to U-values will reduce the apartments heating requirements.



The western part of the building currently has an undercroft, which will be partially infilled to provide accommodation. The ground floors to this element to the eastern part of the building will be insulated with 150mm 'Kingspan' PIR insulation or similar.

The new walls and existing wall will be insulated to achieve the U-value set out in the table below.

All windows and external doors will be replaced and will be double glazed with Low 'e' soft coat and argon filled.

It is proposed to set maximum limits for the elemental U-values as follows:

Element	Part L Limiting U-values	Proposed U-values	Proposed Improvement
	W/m ² K	W/m²K	
Floor	0.20	0.11	45%
External Walls	0.30	0.17	43%
Flat Roof	0.20	0.14	30%
Windows	2.00	1.40	30%
Entrance Doors		1.60	

Air Leakage

Large amounts of heat are lost in winter through air leakage from a building (also referred to as infiltration or air permeability) often through poor sealing of joints and openings in the building

The Building Regulations set a minimum standard for air permeability of 10 m³ of air per hour per m² of envelope area, at 50Pa.

It is proposed to achieve a 60% improvement over Building Regulations and the building will target a permeability of 4.0 m³/hr/m².

Thermal Bridging

The significance of Thermal Bridging, as a potentially major source of fabric heat losses, is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the Thermal Bridging is no longer an option and will not achieve the fabric energy efficiency and energy and CO_2 reduction targets set out in this strategy.

The building will use the Accredited Construction Details where applicable and bespoke details where ACDs do not exist.

The bridging losses have been based upon the use of the ACDs and calculated using SAP Appendix K Table 1.



Ventilation

As a result of increasing thermal efficiency and air tightness, Building Regulations Approved Document F was also revised in 2006 to address the possibility of overheating and poor air quality.

Active Design Measures will include;

Efficient Lighting and Controls

Throughout the scheme natural lighting will be optimised.

Approved Document L1A requires three in four light fittings (75%) to be dedicated low energy fittings. The homes will exceed this and all light fittings will be of a dedicated energy efficient type.

External lighting will be fitted with time controls and light sensors to ensure illumination is restricted to required times. External lighting will be limited to a maximum fitting output of 150w.

Space Heating and Hot Water

The baseline SAP modelling has been based upon the use of a combination boiler installed to each apartment but the assessment considers other options for providing space heating and hot water.



5.2 Establishing Energy Demand and Carbon Dioxide Emissions (Be Lean)

The GLA Energy Assessment Guidance of October 2018 requires the energy efficient of a building (Be Lean) to be expressed using a gas heating system as a baseline.

A set of calculations have therefore been prepared on this basis, which are not necessarily the proposed final option but are used to test the 'Be Lean' reductions only.

SAP calculations have been prepared for a 1-Bedroom apartment with a southeast aspect at 51.5 m² modelled as a ground, mid and top-floor unit.

Calculations have also been prepared for a 2-Bedroom apartment with a northeast aspect at 65.2 m^2 and a 3-Bedroom apartment with a southwest aspect at 83.0 m^2 , which are both modelled as ground, mid and top-floor units.

Baseline

The Regulations Compliance Reports are attached as Appendix 1 but the energy demand for the modelled apartments can be summarised as follows;

1-Bedroom apartment – 51.5 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,621	1,448
Water heating	1,954	1,552
Electricity for pumps, fans & lighting	335	335
Total	3,910	3,335

1-Bedroom apartment – 51.5 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,041	856
Water heating	1,973	1,558
Electricity for pumps, fans & lighting	335	335
Total	3,349	2,749

1-Bedroom apartment – 51.5 m² Top-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,664	1,666
Water heating	1,953	1,551
Electricity for pumps, fans & lighting	335	335
Total	3,952	3,552



2-Bedroom apartment – 65.2 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,514	2,395
Water heating	2,179	1,714
Electricity for pumps, fans & lighting	386	386
Total	5,079	4,495

2-Bedroom apartment – 65.2 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,801	1,691
Water heating	2,195	1,718
Electricity for pumps, fans & lighting	386	386
Total	4,382	3,795

2-Bedroom apartment – 65.2 m² Top	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,339	2,302
Water heating	2,183	1,714
Electricity for pumps, fans & lighting	386	386
Total	4,908	4,402

3-Bedroom apartment – 83.0 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,622	2,186
Water heating	2,424	1,884
Electricity for pumps, fans & lighting	430	430
Total	5,476	4,500

3-Bedroom apartment – 83.0 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,831	1,445
Water heating	2,444	1,890
Electricity for pumps, fans & lighting	430	430
Total	4,705	3,765



3-Bedroom apartment – 83.0 m² Top	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,659	2,447
Water heating	2,423	1,883
Electricity for pumps, fans & lighting	430	430
Total	5,512	4,760

The energy demand figures calculated above have been inputted into the SAP 10 spreadsheet, which is attached as Appendix 2 and provides the total site TER and DER emissions using the emerging carbon emissions factors and as required by the GLA Energy Assessment Guidance (October 2018).

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **75,274 kg CO₂ per year**, with the actual carbon dioxide emissions (DER) assessed as **63,667 kg CO₂ per year**.

The reduction in emissions using from energy efficiency for the 'Be Lean' scenario and using the SAP 10 carbon factors is **11,607 kg CO₂ per year**, which equates to;

15.42%



5.3 Low-Carbon and Renewable Technologies (Be Clean and Be Green)

The carbon dioxide emissions established above have been used to test the viability of various renewable and low carbon technologies as follows.

The Government's Renewable Obligation defines renewable energy in the UK. The identified technologies are;

- Small hydro-electric
- Landfill and sewage gas
- Onshore and offshore wind
- Biomass
- Tidal and wave power
- Geothermal power
- Solar

The use of landfill or sewage gas, offshore wind or any form of hydroelectric power is not suitable for the site due to its location. The remaining technologies are considered below;

Wind

Wind turbines are available in various sizes from large rotors able to supply whole communities to small roof or wall-mounted units for individual dwellings.

The Government wind speed database predicts local wind speeds at Church Grove to be 4.8 m/s at 10m above ground level and 5.6 m/s at 25m above ground level. This is below the level generally required for commercial investment in large wind turbines. In addition the land take, potential for noise and signal interference make a large wind turbine unsuitable for this development.

Roof mounted turbines could be used at the development to generate small but valuable amounts of renewable electricity but the small output and contribution to total emissions means any investment would be small and purely tokenism. In addition the use of wind turbines will have a detrimental aesthetic impact on the appearance of the development.

Combined Heat and Power and Community Heating

Combined heat and power (CHP) also called co-generation is a de-centralised method of producing electricity from a fuel and 'capturing' the heat generated for use in buildings. The plant is essentially a small-scale electrical power station. The production and transportation of electricity via the National Grid is very inefficient with over 65% of the energy produced at the power station being lost to the atmosphere and through transportation.



Consequently CHP can demonstrate significant CO₂ savings and although not necessary classed as renewable energy (depending on the fuel used) the technology is low carbon.

For a CHP plant to be economic it needs to operate for as much of the time as possible (usually deemed to be in excess of 14 hours per day) and therefore the size of the unit are usually based upon the hot water load of the building (s) with additional boilers meeting the peak space heating demand.

There is insufficient baseload to justify a CHP unit and therefore this technology is not proposed.

Ground Source Heat Pumps

Sub soil temperatures are reasonably constant and predictable in the UK, providing a store of the sun's energy throughout the year. Below London the groundwater in the lower London aquifer is at a fairly constant temperature of 12° C. Ground source heat pumps (GSHP) extract this low-grade heat and convert it to usable heat for space heating.

GSHP operates on a similar principle to refrigerators, transferring heat from a cool place to a warmer place. They operate most efficiently when providing space heating at a low temperature, typically via under floor heating or with low temperature radiators.

There is insufficient external area to install a shallow, horizontal collection system and in order to use ground source heat pumps the collection system would need to include a number of boreholes. There are limited opportunities to place these away from the building and there is insufficient ground area to accommodate the required number.

The installation of ground source heat pumps into this site is not appropriate.

Solar

(i) Solar Water Heating

Solar hot water panels use the suns energy to directly heat water circulating through panels or pipes. The technology is simple and easily understood by purchasers.

Solar hot water heating panels are based generally around two types, which are available being 'flat plate collectors' and 'evacuated tubes'. Flat plate collectors can achieve an output of up to 1,124 kWh/annum (Schuco) and evacuated tubes can achieve outputs up to 1,365 kWh/annum (Riomay).

Panels are traditionally roof mounted and for highest efficiencies should be mounted plus or minus 30 degrees of due south. Evacuated tubes can be laid horizontally on flat roofs but flat plate collectors are recommended for installation at an incline of 30 degrees



In apartment buildings servicing apartments below the top-floor can be problematic for solar thermal panels. The total hot water demand of the 13 top-floor apartments is 21,697 kWh per year (based on the gas system) and assuming panels would reduce demand by 50% the reduction in CO_2 emissions would be 2,278 kg CO_2 per year. When combined with the energy efficiency measures incorporated into the scheme this equates to a total reduction of 18.44%.

Solar hot water panels could be used to reduce emissions but additional technologies would be required to achieve the policy target and the use of solar hot water heating panels would require the use of a conventional gas boiler with hot water cylinders in selected units.

Solar hot water heating panels are not proposed.

(ii) Photovoltaics

Photovoltaic panels (PV) provide clean silent electricity. They generate electricity during most daylight conditions although they are most efficient when exposed to direct sunlight or are orientated to face plus or minus 30 degrees of due south.

PV panels can be integrated into many different aspects of a development including roofs, walls, shading devices or architectural panels.

The panels typically have an electrical warranty of 20-25 years and an expected system lifespan of 25-40 years.

The building contains large flat roofs and photovoltaic panels could be installed without detrimentally impacting on the aesthetics of the development. The Roof Plan attached as Appendix 5 demonstrate a total of 155 panels could be installed. These would be installed on racks and gently inclined towards the southwest and southeast. Assuming the installation of 400W panels the total reduction in emissions from the array would be **13,175 kg CO₂ per year**.

Air Source Heat Pumps (ASHP)

Air sourced heat pumps operate using the same reverse refrigeration cycle as ground source heat pumps, however the initial heat energy is extracted from the external air rather than the ground.

Whilst ASHPs generally have a coefficient of performance (CoP) of around 3 because electricity costs around 4.5 times more than gas (per kWh) the annual heating bills for ASHPs can be more expensive than using a gas system.

However, due to the reduction in the carbon emissions factors proposed in the new SAP the use of electrical heating system can reduce emissions more than comparable gas installation.



5.4 Establishing Energy Demand and Carbon Dioxide Emissions (Be Clean)

Using the methodology set out in the Mayor of London's 'Energy Assessment Guidance' (Oct 2018), the carbon emissions have been calculated using the new carbon factors proposed as part of the new Part L of the Building Regulations, which is expected to be published in 2021 but using the existing SAP methodology (2012).

The apartments modelled above under the 'Be Lean' scenario have been remodelled using a Vaillant aroSTOR air source heat pump hot water cylinder in lieu of a gas system.

The Regulations Compliance Reports are attached as Appendix 3 but the energy demand for the modelled apartments can be summarised as follows;

1-Bedroom apartment – 51.5 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,466	1,377
Water heating	2,085	698
Electricity for pumps, fans & lighting	335	290
Total	3,886	2,365

1-Bedroom apartment – 51.5 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	904	820
Water heating	2,107	698
Electricity for pumps, fans & lighting	335	290
Total	3,346	1,808

1-Bedroom apartment – 51.5 m² Top-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,508	1,582
Water heating	2,084	698
Electricity for pumps, fans & lighting	335	290
Total	3,927	2,570

2-Bedroom apartment – 65.2 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,348	2,267
Water heating	2,241	783
Electricity for pumps, fans & lighting	386	341
Total	4,975	3,391



2-Bedroom apartment – 65.2 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,644	1,607
Water heating	2,259	783
Electricity for pumps, fans & lighting	386	341
Total	4,289	2,731

2-Bedroom apartment – 65.2 m² Top	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,175	2,181
Water heating	2,245	783
Electricity for pumps, fans & lighting	386	341
Total	4,806	3,305

3-Bedroom apartment – 83.0 m² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,495	2,066
Water heating	2,422	870
Electricity for pumps, fans & lighting	430	385
Total	5,347	3,321

3-Bedroom apartment – 83.0 m² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,717	1,369
Water heating	2,444	870
Electricity for pumps, fans & lighting	430	385
Total	4,591	2,624

3-Bedroom apartment – 83.0 m² Top	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,532	2,310
Water heating	2,422	870
Electricity for pumps, fans & lighting	430	385
Total	5,384	3,565



The energy demand figures calculated above have been inputted into the SAP 10 spreadsheet, which is attached as Appendix 4 and provides the total site TER and DER emissions using the emerging carbon emissions factors and as required by the GLA Energy Assessment Guidance (October 2018).

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **74,429 kg CO₂ per year**, with the actual carbon dioxide emissions (DER) assessed as **48,704 kg CO₂ per year**.

The reduction in emissions using from energy efficiency and air source heat pump hot water cylinders and using the SAP 10 carbon factors is **25,725 kg CO**₂ **per year**, which equates to;

34.56%



5.5 Summary of Calculations and Proposals for Low-carbon and Renewable Technologies

Be Lean

A baseline calculation has been prepared using 2013 Building Regulations and the SAP 10 carbon factors. Using the current Regulations and based upon a gas heating system for the apartments the total site CO₂ emissions are calculated as **75,274 kg CO₂ per year** (TER) and **63,667 kg CO₂ per year** (DER).

This equates to a reduction of **11,607 kg CO₂ per year** or **15.42%** of the total TER emissions and is therefore compliant with the GLA energy planning guidance. The Regulation Compliance Reports are attached as Appendix 1 and the SAP 10 'Be Lean' spreadsheet is attached as Appendix 2.

Be Clean

A further set of calculations has been prepared for the proposed energy strategy. This proposes the installation of Vaillant aroSTOR air source heat pump hot water cylinders. These calculations have been converted to SAP 10 emissions and the 'Be Clean' spreadsheet is attached as Appendix 4. The Regulation Compliance Reports for the proposed energy strategy (based on Part L – 2013) are attached as Appendix 3.

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **74,429 kg CO₂ per year**, with the actual carbon dioxide emissions (DER) assessed as **48,704 kg CO₂ per year**.

The reduction in emissions using from energy efficiency and air source heat pump hot water cylinders and using the SAP 10 carbon factors is **25,725 kg CO**₂ **per year**, which equates to **34.56%**.

Be Green

It is proposed to install a photovoltaic array of 62 kW on the roof of the building. The array will be comprised of 155 x 400W panels, which will be installed on racks and inclined towards the southwest and southeast. The panels will reduce emissions by a further **13,175 kg CO₂ per year** (based on panels inclined at 20 degrees, orientated to due southwest and southeast at postcode KT1 and using the SAP 10 emissions factors).

A Roof Plan showing the indicative location of the panels is attached as Appendix 5.

Summary

The total reduction in emissions from energy efficiency, low-carbon and renewable technologies are calculated as; $38,900 \text{ kg CO}_2$ per year, which equates to a reduction of <u>52.26%</u> (% of TER).

The residual emissions are **35.529 tonnes**, which requires a carbon offset payment of **£63,952** (based on the carbon offset payment of \pounds 1,800 per tonne).



6.0 Climate change adaption and Water resources

Sustainable Drainage Systems (SUDS)

The site lies within Flood Zone 1 and Flood Zone 2 and a site-specific Flood Risk Assessment has been prepared which considers the issues and sets out what measures may be incorporated.

The existing site is mostly covered with buildings and hard surfacing and the proposal does not increase the volume or rate of surface water run-off. It is understood that it will be disposed of into the combined sewer in Church Grove.

Surface Water Management

Consideration has been given to the use of grey water recycling. However, customer's resistance to the appearance of the recycled water and the cost of the systems does not currently make them a viable option. They have therefore not been included in the proposals.

Water efficiency measures

In excess of 20% of the UK's water is used domestically with over 50% of this used for flushing WCs and washing (source: Environment Agency). The majority of this comes from drinking quality standard or potable water.

The water efficiency measures included will ensure that the water use target of 110 litres per person per day is achieved.

Water efficient devices will be fully evaluated, and installed, wherever possible. The specification of such devices will be considered at detailed design stage and each will be subject to an evaluation based on technical performance, cost and market appeal, together with compliance with the water use regulations.

The following devices will be incorporated within the apartments:

- water efficient taps
- water efficient toilets
- low output showers
- flow restrictors to manage water pressures to achieve optimum levels and
- water meters

Water consumption calculations have been carried out using the Water Efficiency Calculator provided by the BRE. Although not perfect this calculator gives a good indication of the probable water use in a dwelling, although this is largely dependent on the way on which occupants use their homes.



Below is a typical specification, which would achieve the 110 Litres per person per year target.

Schedule of Appliance Water Consumption		
Appliance	Flow rate or capacity	Total Litres
WC	4/2.6 litres dual flush	14.72
Basin	1.7 litres/min.	5.98
Shower	9.5 litres/min	28.50
Bath	160 litres	25.60
Sink	4 litres/min	14.13
Washing Machine	Default used	16.66
Dishwasher	Default used	3.90
		109.49



7.0 Materials and Waste

The BRE Green Guide to Specification is a simple guide for design professionals. The guide provides environmental impact, cost and replacement interval information for a wide range of commonly used building specifications over a notional 60-year building life. The construction specification will prioritise materials within ratings A+, A or B.

Preference will be given to the use of local materials & suppliers where viable to reduce the transport distances and to support the local economy. A full evaluation of these suppliers will be undertaken at the next stage of design.

In addition, timber would be sourced, where practical, certified by PEFC or an equivalent approved certification body and all site timber used within the construction process would be recycled.

All insulation materials to will have a zero ozone depleting potential

Construction waste

Targets will be set to promote resource efficiency in accordance with guidance from WRAP, Envirowise, BRE and DEFRA.

The overarching principle of waste management is that waste should be treated or disposed of within the region where it is produced.

Construction operations generate waste materials as a result of general handling losses and surpluses. These wastes can be reduced through appropriate selection of the construction method, good site management practices and spotting opportunities to avoid creating unnecessary waste.

The Construction Strategy will explore these issues, some of which are set out below:

- Proper handling and storage of all materials to avoid damage.
- Efficient purchasing arrangements to minimise over ordering.
- Segregation of construction waste to maximise potential for reuse/recycling.
- Suppliers who collect and reuse/recycle packaging materials.



Appendix 1 – Regulations Compliance Reports for Modelled Units using Baseline Gas

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 29 October 2020 at 13:01:36						
Project Information	on:					
Assessed By:	Bluesky Unlimited			Building Type:	Flat	
Dwelling Details:						
NEW DWELLING	NEW DWELLING DESIGN STAGE Total Floor Area: 51.5m ²					
Site Reference :	Kingston Bridge Ho	use, Hampton Wick		Plot Reference: 1	BF 52 GND GAS	
Address :						
Client Details:						
Name: Address :	Westcombe Group					
This report cover It is not a comple	rs items included wite report of regulation	hin the SAP calculations compliance.	ons.			
1a TER and DEF	R					
Fuel for main heat	ting system: Mains ga	S				
Fuel factor: 1.00 (I	mains gas) wido Emission Poto ($19.27 kg/m^2$		
Dwelling Carbon	Dioxide Emission Rate (15.96 kg/m ²		ок
1b TFEE and DF	EE			10.00 kg/m		
Target Fabric Ene Dwelling Fabric Er	rgy Efficiency (TFEE) nergy Efficiency (DFE	E)		40.0 kWh/m² 34.0 kWh/m²		OK
Element External Party wal Floor Roof Openings	wall	Average 0.17 (max. 0.30) 0.00 (max. 0.20) 0.11 (max. 0.25) (no roof) 1.30 (max. 2.00)		Highest 0.17 (max. 0.70) - 0.11 (max. 0.70) 1.30 (max. 3.30)		ок ок ок ок
2a Thermal brid	ging					
Thermal	bridging calculated fro	m linear thermal transm	nittances for e	each junction		
Air permeabili Air permea Maximum	ty bility at 50 pascals			4.00 (design val 10.0	ue)	ок
4 Heating efficie	ency					
Main Heatir	ng system:	Database: (rev 464, pr Boiler systems with rac Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 (Combi) Efficiency 89.6 % SED Minimum 88.0 %	roduct index 0 diators or und 1 24 DBUK2009)17955): lerfloor heating - ma	ains gas	ОК
Secondary	heating system:	None				

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	Time and temperatu	ure zone control by device in database	ОК
Hot water controls:	No cylinder thermos	stat	
	No cylinder		
Boiler interlock:	Yes		OK
7 Low energy lights			
Percentage of fixed lights with lo	w-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East En	gland):	Slight	ОК
Based on:			
Overshading:		Average or unknown	
Windows facing: South East		2.88m ²	
Windows facing: South East		3.72m ²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
10 Key features			
Party Walls U-value Floors U-value	\mathbf{K}	0 W/m²K 0.11 W/m²K	

Approved Docume	ent L1A, 2013 Edition	, England assessed by Str	roma FSAP 2012 program, Ve	ersion: 1.0.4.26		
Project Information	on:	,				
Assessed By:	Bluesky Unlimited		Building Type:	Flat		
Dwelling Details:			0 /1			
	DESIGN STAGE		Total Floor Area:	51 5m²		
Site Reference :	Kingston Bridge Ho	ouse. Hampton Wick	Plot Reference:	1BF 52 MID GAS		
Address -						
Client Details						
Name:	Westcombe Group					
Address :	Westeenise Group					
This report cover It is not a comple	s items included wi te report of regulation	thin the SAP calculation ons compliance.	S.			
1a TER and DER	R					
Fuel for main heat	ing system: Mains ga	s				
Fuel factor: 1.00 (r	nains gas) wide Environmente (40.00 h = /== 3			
Target Carbon Did	DXIDE EMISSION RATE (16.02 Kg/m ²		OK	
1b TFEE and DE	FF	(DER)	13.51 kg/m-		UK	
Target Fabric Ene	ray Efficiency (TFEE)		28.0 kWh/m ²			
Dwelling Fabric Er	nergy Efficiency (DFE	E)	23.3 kWh/m ²		ОК	
2 Fabric U-value Element External v Party wal Floor Roof Openings	wall	Average 0.17 (max. 0.30) 0.00 (max. 0.20) (no floor) (no roof) 1.30 (max. 2.00)	Highest 0.17 (max. 0.70) - 1.30 (max. 3.30)		ок ок ок	
2a Thermal brid	ging					
Thermal I	bridging calculated fro	om linear thermal transmit	tances for each junction			
3 Air permeabili	ty					
Air permeat Maximum	oility at 50 pascals		4.00 (design va 10.0	llue)	ОК	
4 Heating efficie	ency					
Main Heatir	ng system:	Database: (rev 464, proc Boiler systems with radia Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 24 (Combi) Efficiency 89.6 % SEDB Minimum 88.0 %	duct index 017955): ators or underfloor heating - m 4 UK2009	nains gas	ОК	
Secondary	heating system:	None				

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	Time and tempera	ature zone control by device in database	ОК
Hot water controls:	No cylinder therm	ostat	
	No cylinder		
Boiler interlock:	Yes		OK
7 Low energy lights			
Percentage of fixed lights with low	w-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East Eng	gland):	Slight	ОК
Based on:			
Overshading:		Average or unknown	
Windows facing: South East		2.88m ²	
Windows facing: South East		3.72m ²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
10 Key features			
Party Walls U-value		0 vv/m²K	

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Project Information	on:					
Assessed By:	Bluesky Unlimited		Building Type:	Flat		
Dwelling Details:						
NEW DWELLING DESIGN STAGE Total Floor Area: 51.5m ²						
Site Reference :	Site Reference : Kingston Bridge House, Hampton Wick			1BF 52 TOP GAS		
Address :						
Client Details:						
Name: Address :	Westcombe Group					
This report cover It is not a comple	rs items included wi ete report of regulati	thin the SAP calculation ons compliance.	IS .			
1a TER and DEF	ર					
Fuel for main heat	ting system: Mains ga	S				
Fuel factor: 1.00 (I	mains gas)					
Target Carbon Did	oxide Emission Rate (18.55 kg/m ²		OK	
1b TEEE and DE		(DER)	10.07 Kg/III ²		UK	
Target Fabric Ene Dwelling Fabric En	rgy Efficiency (TFEE) nergy Efficiency (DFE	E)	40.9 kWh/m² 37.9 kWh/m²		ОК	
Element External Party wal Floor Roof Openings	wall	Average 0.17 (max. 0.30) 0.00 (max. 0.20) (no floor) 0.15 (max. 0.20) 1.30 (max. 2.00)	Highest 0.17 (max. 0.70) - 0.15 (max. 0.35) 1.30 (max. 3.30)		ок ок ок ок	
2a Thermal brid	ging					
Thermal	bridging calculated fro	om linear thermal transmi	ttances for each junction			
3 Air permeabili	ty					
Air permeal Maximum	bility at 50 pascals		4.00 (design va 10.0	ilue)	ок	
4 Heating efficie	ency					
Main Heatir	ng system:	Database: (rev 464, pro Boiler systems with radi Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 2 (Combi) Efficiency 89.6 % SEDE Minimum 88.0 %	iduct index 017955): iators or underfloor heating - m 4 BUK2009	nains gas	ок	
Secondary	heating system:	None				

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	Time and tempera	ature zone control by device in database	ОК
Hot water controls:	No cylinder therm	ostat	
	No cylinder		
Boiler interlock:	Yes		OK
7 Low energy lights			
Percentage of fixed lights with low	w-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East Eng	gland):	Slight	ОК
Based on:			
Overshading:		Average or unknown	
Windows facing: South East		2.88m ²	
Windows facing: South East		3.72m ²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
10 Key features			
Party Walls U-value		0 vv/m²K	

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Project Information	on:					
Assessed By:	Bluesky Unlimited		В	uilding Type:	Flat	
Dwelling Details:						
NEW DWELLING DESIGN STAGE Total Floor Area: 65.2m ²						
Site Reference :	Site Reference: Kingston Bridge House, Hampton Wick			lot Reference: 2	BF 65 GND GAS	
Address :						
Client Details:						
Name: Address :	Westcombe Group					
This report cover It is not a comple	s items included with the report of regulation	thin the SAP calculatio	ons.			
1a TER and DER	R					
Fuel for main heat	ing system: Mains ga	S				
Fuel factor: 1.00 (r	nains gas) wide Emission Dete ($10.00 km/m^2$		
Dwelling Carbon Did	DXIDE EMISSION RATE (Dioxide Emission Rate			18.62 kg/m^2 16.69 kg/m²		OK
1b TFEE and DF	EE			10.09 kg/m		
Target Fabric Ene Dwelling Fabric Er	rgy Efficienc y (TFEE) hergy Efficiency (DFE	E)		47.3 kWh/m ² 40.2 kWh/m ²		ОК
Element External Party wal Floor Roof Openings	wall	Average 0.17 (max. 0.30) 0.00 (max. 0.20) 0.11 (max. 0.25) (no roof) 1.30 (max. 2.00)	H 0 - 0 1	l ighest .17 (max. 0.70) .11 (max. 0.70) .30 (max. 3.30)		ок ок ок ок
2a Thermal brid	ging					
Thermal	bridging calculated fro	om linear thermal transm	nittances for eac	ch junction		
3 Air permeabili	ty				```	
Air permeal Maximum	oility at 50 pascals			4.00 (design valu 10.0	le)	ОК
4 Heating efficie	ncy					
Main Heatir	ng system:	Database: (rev 464, pro Boiler systems with rac Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 2 (Combi) Efficiency 89.6 % SEDI Minimum 88.0 %	oduct index 017 diators or under 24 BUK2009	7955): floor heating - ma	iins gas	ОК
Secondary	heating system:	None				
5 Cylinder insulation						
---------------------------------------	--------------------	---------------------	-----------------------	---	----	
Hot water Storage:	No cylinder					
6 Controls						
Space heating controls	Time and temperat	ture zone control b	y device in database		ОК	
Hot water controls:	No cylinder thermo	ostat				
	No cylinder					
Boiler interlock:	Yes				OK	
7 Low energy lights						
Percentage of fixed lights with lo	w-energy fittings	1	00.0%			
Minimum		7	75.0%		ОК	
8 Mechanical ventilation						
Not applicable						
9 Summertime temperature						
Overheating risk (South East En	gland):	S	Slight		ОК	
Based on:						
Overshading:		A	Average or unknown			
Windows facing: North East		5	5.76m ²			
Windows facing: North East		3	3.72m ²			
Ventilation rate:		4	1.00			
Blinds/curtains:		Ν	None			
10 Key features				_		
Party Walls U-value Floors U-value	\mathbf{Z}) W/m²K).11 W/m²K			

Approved Docume	ent L1A, 2013 Edition,	England assessed by Str	oma FSAP 2012 program, Ve	ersion: 1.0.4.26	
Project Informatic	on:				
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area:	65.2m²	
Site Reference :	Kingston Bridge Ho	ouse, Hampton Wick	Plot Reference: 2	2BF 65 MID GAS	
Address :					
Client Details:					
Name: Address :	Westcombe Group				
This report cover It is not a comple	s items included wi te report of regulati	thin the SAP calculation ons compliance.	S.		
1a TER and DER					
Fuel for main heati	ing system: Mains ga	S			
Fuel factor: 1.00 (n	nains gas) vide Emission Dete (10.00 km/m2		
Dwelling Carbon Dio	niovide Emission Rate ((DER)	16.32 Kg/m² 14.37 kg/m²		ОК
1b TFEE and DF	EE		1 4 .57 kg/m		UK
Target Fabric Ener	gy Efficiency (TFEE)		35.6 kWh/m ²		
Dwelling Fabric En	nergy Efficiency (DFE	E)	30.2 kWh/m²		ОК
2 Fabric U-value	S				
Element		Average	Highest		
External v	wall	0.17 (max. 0.30)	0.17 (max. 0.70)		OK
Party wai		(100)(max. 0.20)			OK
Roof		(no roof)			
Openings		1.30 (max. 2.00)	1.30 (max. 3.30)		ок
2a Thermal bridg	ging				
Thermal b	oridging calculated fro	om linear thermal transmit	tances for each junction		
3 Air permeabilit	ty				
Air permeat Maximum	pility at 50 pascals		4.00 (design va 10.0	lue)	ок
4 Heating efficie	ncy				
Main Heatin	ng system:	Database: (rev 464, proc Boiler systems with radia Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 24 (Combi) Efficiency 89.6 % SEDBI Minimum 88.0 %	duct index 017955): ators or underfloor heating - m UK2009	ains gas	ок
Secondary I	heating system:	None			

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	Time and temperate	ure zone control by device in database	ОК
Hot water controls:	No cylinder thermos	stat	
	No cylinder		
Boiler interlock:	Yes		OK
7 Low energy lights			
Percentage of fixed lights with low	w-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East Eng	gland):	Slight	ОК
Based on:			
Overshading:		Average or unknown	
Windows facing: North East		5.76m ²	
Windows facing: North East		3.72m ²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
10 Key features			
Party Walls U-value		0 W/m²K	

Approved Docume Printed on 29 Octo	ent L1A, 2013 Edition, ober 2020 at 13:01:08	England assessed by S	troma FSAP 20	12 program, Ver	rsion: 1.0.4.26	
Project Information	on:					
Assessed By:	Bluesky Unlimited		Bu	ilding Type:	Flat	
Dwelling Details:						
NEW DWELLING	DESIGN STAGE		То	tal Floor Area: 6	5.2m²	
Site Reference :	Kingston Bridge Ho	use, Hampton Wick	Plo	ot Reference: 2	BF 65 TOP GAS	
Address :						
Client Details:						
Name: Address :	Westcombe Group					
This report cover It is not a comple	s items included with the report of regulation	hin the SAP calculation	ns.			
1a TER and DEF	R					
Fuel for main heat	ing system: Mains ga	8				
Fuel factor: 1.00 (I	nains gas) wide Emission Bote ($10.06 ka/m^2$		
Dwelling Carbon)ioxide Emission Rate (16.38 kg/m²		ок
1b TFEE and DF	EE	(BER)		10.00 kg/m		
Target Fabric Ene Dwelling Fabric Er	rgy Efficiency (TFEE) hergy Efficiency (DFE	Ε)		14.4 kWh/m² 38.9 kWh/m²		OK
2 Fabric U-value Element External Party wal Floor Roof Openings	wall	Average 0.17 (max. 0.30) 0.00 (max. 0.20) (no floor) 0.15 (max. 0.20) 1.30 (max. 2.00)	Hig 0.1 - 0.1 1.3	ghest 7 (max. 0.70) 5 (max. 0.35) 60 (max. 3.30)		ок ок ок ок
2a Thermal brid	ging					
Thermal	bridging calculated fro	m linear thermal transmi	ittances for each	n junction		
3 Air permeabili Air permeal Maximum	bility at 50 pascals			4.00 (design valı 10.0	ue)	ок
4 Heating efficie	ncy	-)		
Main Heatir	ng system:	Database: (rev 464, pro Boiler systems with rad Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 2 (Combi) Efficiency 89.6 % SEDE Minimum 88.0 %	Dauct Index 0179 liators or underfl 24 BUK2009	955): oor heating - ma	ains gas	ок
Secondary	heating system:	None				

5 Cylinder insulation				
Hot water Storage:	No cylinder			
6 Controls				
Space heating controls	Time and temper	ature zone contro	ol by device in database	ОК
Hot water controls:	No cylinder therm	nostat		
	No cylinder			
Boiler interlock:	Yes			OK
7 Low energy lights				
Percentage of fixed lights with lo	w-energy fittings		100.0%	
Minimum			75.0%	OK
8 Mechanical ventilation				
Not applicable				
9 Summertime temperature				
Overheating risk (South East En	gland):		Slight	ОК
Based on:				
Overshading:			Average or unknown	
Windows facing: North East			5.76m ²	
Windows facing: North East			3.72m ²	
Ventilation rate:			4.00	
Blinds/curtains:		_	None	
10 Key features				
Thermal bridging			0.036 W/m²K	
Party Walls U-value			0 W/m²K	

Approved Docume	ent L1A, 2013 Edition	, England assessed by S	troma FSAP 2012 إ	program, Ver	sion: 1.0.4.26	
Project Information	on:	,				
Assessed By:	Bluesky Unlimited		Buildi	ing Type:	Flat	
Dwelling Details:						
NEW DWELLING	DESIGN STAGE		Total I	Floor Area: 8	3m²	
Site Reference :	Kingston Bridge Ho	ouse, Hampton Wick	Plot R	Reference: 3	BF 83 GND GAS	
Address :						
Client Details:						
Name: Address :	Westcombe Group					
This report cover It is not a comple	s items included wi te report of regulati	thin the SAP calculation ons compliance.	ns.			
1a TER and DER	R					
Fuel for main heat	ing system: Mains ga	S				
Fuel factor: 1.00 (r	mains gas) wido Emission Poto (TED)	15.0	$22 ka/m^2$		
Dwelling Carbon F	ioxide Emission Rate	(DFR)	13.2	28 kg/m^2		ок
1b TFEE and DF	EE			-0 Ng/11		
Target Fabric Ener Dwelling Fabric Er	rgy Efficiency (TFEE) hergy Efficiency (DFE	E)	41.0 31.9) kWh/m²) kWh/m²		ОК
2 Fabric U-value Element External v Party wal Floor Roof Openings	wall	Average 0.17 (max. 0.30) 0.00 (max. 0.20) 0.11 (max. 0.25) (no roof) 1.30 (max. 2.00)	Highe 0.17 (- 0.11 (1.30 (est max. 0.70) max. 0.70) max. 3.30)		ок ок ок ок
2a Thermal brid	ging					
Thermal I	bridging calculated fro	om linear thermal transm	ittances for each ju	nction		
3 Air permeabili	ty					
Air permeat Maximum	oility at 50 pascals		4.00 10.0) (design valı)	le)	ок
4 Heating efficie	ency					
Main Heatir	ng system:	Database: (rev 464, pro Boiler systems with rad Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 2 (Combi) Efficiency 89.6 % SEDE Minimum 88.0 %	oduct index 017955 iators or underfloor 24 BUK2009): heating - ma	iins gas	ок
Secondary	heating system:	None				

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	Time and temperat	ture zone control by device in database	OK
Hot water controls:	No cylinder thermo	ostat	
Boiler interlock:	Yes		ОК
7 Low energy lights			
Percentage of fixed lights with lo	w-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East En	gland):	Slight	ОК
Based on:			
Overshading:		Average or unknown	
Windows facing: South West		2.88m ²	
Windows facing: South West		16.74m²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
10 Key features			
Party Walls U-value Floors U-value		0 W/m²K 0.11 W/m²K	

Approved Docume	ent L1A, 2013 Edition	, England assessed by Str	oma FSAP 2012 program, Ve	ersion: 1.0.4.26	
Project Information	on:				
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area:	83m²	
Site Reference :	Kingston Bridge Ho	ouse, Hampton Wick	Plot Reference:	3BF 83 MID GAS	
Address :					
Client Details:					
Name: Address :	Westcombe Group				
This report cover It is not a comple	s items included wi te report of regulati	thin the SAP calculation ons compliance.	s.		
1a TER and DER	R				
Fuel for main heat	ing system: Mains ga	S			
Fuel factor: 1.00 (r	nains gas) wide Emission Rote ($12.01 kg/m^2$		
Dwelling Carbon D)ioxide Emission Rate ((DFR)	13.01 Kg/III- 11 37 kg/m²		ОК
1b TFEE and DF	EE		11.07 kg/m		
Target Fabric Ene	rgy Efficienc <mark>y (TFEE</mark>)		30.9 kWh/m²		
Dwelling Fabric Er	nergy Efficiency (DFE	E)	23.7 kWh/m²		ОК
2 Fabric U-value	es				
Element		Average	Highest		011
External Party wal	wali	0.17 (max. 0.30)	0.17 (max. 0.70)		OK
Floor		(no floor)			OR
Roof		(no roof)			
Openings	6	1.30 (max. 2.00)	1.30 (max. 3.30)		ОК
2a Thermal brid	ging				
Thermal I	bridging calculated fro	om linear thermal transmit	tances for each junction		
3 Air permeabili	ty		4.00 (decime ve	h	
Maximum	bility at 50 pascals		4.00 (design va 10.0	iue)	ОК
4 Heating efficie	ency				
Main Heatir	ng system:	Database: (rev 464, proc Boiler systems with radia Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 24 (Combi) Efficiency 89.6 % SEDBI Minimum 88.0 %	duct index 017955): ators or underfloor heating - m UK2009	ains gas	ок
Secondary	heating system:	None			

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	Time and temperate	ure zone control by device in database	ОК
Hot water controls:	No cylinder thermos No cylinder	stat	
Boiler interlock:	Yes		ОК
7 Low energy lights			
Percentage of fixed lights with low	w-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East Eng	gland):	Medium	OK
Based on:			
Overshading:		Average or unknown	
Windows facing: South West		2.88m ²	
Windows facing: South West		16.74m²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
10 Key features			
Party Walls U-value		0 W/m²K	

Approved Docume Printed on 29 Octo	ent L1A, 2013 Edition ober 2020 at 13:01:01	, England assessed by Si	troma FSAP 2012 program, Vo	ersion: 1.0.4.26	
Project Information	on:				
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area:	83m²	
Site Reference :	Kingston Bridge Ho	ouse, Hampton Wick	Plot Reference:	3BF 83 TOP GAS	
Address :					
Client Details:					
Name: Address :	Westcombe Group				
This report cover It is not a comple	rs items included wi ete report of regulati	thin the SAP calculation ons compliance.	IS .		
1a TER and DEF	२				
Fuel for main heat	ting system: Mains ga	S			
Fuel factor: 1.00 (mains gas)		45 00 her/m2		
Dwelling Carbon Di	DXIDE EMISSION RATE (IER)	15.92 Kg/m² 13.96 kg/m²		OK
1b TFEE and DF	EE		15.90 kg/m²		UN
Target Fabric Ene Dwelling Fabric Er	rgy Efficiency (TFEE) nergy Efficiency (DFE	E)	41.5 kWh/m² 34.8 kWh/m²		ОК
2 Fabric U-value Element External Party wa Floor Roof Openings	wall II S	Average 0.17 (max. 0.30) 0.00 (max. 0.20) (no floor) 0.15 (max. 0.20) 1.30 (max. 2.00)	Highest 0.17 (max. 0.70) - 0.15 (max. 0.35) 1.30 (max. 3.30)		ок ок ок ок
2a Thermal brid	ging				
Thermal	bridging calculated fro	om linear thermal transmi	ttances for each junction		
3 Air permeabili	ty			· .	
Air permea Maximum	bility at 50 pascals		4.00 (design va 10.0	alue)	ОК
4 Heating efficie	ency				
Main Heatir	ng system:	Database: (rev 464, pro Boiler systems with radi Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 2 (Combi) Efficiency 89.6 % SEDE Minimum 88.0 %	iduct index 017955): iators or underfloor heating - n 4 3UK2009	nains gas	ок
Secondary	heating system:	None			

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	Time and temperate	ure zone control by device in database	ОК
Hot water controls:	No cylinder thermos No cylinder	stat	
Boiler interlock:	Yes		ОК
7 Low energy lights			
Percentage of fixed lights with low	w-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East Eng	gland):	Medium	OK
Based on:			
Overshading:		Average or unknown	
Windows facing: South West		2.88m ²	
Windows facing: South West		16.74m²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
10 Key features			
Party Walls U-value		0 W/m²K	



Appendix 2: 'Be Lean' GLA SAP 10 Spreadsheet

Be Lean - SAP 2012 Methodology SAP 10 Carbon Factors

A

Project Client File ref and engineer Sheet Date Rev

Kingston Bridge House, Hampton Wick

1 Oct-20

Carbon Factor SAP 10 0.216 Gas SAP 2012 Carbon Factor

Gas 0.210 Grid Elec 0.519 Grid Elec 0.233

Plot Bedrooms Flor Area Location Space Hig Water Hig Pumps/ Lighting Emission 1 3 86.7 GND 2739 2532 449 12 2 1 55.6 GND 2739 2532 449 121 3 2 67.9 GND 2618 2269 402 112 4 1 65.5 GND 1212 143 333 822 7 1 50.0 GND 1574 1897 325 800 10 2 63.4 GND 1245 2119 375 104 11 3 83.0 MD 1831 2444 430 996 14 1 65.2 MD 1318 2484 441 107 15 3 89.0 MD 1963 22621 4461 107 16 2 63.9 MID 10155 1157	
Piot Bedrooms Floor Area Location Space Hig Water Hig Uppting Emission 1 3 86.7 GND 2739 2532 449 121 2 1 556 GND 2739 2532 449 101 3 2 67.9 GND 22618 2268 4022 1101 6 1 51.2 GND 1612 1143 333 824 7 1 50.0 GND 1674 1897 325 800 8 1 51.5 GND 1633 1908 327 800 101 2 63.4 GND 1313 2444 430 999 12 1 60.5 MID 1318 2498 424 900 14 1 65.2 MID 1035 1962 333 707 15 3 89.0 MID 1035 1962	
1 3 86.7 GND 2739 2532 449 121 2 1 55.6 GND 2110 382 881 3 2 67.9 GND 2618 2269 426 112 4 1 65.5 GND 2062 2445 426 101 6 1 51.2 GND 1674 1897 325 800 7 1 50.0 GND 1574 1897 325 800 8 1 51.5 GND 1631 2444 430 996 12 1 60.5 MD 1233 2318 394 832 13 2 74.9 MD 1069 2522 443 106 14 1 65.2 MD 1318 2488 424 907 15 3 80.0 MD 1035 1862 2333 7019 <	ot
2 1 55.6 CND 21.0 362 BR 3 2 67.9 GND 26.8 21.0 362 BR 4 1 65.5 GND 20.62 24.65 42.6 11.5 5 2 61.4 GND 1612 19.43 33.3 82.7 7 1 50.0 GND 157.4 1897 32.5 60.2 9 1 50.3 GND 1512 194.4 33.5 60.2 10 2 63.4 GND 14.45 2119 37.5 104 11 3 83.0 MID 183.1 244.4 43.0 98.1 12 1 60.5 MID 13.8 248.4 44.1 90.0 15 3 89.0 MID 198.3 282.1 46.1 91.1 16 2 63.9 MID 196.3 282.1 36.4 91.1 <td></td>	
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38 1 60.5 MID 1223 2318 394 833 39 2 74.9 MID 2069 2522 443 106 40 2 65.2 MID 1801 2195 386 925 41 3 89.0 MID 1765 2151 378 911 42 2 63.9 MID 1765 2151 378 911 43 2 61.4 MID 1696 2067 364 873 44 1 51.2 MID 1015 1962 333 701 45 1 50.0 MID 1011 1973 335 711 46 1 51.5 MID 1041 1973 335 714 47 1 50.3 MID 1032 142 364 772 50 3 83.0 MID 1831 2444 430 983 <td>,</td>	,
39 2 74.9 MID 2069 2522 443 106 40 2 65.2 MID 1801 2195 386 922 41 3 89.0 MID 1963 2621 461 107 42 2 63.9 MID 1765 2151 378 917 43 2 61.4 MID 1696 2067 364 877 44 1 51.2 MID 1035 1962 333 701 45 1 50.0 MID 1011 1916 325 690 46 1 51.5 MID 1041 1973 335 711 47 1 50.3 MID 1032 2142 364 772 50 3 83.0 MID 1831 2444 430 998 51 1 60.5 MID 1223 2318 394 833 <td>1</td>	1
40 2 65.2 MID 1801 2195 386 925 41 3 89.0 MID 1963 2621 461 107 42 2 63.9 MID 1963 2621 363 911 43 2 61.4 MID 1966 2067 364 87 44 1 51.2 MID 1011 1962 333 701 45 1 50.0 MID 1011 1973 335 711 46 1 51.5 MID 1041 1973 335 711 47 1 50.3 MID 1017 1927 327 694 48 ST 39.8 MID 805 1525 259 544 51 1 60.5 MID 1831 2444 430 989 53 2 65.2 MID 1801 2151 378 911 <td>)</td>)
41 3 89.0 MID 1963 2621 461 107 42 2 63.9 MID 1765 2151 378 917 43 2 61.4 MID 1696 2067 364 877 44 1 51.2 MID 1035 1962 333 701 45 1 50.0 MID 1011 1916 325 699 46 1 51.5 MID 1041 1973 335 711 47 1 50.3 MID 1017 1927 327 694 49 1 55.9 MID 1130 2142 364 772 50 3 83.0 MID 1233 2318 394 833 52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1861 2195 386 925 <td>)</td>)
42 2 63.9 MID 1765 2151 378 911 43 2 61.4 MID 1666 2067 364 877 44 1 51.2 MID 1035 1962 333 707 45 1 50.0 MID 1011 1916 326 699 46 1 51.5 MID 1041 1973 335 711 47 1 50.3 MID 1017 1927 327 694 49 1 55.9 MID 1831 2444 430 933 51 1 60.5 MID 1831 2444 430 933 52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1765 2151 378 917 56 2 63.9 MID 1661 2195 384 925 <td></td>	
43 2 61.4 MID 1696 2067 364 87 44 1 51.2 MID 1035 1962 333 707 45 1 50.0 MID 1011 1916 325 699 46 1 51.5 MID 1041 1973 335 711 47 1 50.3 MID 1017 1927 327 694 48 ST 39.8 MID 805 1525 259 545 49 1 55.9 MID 1130 2142 364 772 50 3 83.0 MID 1831 2444 430 996 51 1 60.5 MID 1223 2318 394 833 52 2 74.9 MID 2069 2521 461 107 54 3 89.0 MID 1963 2661 876 5	2
44 1 51.2 MID 1035 1962 333 700 45 1 50.0 MID 1011 1916 325 690 46 1 51.5 MID 1041 1973 335 711 47 1 50.3 MID 1041 1973 327 694 48 ST 39.8 MID 805 1525 259 544 49 1 55.9 MID 1831 2444 430 998 51 1 60.5 MID 1801 2195 386 922 53 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1861 2195 386 922 54 3 89.0 MID 1666 2067 364 875 55 2 63.9 MID 1035 1962 333 707 <td>ŝ</td>	ŝ
46 1 50.0 MID 1011 1916 325 699 46 1 51.5 MID 1041 1973 335 711 47 1 50.3 MID 10017 1927 327 694 48 ST 39.8 MID 805 1525 259 544 49 1 55.9 MID 1130 2142 364 777 50 3 83.0 MID 1831 2444 430 998 51 1 60.5 MID 1223 2318 394 833 52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1801 2151 378 911 56 2 63.9 MID 1765 2151 378 911 57 1 51.2 MID 1035 1962 333 703 </td <td>ŧ.</td>	ŧ.
46 1 51.5 MID 1041 1973 335 711 47 1 50.3 MID 1017 1927 327 694 48 ST 39.8 MID 805 1525 259 544 49 1 55.9 MID 1130 2142 364 777 50 3 83.0 MID 1831 2444 430 996 51 1 60.5 MID 1232 2318 394 833 52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1981 2424 461 107 55 2 63.9 MID 1963 2621 461 107 56 2 61.4 MID 1696 2067 364 875 57 1 51.2 MID 1035 1962 333 707 <td>j i</td>	j i
47 1 50.3 MID 1017 1927 327 694 48 ST 39.8 MID 805 1525 259 544 49 1 55.9 MID 1130 2142 364 772 50 3 83.0 MID 1831 2444 430 999 51 1 60.5 MID 1223 2318 394 833 52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1961 2195 386 922 54 3 89.0 MID 1963 2621 461 107 55 2 63.9 MID 1765 2151 378 970 56 2 61.4 MID 1035 1962 333 707 58 1 50.0 MID 1011 1973 335 711 <td>i i</td>	i i
48 ST 39.8 MID 805 1525 259 544 49 1 55.9 MID 1130 2142 364 772 50 3 83.0 MID 1831 2444 430 996 51 1 60.5 MID 1232 2318 394 803 52 2 74.9 MID 1203 22142 364 727 53 2 65.2 MID 1223 2318 394 806 53 2 65.2 MID 1801 2195 386 925 54 3 89.0 MID 1963 2621 461 107 55 2 63.9 MID 1765 2151 378 911 56 2 61.4 MID 1696 2067 364 876 57 1 51.2 MID 1035 1962 333 707 </td <td>,</td>	,
49 1 55.9 MID 1130 2142 364 77 50 3 83.0 MID 1831 2444 430 983 51 1 60.5 MID 1223 2318 394 833 52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1801 2195 386 922 54 3 89.0 MID 1963 2621 461 107 55 2 63.9 MID 1765 2151 378 911 56 2 61.4 MID 1035 1962 333 707 58 1 50.0 MID 1035 1962 333 701 58 1 50.0 MID 1011 1973 335 711 60 1 50.3 MID 1041 1973 327 694 <td>\$</td>	\$
50 3 83.0 MID 1831 2444 430 999 51 1 60.5 MID 1223 2318 394 833 52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1801 2195 386 925 54 3 89.0 MID 1963 2621 461 107 55 2 63.9 MID 1963 2067 364 877 56 2 61.4 MID 1035 1962 333 707 58 1 50.0 MID 1041 1913 325 671 60 1 51.5 MID 1041 1973 335 711 60 1 50.3 MID 1017 1927 327 644 61 ST 39.8 MID 805 1525 545)
51 1 60.5 MID 1223 2318 394 833 52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1801 2195 386 925 54 3 89.0 MID 1963 2621 461 107 55 2 63.9 MID 1765 2151 378 911 56 2 61.4 MID 1606 2067 364 875 57 1 51.2 MID 1035 1962 333 707 58 1 50.0 MID 1011 1973 335 694 60 1 50.3 MID 1041 1973 337 711 61 ST 39.8 MID 805 1525 259 549 62 1 55.9 MID 1130 2142 364 772 <td>)</td>)
52 2 74.9 MID 2069 2522 443 106 53 2 65.2 MID 1801 2195 386 922 54 3 89.0 MID 1963 2621 461 107 55 2 63.9 MID 1765 2151 378 911 56 2 61.4 MID 1696 2067 364 877 57 1 51.2 MID 1035 1962 333 707 58 1 50.0 MID 1011 1916 325 699 59 1 51.5 MID 1041 1973 335 711 60 1 50.3 MID 1017 1927 327 694 61 ST 39.8 MID 805 1525 259 544 62 1 55.9 MID 1130 2142 364 772 <td></td>	
53 2 65.2 MID 1801 2195 386 925 54 3 89.0 MID 1963 2621 461 107 55 2 63.9 MID 1765 2151 378 911 56 2 61.4 MID 1696 2067 364 875 57 1 51.2 MID 1035 1962 333 707 58 1 50.0 MID 1011 1916 325 690 59 1 51.5 MID 1041 1973 337 711 60 1 50.3 MID 1017 1927 327 694 61 ST 39.8 MID 805 1525 259 545 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2659 2423 430 116 <td>2</td>	2
54 3 89.0 MID 1963 2621 461 107 55 2 63.9 MID 1765 2151 378 911 56 2 61.4 MID 1696 2067 364 875 57 1 51.2 MID 1035 1962 333 707 58 1 50.0 MID 1011 1916 325 699 59 1 51.5 MID 1041 1973 335 711 60 1 50.3 MID 1017 1927 327 694 61 ST 39.8 MID 805 1525 259 548 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2559 2243 30 116 64 1 60.5 TOP 2559 2423 30 116	1
55 2 63.9 MID 1765 2151 378 911 56 2 61.4 MID 1696 2067 364 875 57 1 51.2 MID 1035 1962 333 707 58 1 50.0 MID 1011 1916 325 699 59 1 51.5 MID 1041 1973 335 711 60 1 50.3 MID 1017 1927 327 694 61 ST 39.8 MID 805 1525 259 545 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2559 2294 394 984 64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 256.8 442 440	ŧ.
56 2 61.4 MID 1696 2067 364 87 57 1 51.2 MID 1035 1962 333 701 58 1 50.0 MID 1011 1916 325 690 59 1 51.5 MID 1041 1973 335 711 60 1 50.3 MID 1041 1927 327 694 61 ST 39.8 MID 805 1525 259 545 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2659 2423 430 116 64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 2957.8 2423 394 196	i
57 1 51.2 MID 1035 1962 333 701 58 1 50.0 MID 1011 1916 325 690 59 1 51.5 MID 1041 1973 335 711 60 1 50.3 MID 1047 1927 327 644 61 ST 39.8 MID 805 1525 259 544 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2569 2423 430 116 64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 2967 2568 442 442	j
58 1 50.0 MID 1011 1916 325 69(59 1 51.5 MID 1041 1973 335 711 60 1 50.3 MID 1017 1927 327 694 61 ST 39.8 MID 805 1525 259 545 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2559 2294 394 984 64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 256.8 442 442 442	,
59 1 51.5 MID 1041 1973 335 711 60 1 50.3 MID 1017 1927 327 698 61 ST 39.8 MID 805 1525 259 548 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2659 2423 430 116 64 1 60.5 TOP 2659 2423 304 116 64 1 60.5 TOP 2659 2423 304 116 64 1 60.5 TOP 2659 2423 430 116 64 1 60.5 TOP 2567 2284 394 984 65 2 74.9 TOP 2687 2568 442 440	J
60 1 50.3 MID 1017 1927 327 699 61 ST 39.8 MID 805 1525 259 548 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2659 2423 430 116 64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 2657 2568 442 140)
61 ST 39.8 MID 805 1525 259 545 62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2659 2423 430 116 64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 2987 2568 442 440	J
62 1 55.9 MID 1130 2142 364 772 63 3 83.0 TOP 2659 2423 430 116 64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 2687 2568 442 440	
63 3 83.0 TOP 2659 2423 430 116 64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 2687 2508 442 140	2
64 1 60.5 TOP 1955 2294 394 984 65 2 74.9 TOP 2687 2508 443 419	j.
65 2 74 9 TOP 2687 2508 442 110	Į.
2 17.0 101 2001 2000 443 119	i
66 2 65.2 TOP 2339 2183 386 104	j
67 3 89.0 TOP 2851 2598 461 125	
68 2 63.9 TOP 2292 2139 378 101	J
69 2 61.4 MID 1696 2067 364 875)
70 1 51.2 MID 1035 1962 333 707)
71 1 50.0 MID 1011 1916 325 690	
72 1 51.5 MID 1041 1973 335 711	2
73 1 50.3 MID 1017 1927 327 694	J .
74 ST 39.8 MID 805 1525 259 549	ł
75 1 55.9 MID 1130 2142 364 772	j
76 2 61.4 MID 1696 2067 364 875	j.
77 1 51.2 MID 1035 1962 333 707	,
78 1 50.0 MID 1011 1916 325 690	ł
79 1 51.5 MID 1041 1973 335 711)
80 1 50.3 MID 1017 1927 327 694)
81 ST 39.8 MID 805 1525 259 545	
82 1 55.9 MID 1130 2142 364 772	2
83 2 61.4 TOP 2203 2056 364 975	\$
84 1 51.2 TOP 1654 1942 333 833	ŧ.
85 1 50.0 TOP 1616 1896 325 813	i
86 1 51.5 TOP 1664 1953 335 838	<i>i</i>
87 1 50.3 TOP 1625 1907 327 818	,
88 ST 39.8 TOP 1286 1509 259 647	\$
89 1 55.9 TOP 1806 2120 364 909	j.

DER - Based	on Gas Heating v Carbon Factors	with SAP 10
Space Htg	Water Htg	Pumps/ Lighting
2283	1968	449
1563	1676	362
2494	1785	402
2255	1614	364
1440	1543	333
1406	1507	325
1414	1516	327
2329	1667	375
1445	1890	430
1943	1974	443
1084	1972	424
1549 1657	2027	461 378
1592	1618	364
851	1549	333
831	1513	325
836	1522	327
662	1204	259
929	1691	364
1006	1830	394
1943	1974	443
1084	2027	424
1657	1684	378
1592	1618	364
851 831	1549 1513	333
856	1558	335
836	1522	327
929	1204	259
1445	1890	430
1006	1830	394
1943	1974	443 386
1549	2027	461
1657	1684	378
1592	1618	364
831	1513	325
856	1558	335
662	1522	327
929	1691	364
1445	1890	430
1006	1830	394 443
1691	1718	386
1549	2027	461
1592	1604	364
851	1549	333
831	1513	325
836	1556	327
662	1204	259
929	1691	364
1957	1822	394
2644	1969	443
2302	1714	386
2024	1680	378
1592	1618	364
851	1549	333
856	1513	335
836	1522	327
662	1204	259
929 1592	1618	364
851	1549	333
831 856	1513	325 335
836	1522	327
662	1204	259
929	1691	364
1656	1542	333
1617	1506	325
1666 1627	1551 1515	335 327
1288	1199	259
1808	1684	364

Gas Electricity

Plot

Price £0.0392 per kW/hr £0.1696 per kW/hr

Emissions 997.5

764.4 992.3 900.5 897.3 703.9 687.4 708.1 691.6 926.5 800.5 687.2 925.7 740.6 858.4 789.8 758.9 581.6 568.0 585.0 585.1 4452.1

432.1 635.0 800.5 687.2 925.7 740.6 858.4

789.8 758.9 581.6 568.0 585.0 571.4 452.1

635.0

800.5 687.2 925.7 805.8 858.4 789.8 758.9

758.9 581.6 568.0 585.0 571.4 452.1 635.0

800.5 687.2 925.7 805.8 858.4 789.8

758.9

758.9 581.6 568.0 585.0 571.4 452.1 635.0 1009.5

885.3 1072.1 933.3 1082.5 914.7 758.9 581.6

568.0 585.0

571.4 452.1 635.0 758.9 581.6 568.0 585.0 571.4 452.1 635.0 878.9

749.2 731.7 753.6 736.1 582.4 818.0

63667.3

Total Site Target Emissions

5306.7

Total Site Design Emissions (Be Clean) Total Reduction % Reduction

75,274 kgCO₂ per year 63,667 kgCO₂ per year 11,607 kgCO₂ per year 15.42%

75274.4



Appendix 3 – Regulations Compliance Reports for Modelled Units using ASHP cylinders

Approved Docume	ent L1A, 2013 Edition,	England assessed by St	roma FSAP 2012 program, Ve	ersion: 1.0.4.26	
Project Information	on:	,			
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area:	51.5m²	
Site Reference :	Kingston Bridge Ho	use, Hampton Wick	Plot Reference:	1BF GND 52 ASHP	
Address :					
Client Details:					
Name: Address :	Westcombe Group				
This report cover It is not a comple	rs items included wite report of regulation	thin the SAP calculation ons compliance.	IS.		
1a TER and DEF	R				
Fuel for main heat	ing system: Electricity	1			
Fuel factor: 1.55 (e	electricity)	TED)	$26.47 kg/m^2$		
Dwelling Carbon D	Dioxide Emission Rate ((DER)	23.84 kg/m ²		ок
1b TFEE and DF	EE				
Target Fabric Ene	rgy Efficienc <mark>y (TFEE)</mark>		40.0 kWh/m ²		
Dwelling Fabric Er	nergy Efficiency (DFE	E)	34.0 kWh/m ²		01/
2 Eobrio II voluc					OK
Element External Party wal Floor	wall	Average 0.17 (max. 0.30) 0.00 (max. 0.20) 0.11 (max. 0.25)	Highest 0.17 (max. 0.70) - 0.11 (max. 0.70)		ок ок ок
Roof		(no roof) 1.20 (max, 2.00)	1.20 (max, 2.20)		OK
2a Thermal brid	aina	1.50 (max. 2.00)	1.50 (max. 5.50)		UK
Thermal	bridging calculated fro	om linear thermal transmit	ttances for each junction		
3 Air permeabili	ty				
Air permeal Maximum	bility at 50 pascals		4.00 (design va 10.0	lue)	ок
4 Heating efficie	ency				
Main Heatir	ng system:	Boiler systems with radia Efficiency 99.8	ators or underfloor heating - e	lectric	
Secondary	heating system:	None			
5 Cylinder insul	ation				
Hot water S	Storage:	No cylinder			
6 Controls					
Space heat Hot water c	ing controls ontrols:	Time and temperature z No cylinder thermostat No cylinder	one control by device in datab	ase	ОК

7 Low energy lights		
Percentage of fixed lights with low-energy fittings Minimum	100.0% 75.0%	ок
8 Mechanical ventilation		
Not applicable		
9 Summertime temperature		
Overheating risk (South East England):	Slight	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South East	2.88m ²	
Windows facing: South East	3.72m ²	
Ventilation rate:	4.00	
Blinds/curtains:	None	
10 Key features		
Party Walls U-value	0 W/m²K	
Floors U-value	0.11 W/m²K	



Approved Docume	ent L1A, 2013 Edition,	England assessed by Stro	ma FSAP 2012 program, Ve	rsion: 1.0.4.26	
Project Information	on:				
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area: 5	51.5m ²	
Site Reference :	Kingston Bridge Hc	use, Hampton Wick	Plot Reference: 1	BF MID 52 ASHP	
Address :	<u>j</u>				
Client Details:					
Name: Address :	Westcombe Group				
This report cover	s items included wit	thin the SAP calculations.			
It is not a comple	te report of regulation	ons compliance.			
1a TER and DER					
Fuel for main heat	ing system: Electricity	,			
Fuel factor: 1.55 (e	ectricity)		22.05 kg/m^2		
Dwelling Carbon D	Dioxide Emission Rate	(DER)	18.22 kg/m ²		ок
1b TFEE and DF	EE		· • · ·g,		
Target Fabric Ene	rgy Efficiency (TFEE)		28.0 kWh/m²		
Dwelling Fabric Er	ergy Efficiency (DFE	E)	23. <mark>3 kWh/m²</mark>		
2 Eabric II-value					OK
Flement		Average	Highest		
External	wall	0.17 (max. 0.30)	0.17 (max. 0.70)		ок
Party wal		0.00 (max. 0.20)	-		ОК
Floor		(no floor)			
Roof		(no roof)			01/
Openings	\$ •	1.30 (max. 2.00)	1.30 (max. 3.30)		OK
2a Thermal brid	ging briddian actoriated fro		need for each investiga		
3 Air permeabili	tv		inces for each junction		
Air permeal	pility at 50 pascals		4.00 (design val	lue)	
Maximum			10.0	,	ОК
4 Heating efficie	ncy				
Main Heatir	ng system:	Boiler systems with radiate	ors or underfloor heating - el	ectric	
		Efficiency 99.8			
Secondary	heating system:	None			
5 Cylinder insul	ation				
Hot water S	itorage:	No cylinder			
6 Controls					
~ • •	· · · · · · · ·	T '			011
Space heat	ing controls	I ime and temperature zor	he control by device in databa	ase	OK
riot water c		No cylinder			

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Not applicable		
9 Summertime temperature		
Overheating risk (South East England):	Slight	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South East	2.88m ²	
Windows facing: South East	3.72m ²	
Ventilation rate:	4.00	
Blinds/curtains:	None	
10 Key features		

Party Walls U-value

0 W/m²K



Approved Docume	ent L1A, 2013 Edition,	England assessed by Str	roma FSAP 2012 program, V	ersion: 1.0.4.26	
Project Information	on:				
Assassad By:	Rhucky Linimited		Building Type:	Flat	
Assessed by.	Bluesky Offinitilled		Building Type.	FIAL	
Dwelling Details:			Tatal Elsan Anaos	54 5 1 2	
Site Deference	Vingeton Bridge He	uco Hompton Wick	Plot Poforonoo		
Addross :	Kingston Bruge Ho		FIOL Reference.	IBF IOF 52 ASHF	
Address .					
Client Details:	Westsembe Croup				
Address :	Westcombe Group				
This report cover	s itoms included wi	hin the SAR calculation	c		
It is not a comple	te report of regulation	ons compliance.	5.		
1a TER and DER		•			
Fuel for main heat	ing system: Electricity	,			
Fuel factor: 1.55 (e	ectricity)				
Target Carbon Dic	xide Emission Rate (TER)	26.73 kg/m ²		01/
1b TEEE and DE	FF	(DER)	25.90 kg/m²		UK
Target Fabric Ene	ray Efficiency (TFEE)		40.9 kWh/m²		
Dwelling Fabric Er	ergy Efficiency (DFE	E)	37. <mark>9 kWh/m²</mark>		
					OK
2 Fabric U-value	S				
Element		Average	Highest		01/
External	vall	0.17 (max. 0.30)	0.17 (max. 0.70)		OK
Floor		(no floor)			UN
Roof		0.15 (max. 0.20)	0.15 (max. 0.35)		ок
Openings	\$	1.30 (max. 2.00)	1.30 (max. 3.30)		ок
2a Thermal brid	ging				
Thermal I	pridging calculated fro	m linear thermal transmit	tances for each junction		
3 Air permeabili	ly		4.00 (desire or		
Air permear Maximum	bility at 50 pascals		4.00 (design va 10.0	alue)	ок
4 Heating emcle Main Heatin	ncy og svetem:	Boiler systems with radi:	ators or underfloor beating - e	lectric	
Main neath	ig system.	Efficiency 99.8	ators of undernoor heating - e		
		, , , , , , , , , , , , , , , , , , ,			
Secondary	heating system:	None			
5 Cylinder insula	ation				
Hot water S	otorage:	No cylinder			
6 Controls	-	- -			
Space heat	ing controls	Time and temperature ze	one control by device in datal	base	ΟΚ
Hot water c	ontrols:	No cylinder thermostat			
		NO CYIINDER			

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Not applicable		
9 Summertime temperature		
Overheating risk (South East England):	Slight	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South East	2.88m ²	
Windows facing: South East	3.72m ²	
Ventilation rate:	4.00	
Blinds/curtains:	None	
10 Key features		

Party Walls U-value

0 W/m²K



Approved Docum Printed on 29 Oct	ent L1A, 2013 Edition, tober 2020 at 14:55:28	England assessed by Stro	oma FSAP 2012 program, Vei	rsion: 1.0.4.26	
Project Informati	ion:				
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details					
			Total Floor Areas 6	·E 0m²	
	JUESIGN STAGE	use Llemates Wield			
Site Reference :	Kingston Bridge Ho	use, Hampton Wick	Plot Reference: 2	BF GIND 00 ASHP	
Address :					
Client Details:					
Name: Address :	Westcombe Group				
This report cove It is not a comple	ers items included wit ete report of regulation	hin the SAP calculations compliance.			
1a TER and DE	R				
Fuel for main hea	ting system: Electricity	,			
Fuel factor: 1.55 ((electricity)				
Target Carbon Di	oxide Emission Rate (TER)	26.64 kg/m ²		E e il
Dwelling Carbon	Dioxide Emission Rate $r = 0.36 \text{ kg/m}^2 (1.4.\%)$	(DER)	27.00 kg/m²		Fall
1b TFEE and D	FEE				
Target Fabric Ene	eray Efficiency (TEEE)		47.3 kWh/m ²		
Dwelling Fabric E	nergy Efficiency (DFE	E)	40.2 kWh/m ²		ок
2 Fabric U-valu	es			_	
Element	t i i i i i i i i i i i i i i i i i i i	Average	Highest	_	
External	wall	0.17 (max. 0.30)	0.17 (max. 0.70)		OK
Party wa	All	0.00 (max. 0.20)	-		OK
Ploof		0.11 (max. 0.25) (no roof)	0.11 (max. 0.70)		UN
Opening	IS	(10100) 1.30 (max. 2.00)	1.30 (max. 3.30)		ок
2a Thermal bric	laina	1.00 (max: 2.00)			
Thermal	bridging calculated fro	m linear thermal transmitt	ances for each junction		
3 Air permeabil	lity				
Air permea	ability at 50 pascals		4.00 (design val	ue)	
Maximum	, , , , , , , , , , , , , , , , , , ,		10.0	,	ΟΚ
4 Heating effici	ency				
Main Heati	ing system:	Boiler systems with radiat Efficiency 99.8	tors or underfloor heating - ele	ectric	
Secondary	v heating system:	None			
5 Cylinder insu	lation				
Hot water	Storage:	No cylinder			N/A

6 Controls			
Space heating controls T Hot water controls: N	Time and temperature zone control No cylinder thermostat No cylinder	by device in database	ок
7 Low energy lights			
Percentage of fixed lights with low- Minimum	energy fittings	100.0% 75.0%	ОК
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East Engla	and):	Slight	ОК
Based on:			
Overshading:		Average or unknown	
Windows facing: North East		5.76m ²	
Windows facing: North East		3.72m ²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
10 Key features			
Party Walls U-value		0 W/m²K	
Floors U-value		0.11 W/m²K	

Approved Docume	ent L1A, 2013 Edition,	England assessed by Stro	oma FSAP 2012 program, Ve	rsion: 1.0.4.26	
Project Information	on:				
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details:	-				
NEW DWELLING	DESIGN STAGE		Total Floor Area: 6	65.2m ²	
Site Reference :	Kingston Bridge Ho	use, Hampton Wick	Plot Reference: 2	BF MID 65 ASHP	
Address :					
Client Details:					
Name: Address :	Westcombe Group				
This report cover	s items included wit	hin the SAP calculations	5.		
It is not a comple	te report of regulation	ons compliance.			
1a TER and DER					
Fuel for main heat	ing system: Electricity	1			
Target Carbon Dic	electricity) oxide Emission Rate (TER)	23.12 kg/m ²		
Dwelling Carbon E	Dioxide Emission Rate	e (DER)	21.75 kg/m ²		ок
1b TFEE and DF	EE				
Target Fabric Ene	rgy Efficiency (TFEE)		35.6 kWh/m ²		
Dwelling Fabric Er	ergy Efficiency (DFE	E)	30.2 kWh/m ²		OK
2 Fabric U-value					UN
Element External Party wal	wall	Average 0.17 (max. 0.30) 0.00 (max. 0.20)	Highest 0.17 (max. 0.70) -		ок ок
Roof		(no roof)			
Openings	3	1.30 (max. 2.00)	1.30 (max. 3.30)		ок
2a Thermal brid	ging				
Thermal 3 Air permeabili	bridging calculated fro	om linear thermal transmitt	ances for each junction		
Air permeal Maximum	bility at 50 pascals		4.00 (design val 10.0	ue)	ок
4 Heating efficie	ncy				
Main Heatir	ng system:	Boiler systems with radia Efficiency 99.8	tors or underfloor heating - ele	ectric	
Secondary	heating system:	None			
5 Cylinder insul	ation				
Hot water S	torage:	No cylinder			
6 Controls					
Space heat Hot water c	ing controls ontrols:	Time and temperature zo No cylinder thermostat No cylinder	ne control by device in databa	ase	ОК

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Not applicable		
9 Summertime temperature		
Overheating risk (South East England):	Slight	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	5.76m ²	
Windows facing: North East	3.72m ²	
Ventilation rate:	4.00	
Blinds/curtains:	None	
10 Key features		

Party Walls U-value

0 W/m²K



Approved Docume Printed on 29 Oct	ent L1A, 2013 Edition, ober 2020 at 14:55:19	England assessed by Stro	oma FSAP 2012 program, Ve	rsion: 1.0.4.26	
Project Informati	on:				
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area: 6	65.2m ²	
Site Reference :	Kingston Bridge Ho	use, Hampton Wick	Plot Reference: 2	BF TOP 65 ASHP	
Address :					
Client Details:					
Name:	Westcombe Group				
Address :					
This report cove It is not a comple	rs items included wite report of regulation	hin the SAP calculations compliance.			
1a TER and DEI	R				
Fuel for main hear	ting system: Electricity	,			
Fuel factor: 1.55 (electricity)				
Dwelling Carbon I	DXIDE EMISSION RATE (Dioxide Emission Rate	IER)	25.77 Kg/m² 26.31 kg/m²		Fail
Excess emissions	$s = 0.54 \text{ kg/m}^2 (2.1 \%)$		20.01 kg/m		i an
1b TFEE and DF	EE				
Target Fabric Ene	ergy Efficienc <mark>y (TFEE)</mark>		44. <mark>4 kWh/m²</mark>		
Dwelling Fabric E	nergy Efficiency (DFE	E)	38.9 kWh/m²		ок
2 Fabric U-value	es				
Element		Average	Highest		
External	wall	0.17 (max. 0.30)	0.17 (max. 0.70)		OK
Floor		(no floor)			UK
Roof		0.15 (max. 0.20)	0.15 (max. 0.35)		ок
Opening	s	1.30 (max. 2.00)	1.30 (max. 3.30)		ОК
2a Thermal brid	lging				
Thermal	bridging calculated fro	om linear thermal transmitta	ances for each junction		
3 Air permeabil	ity				
Air permea Maximum	bility at 50 pascals		4.00 (design val 10.0	ue)	ок
4 Heating efficie	encv				
Main Heati	ng system:	Boiler systems with radiat	tors or underfloor heating - ele	ectric	
	0,	Efficiency 99.8	0		
Secondary	hasting systems	None			
Secondary	nealing system.				
5 Cylinder insul	lation				
Hot water S	Storage:	No cylinder			
					N/A

6 Controls		
Space heating controls Time Hot water controls: No c No c	e and temperature zone control by device in database sylinder thermostat sylinder	ОК
7 Low energy lights		
Percentage of fixed lights with low-ene Minimum	ergy fittings 100.0% 75.0%	ок
8 Mechanical ventilation		
Not applicable		
9 Summertime temperature		
Overheating risk (South East England)	: Slight	ОК
Based on: Overshading: Windows facing: North East Windows facing: North East Ventilation rate: Blinds/curtains:	Average or unknown 5.76m ² 3.72m ² 4.00 None	
10 Key features		
Thermal bridging Party Walls U-value	0.036 W/m²K 0 W/m²K	

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Printed on 29 Octo	ober 2020 at 14:55:16				
	pri.				
Assessed By:	Bluesky Unlimited		Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area	a: 83m²	
Site Reference :	Kingston Bridge Ho	ouse, Hampton Wick	Plot Reference	: 3BF GND 83 ASH	Р
Address :					
Client Details:					
Name:	Westcombe Group				
Address :					
This report cover	s items included wi	thin the SAP calculatio	ns.		
It is not a comple	te report of regulation	ons compliance.			
1a TER and DER					
Fuel for main heat	ing system: Electricity	1			
Target Carbon Dic	ectricity) vide Emission Rate (22 52 kg/m ²		
Dwelling Carbon D	Dioxide Emission Rate	e (DER)	20.76 kg/m ²		ОК
1b TFEE and DF	EE	. (= =: ')	_ en e ng, m		
Target Fabric Ene	rgy Efficienc <mark>y (TFEE)</mark>		41.0 kWh/m ²		
Dwelling Fabric Er	nergy Efficiency (DFE	E)	31.9 kWh/m ²		
					OK
2 Fabric U-value	S				
Element		Average	Highest	N	OK
External Party wal	wali	0.17 (max. 0.30)	0.17 (max. 0.70)	OK
Floor		0.00 (max, 0.20)	0 11 (max 0 70)	OK
Roof		(no roof)		/	
Openings	3	1.30 (max. 2.00)	1.30 (max. 3.30)	ок
2a Thermal brid	ging				
Thermal I	bridging calculated fro	om linear thermal transm	ittances for each junction		
3 Air permeabili	ty				
Air permeat	oility at 50 pascals		4.00 (design v	value)	OK
waximum			10.0		UK
4 Heating efficie	ncy				
Main Heatir	ng system:	Boiler systems with rad	liators or underfloor heating -	electric	
		Efficiency 99.8			
Secondary	heating system:	None			
5 Cylinder insula	ation				
Hot water S	itorage:	No cylinder			
6 Controls					
a .	. , .	 , - , .	, 		
Space heat	ing controls	Lime and temperature :	zone control by device in data	abase	OK
HOT WATER C	UNITUIS.	No cylinder thermostat			

7 Low energy lights		
Percentage of fixed lights with low-energy fittings Minimum	100.0% 75.0%	ок
8 Mechanical ventilation		
Not applicable		
9 Summertime temperature		
Overheating risk (South East England):	Slight	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	2.88m ²	
Windows facing: South West	16.74m ²	
Ventilation rate:	4.00	
Blinds/curtains:	None	
10 Key features		
Party Walls U-value	0 W/m²K	
Floors U-value	0.11 W/m²K	



Approved Docume	ent L1A, 2013 Edition,	England assessed by S	troma FSAP 2012 progra	am, Version: 1.	.0.4.26
Project Information	on:				
Accessed By:	Pluceley Unlimited		Building T	Line Elet	
Assessed By.	Bidesky Onlinnited		Building I	ype. Flat	
NEW DWELLING			Total Floor	Aroa: 92m2	
Site Reference :	Kingston Bridge Hr	use Hampton Wick	Plot Refer	ance: 3BF MID	
Address ·	Ringston Bhage he		TIOURCIER		
Client Details:					
Name:	Westcombe Group				
Address :					
This report cover	s items included wi	thin the SAP calculation	ns.		
It is not a comple	te report of regulation	ons compliance.			
1a TER and DER	R				
Fuel for main heat	ing system: Electricity	1			
Fuel factor: 1.55 (6	ectricity)		10 /7 kg	/m²	
Dwelling Carbon F	Dioxide Emission Rate	(DFR)	16 41 kg	/m²	ОК
1b TFEE and DF	EE		loi i i kg		
Target Fabric Ene	rgy Efficiency (TFEE)		30.9 kWł	n/m²	
Dwe <mark>lling Fabric Er</mark>	hergy Efficiency (DFE	E)	23.7 kWł	n/m²	
					ОК
2 Fabric U-value	S				
Element		Average	Highest	0.70)	01/
External Party wal	wali	0.17 (max. 0.30)	0.17 (max.	0.70)	OK
Floor		(no floor)			OK
Roof		(no roof)			
Openings	3	1.30 (max. 2.00)	1.30 (max.	3.30)	ОК
2a Thermal brid	ging				
Thermal	bridging calculated fro	om linear thermal transm	ittances for each junction	า	
3 Air permeabili	ty				
Air permeal	oility at 50 pascals		4.00 (des	sign value)	OK
Maximum			10.0		UK
4 Heating efficie	ncy			· · · · ·	
Main Heatir	ig system:	Boiler systems with rad	liators or underfloor heat	ing - electric	
		Enclency 99.0			
Secondary	heating system:	None			
E Culinder in out	ot: o p				
Bot water S		No cylinder			
6 Controls					
-0-00111015					
Space heat	ina controls	Time and temperature a	zone control by device in	database	ОК
Hot water c	ontrols:	No cylinder thermostat			
		No cylinder			

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
8 Mechanical ventilation		
Not applicable		
9 Summertime temperature		
Overheating risk (South East England):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	2.88m ²	
Windows facing: South West	16.74m ²	
Ventilation rate:	4.00	
Blinds/curtains:	None	
10 Key features		
Party Walls U-value	0 W/m²K	



Approved Docume	ent L1A, 2013 Edition,	England assessed by S	troma FSAP 2012 program,	Version: 1.0.4.26	
Project Information	on:				
Assassad By:	Rhucky Linimited		Building Type	• Elat	
Assessed by.	Bluesky Onlinnited		Building Type		
Dwelling Details:			Tatal Elsan Ana	00-m ²	
Site Deference	Vingoton Bridge He	waa Hampton Wiek	Plot Poforono		סו
Addross :	Kingston Blidge no			e. SBF TOF 65 ASI	IF
Address .					
Client Details:	Westsembe Croup				
Address :	Westcombe Group				
This report cover	s itoms included wi	thin the SAR calculation	ne		
It is not a comple	te report of regulation	ons compliance.			
1a TER and DER		•			
Fuel for main heat	ing system: Electricity	/			
Fuel factor: 1.55 (e	ectricity)				
Target Carbon Dic	xide Emission Rate (22.67 kg/m ²		OK
1b TEEE and DE	FF	(DER)	22.29 Kg/m²		UK
Target Fabric Ene	ray Efficiency (TFEE)		41.5 kWh/m ²	2	
Dwelling Fabric Er	ergy Efficiency (DFE	E)	34.8 kWh/m ²	2	
					ОК
2 Fabric U-value	S				
Element		Average	Highest		011
External	wall	0.17 (max. 0.30)	0.17 (max. 0.70	0)	OK
Faily wai		(no floor)			UK
Roof		0.15 (max. 0.20)	0.15 (max. 0.38	5)	ок
Openings	;	1.30 (max. 2.00)	1.30 (max. 3.30))	ок
2a Thermal bridg	ging				
Thermal I	oridging calculated fro	om linear thermal transm	ittances for each junction		
3 Air permeabili	ly				
Air permeat	oility at 50 pascals		4.00 (design 10.0	value)	ОК
			10.0		UN
4 Heating efficie	ncy	Roilor systems with rad	listors or underfloor bosting	oloctric	
	ig system.	Efficiency 99.8	lators of undernoor heating.	- electric	
Secondary	heating system:	None			
5 Cylinder insula	ation				
Hot water S	torage:	No cylinder			
6 Controls					
Space heat	ing controls	Time and temperature a	zone control by device in dat	tabase	ОК
Hot water c	ontrols:	No cylinder thermostat			
		No cylinder			

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
8 Mechanical ventilation		
Not applicable		
9 Summertime temperature		
Overheating risk (South East England):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	2.88m ²	
Windows facing: South West	16.74m ²	
Ventilation rate:	4.00	
Blinds/curtains:	None	
10 Key features		
Party Walls U-value	0 W/m²K	





Appendix 4: 'Be Clean' GLA SAP 10 Spreadsheet

Be Clean - SAP 2012 Methodology SAP 10 Carbon Factors

Oct-20 A

Project Client File ref and engineer Sheet Date Rev

Kingston Bridge House, Hampton Wick

1

SAP 2012 Gas Grid Elec Carbon Factor SAP 10 0.216 Gas 0.519 Grid Elec Carbon Factor 0.210 0.233

					TER		
Plot	Bedrooms	Floor Area	Location	Space Htg	Water Htg	Pumps/ Lighting	Emissions
1	3	86.7	GND	2606	2530	449	1183
2	1	55.6	GND	1583	2251	362	889
3	2	67.9	GND	2445	2334	402	1097
4	1	65.5	GND	1865	2652	426	1048
5	2	61.4	GND	2211	2110	364	992
6	1	51.2	GND	1457	2073	333	819
,	1	50.0	GND	1423	2024	325	800
9	1	50.3	GND	1400	2085	327	805
10	2	63.4	GND	2283	2179	375	1025
11	3	83.0	MID	1717	2444	430	974
12	1	60.5	MID	1062	2475	394	835
13	2	74.9	MID	1889	2595	443	1045
14	1	65.2	MID	1144	2668	424	899
15	3	89.0	MID	1841	2621	461	1044
10	2	63.9	MID	1611	2214	378	891
18	1	51.2	MID	899	2095	333	706
19	1	50.0	MID	878	2035	325	690
20	1	51.5	MID	904	2107	335	710
21	1	50.3	MID	883	2058	327	694
22	ST	39.8	MID	699	1628	259	549
23	1	55.9	MID	981	2287	364	771
24	3	83.0	MID	1717	2444	430	974
25	1	60.5	MID	1062	2475	394	835
26	2	74.9	MID	1889	2595	443	1045
27	1	65.2	MID	1144	2668	424	899
28	3	89.0	MID	1841	2621	461	1044
29	2	b3.9 61 4	MID	1611	2214	3/8	891
30	2	01.4 51.2	MID	1048	2127	304	00/ 706
32	1	50.0	MID	878	2035	325	690
33	1	51.5	MID	904	2107	335	710
34	1	50.3	MID	883	2058	327	694
35	ST	39.8	MID	699	1628	259	549
36	1	55.9	MID	981	2287	364	771
37	3	83.0	MID	1717	2444	430	974
38	1	60.5	MID	1062	2475	394	835
39	2	74.9	MID	1889	2595	443	1045
40	2	65.2	MID	1644	2259	386	910
41	3	89.0	MID	1841	2621	461	1044
42	2	63.9	MID	1611	2214	378	891
43	2	61.4	MID	1548	2127	364	857
44	1	51.2	MID	878	2095	335	700
46	1	51.5	MID	904	2107	335	710
47	1	50.3	MID	883	2058	327	694
48	ST	39.8	MID	699	1628	259	549
49	1	55.9	MID	981	2287	364	771
50	3	83.0	MID	1717	2444	430	974
51	1	60.5	MID	1062	2475	394	835
52	2	74.9	MID	1889	2595	443	1045
53	2	65.2	MID	1644	2259	386	910
54	3	89.0	MID	1841	2621	461	1044
55	2	63.9	MID	1611	2214	378	891
57	2	01.4 51.2	MID	1048	2127	304	00/
58	1	50.0	MID	878	2095	325	690
59	1	51.5	MID	904	2107	335	710
60	1	50.3	MID	883	2058	327	694
61	ST	39.8	MID	699	1628	259	549
62	1	55.9	MID	981	2287	364	771
63	3	83.0	TOP	2532	2421	430	1140
64	1	60.5	TOP	1772	2448	394	978
65	2	74.9	TOP	2499	2579	443	1170
66	2	65.2	TOP	2175	2245	386	1018
60	3	89.0	TOP	2/15	2596	461	1223
60	2	61 /	MID	2132	2200	364	390
70	<u>∠</u> 1	51.4	MID	899	2095	333	706
71	1	50.0	MID	878	2046	325	690
72	1	51.5	MID	904	2107	335	710
73	1	50.3	MID	883	2058	327	694
74	ST	39.8	MID	699	1628	259	549
75	1	55.9	MID	981	2287	364	771
76	2	61.4	MID	1548	2127	364	857
77	1	51.2	MID	899	2095	333	706
78	1	50.0	MID	878	2046	325	690
79	1	51.5	MID	904	2107	335	710
80	1	50.3	MID	883	2058	327	694
01 82	31	39.8 55.0	MID	099	1028	209 364	549 771
83	2	61 4		2018	2201	364	950
84	2 1	51.4	TOP	2040	2072	333	828
85	1	50.0	TOP	1464	2023	325	808
86	1	51.5	TOP	1508	2084	335	832
87	1	50.3	TOP	1473	2035	327	813
88	ST	39.8	TOP	1165	1611	259	643
89	1	55.9 5306 7	TOP	1637	2262	364	903

Gas Electricity

Price £0.0392 per kW/hr £0.1696 per kW/hr

	DER - Based on A	ASHP Hot Water 10 Carbon Fact	Cylinders with ors	
Plot	Space Htg	Water Htg	Pumps/	Emissions
			Lighting	
1	2158 1487	909 754	402 313	808.3 594.9
3	2361	815	355	822.8
4	1751	888	369	700.8
5	1369	694	288	547.8
7	1337	678	282	535.0
8	1377	698	290	551.0
10	2204	761	332	768.3
11	1369	870	385	611.4
12	963 1846	820	341 392	494.9
14	1038	884	367	533.3
15	1468	933	413	655.6
16 17	1575 1513	767	334 321	623.6 599.2
18	815	694	288	418.8
19	796	678	282	409.0
20	801	682	290	421.5
22	634	539	224	325.6
23	890	758	315	457.3
24	963	870	385 341	611.4 494.9
26	1846	899	392	731.0
27	1038	884	367	533.3
28	1466	933	334	623.6
30	1513	737	321	599.2
31	815 796	694 678	288	418.8
33	820	698	290	405.0
34	801	682	283	411.4
35 36	634 890	539 758	224 315	325.6 457.3
37	1369	870	385	611.4
38	963	820	341	494.9
39 40	1846 1607	899 783	392 341	731.0 636.3
41	1468	933	413	655.6
42	1575	767	334	623.6
43 44	1513 815	737 694	321 288	599.2 418.8
45	796	678	282	409.0
46	820	698	290	421.3
47	634	539	203	325.6
49	890	758	315	457.3
50 51	1369	870 820	385	611.4
52	1846	899	392	731.0
53	1607	783	341	636.3
54 55	1468	933	413 334	623.6
56	1513	737	321	599.2
57	815	694	288	418.8
58 59	796 820	698	282	409.0
60	801	682	283	411.4
61	634	539	224	325.6
63	2310	870	385	830.6
64	1858	820	341	703.5
65	2505 2181	899 783	392 341	884.6 770.1
67	2477	933	413	890.7
68	2138	767	334	754.7
70	815	694	288	418.8
71	796	678	282	409.0
72	820	698	290	421.3
73	634	539	203	325.6
75	890	758	315	457.3
76 77	1513 815	737	321 288	599.2 418 8
78	796	678	282	409.0
79	820	698	290	421.3
80 81	801 634	682 539	283 224	411.4 325.6
82	890	758	315	457.3
83	2054	737	321	725.2
84 85	15/3	678	288 282	595.3 581.4
86	1582	698	290	598.8
87	1545	682	283	584.9
89	1717	758	315	650.0

Total Site Target Emissions Total Site Design Emissions (Be Clean) Total Reduction % Reduction

74,429 kgCO₂ per year 48,704 kgCO₂ per year 25,725 kgCO₂ per year 34.56%

74429.3

48704.4



Appendix 5 – Roof Plans showing Indicative Layout of Photovoltaic Panels



155 x 400W Photovoltaic Panels

Date	Description
	Date




Appendix 6 – London Borough of Richmond Sustainable Construction Checklist

LBRUT Sustainable Construction Checklist - January 2016

This document forms part of the Sustainable Construction Checklist SPD. This document **must** be filled out as part of the planning application for the following developments: all residential development providing **one or more new residential units (including conversions leading to one or more new units)**, and all other forms of development providing **100sqm or more of non-residential floor space**. Developments including new non-residential development of less than 100sqm floor space, extensions less than 100sqm, and other conversions are strongly encouraged to comply with this checklist. Where further information is requested, please either fill in the relevant section, or refer to the document where this information may be found in detail, e.g. Flood Risk Assessment or similar. **Further guidance** on completing the Checklist may be found in the Justification and Guidance section of this SPD.

Property Name (if relevant):	Kingston Bridge House, Hampton Wick		Application No. (if known):	
Address (include. postcode)	Kingston Bridge House, Hampton Wick			
Completed by:	Ivan Ball			
For Non-Residential			For Residential	
Size of development (m2)			Number of dwellings 89	
1 MINIMUM COMPLIAN	NCE (RESIDENTIAL AND NON-RESIDENTI	AL)		
Energy Assessment Has an energy assess renewable energy mea	ment been submitted that demonstrates the asures, including the feasibility of CHP/CCHF	expected energy and carbon dioxide emis P and community heating systems? If yes,	sions saving from energy efficiency and please tick.	Yes
Carbon Dioxide emissions re What is the carbon dio Policy DM SD 1 and L	duction oxide emissions reduction against a Building ondon Plan Policy 5.2 (2015) require a 35%	Regulations Part L (2013) baseline reduction in CO $_2$ emissions beyond Build	ing Regulations 2013.	52.26
Percentage of total sit	te CO2 emissions saved through renewable e	energy installation?		27.05
1A MINIMUM POLICY C	OMPLIANCE (NON-RESIDENTIAL AND DO	MESTIC REFURBISHMENT)		
	Please check the G	uidance Section of this SPD for the poli	icy requirements	
Environmental Rating of deve Non-Residential new-build (100	elopment: Dsam or more)			
BREEAM Level	r residential dwellings	ease Select	Have you attached a pre-assessment to support this?	
BREEAM Domestic R	efurbishment Ple	ease Select	Have you attached a pre-assessment to support this?	
BREEAM Level	Ple	ease Select	Have you attached a pre-assessment to support this?	
Score awarded for En BREEAM:	vironmental Rating: Good = 0, Very Good = 4, Excellent = 8, 0	Outstanding = 16		Subtotal
1B MINIMUM POLICY C	OMPLIANCE (RESIDENTIAL)			
Water Usage				

Internal water usage limited to 105 litres person per day. (Excluding an allowance 5 litres per person per day for external water consumption). Calculations using the water efficiency calculator for new dwellings have been submitted.

J 1 _____

Subtotal

2. EN	IERGY USE AND POLLUTION	
2.1 N	leed for Cooling	Score
a.	How does the development incorporate cooling measures? Tick all that apply:	
	Energy efficient design incorporating specific heat demand to less than or equal to 15 kWh/sqm	6
	Reduce heat entering a building through providng/improving insulation and living roofs and walls	2
	Reduce heat entering a building through shading	√ 3
	Exposed thermal mass and high ceilings	√ 4
	Passive ventilation	✓ 3
	Mechanical ventilation with heat recovery	□ 1
	Active cooling systems, i.e. Air Conditioning Unit	0
2.2 H	eat Generation	
b.	How have the heating and cooling systems, with preference to the heating system hierarchy, been selected (defined in London Plan policy 5.6)? Tick all heating and cooling systems that will be used in the development:	
	Connection to existing heating or cooling networks powered by renewable energy	6
	Connection to existing heating or cooling networks powered by gas or electricity	
	Site wide CHP network powered by renewable energy	4
	Site wide CHP network powered by gas	🗌 3
	Communal heating and cooling powered by renewable energy	2
	Communal heating and cooling powered by gas or electricity	□ 1
	Individual heating and cooling	√ 0
2.3 P	ollution: Air, Noise and Light	
a.	Does the development plan to implement reduction strategies for dust emissions from construction sites?	J 2
b.	Does the development plan include a biomass boiler?	-
	If yes, please refer to the biomass guidelines for the Borough of Richmond, please see guidance for supplementary	
	information. If the proposed boiler is of a qualifying size, you may need to completed the information request form found	_
	on the Richmond website.	L] -
c.	Please tick only one option below	
	Has the development taken measures to reduce existing noise and enhance the existing soundscape of the site?	√ 3
	Has the development taken care to not create any new noise generation/transmission issues in its intended operation?	1
d.	Has the development taken measures to reduce light pollution impacts on character, residential amenity and biodiversity?	J 3
e.	Have you attached a Lighting Pollution Report?	- 🗆
		Subtotal 1
Pleas	se give any additional relevant comments to the Energy Use and Pollution Section below	
A Cor	nstruction Plan will be prepared, which will seek to reduce dust, noise and other disturbances to immediate neighbours.	

3. TRANSPORT

3.1 Provision for the safe efficient and sustainable movement of people and goods

a. Does your development provide opportunities for occupants to use innovative travel technologies?

Please explain:

b.	Does your development include charging point(s) for electric cars?	<u>ا</u> ک
C.	For major developments ONLY: Has a Transport Assessment been produced for your development based on TfL's Best Practice Guidance? If you have provided a Transport Assessment as part of your planning application, please tick here and move to Section 3 of this Checklist.	!
d.	For smaller developments ONLY: Have you provided a Transport Statement?	
e.	Does your development provide cycle storage? (Standard space requirements are set out in the the Council's Parking Standards - DM DPD Appendix 4) If so, for how many bicycles? Is this shown on the site plans?	र र र
f.	Will the development create or improve links with local and wider transport networks? If yes, please provide details.	
Please	e give any additional relevant comments to the Transport Section below	Subtota
Cycle	storage is provided.	

	BIODIVERSITY			
/ 1 M	inimising the threat to biodiversity from new buildings, lighting, hard surfacing and people			
4.1 IVI	Does your development involve the loss of an occological feature or babitat including a loss of	aardon or other ar	coon space? (Indicate if yes)	□_2
a.	If co. please state how much in cam?	garden of other gr	een space? (indicate il yes)	
	If so, please state now much in squi?			See DAS Sqiil
b	Does your development involve the removal of any tree(s)? (Indicate if yes)			
υ.	If so, has a tree report been provided in support of your application? (I	ndicate if ves)		
C.	Does your development plan to add (and not remove) any tree(s) on site? (Indicate if yes)			Ð
d.	Please indicate which features and/or habitats that your development will incorporate to improv	e on site biodivers	sitv:	
-	Pond, reedbed or extensive native planting	6 🗆	Area provided:	sqm
	An extensive areen roof	5 🗖	Area provided:	sam
	An intensive green roof	4 🗆	Area provided:	sam
	Garden space	<u>4</u>	Area provided:	sam
	Additional native and/or wildlife friendly planting to peripheral areas	3 🗆	Area provided:	sam
	Additional planting to peripheral areas	2 []	Area provided:	sam
	A living wall	2 []	Area provided:	sam
	Bat boxes	0.5 I		- 4
	Bird boxes	0.5 J		
	Other	0.5		
				Subtotal
Place	e give any additional relevant comments to the Biodiversity Section below			Custotal
5 5 1 Mitig	FLOODING AND DRAINAGE			
5 5.1 Mitiga	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough			
5 5.1 Mitig a.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes)			□-2 □ -2
5 5.1 Mitig a.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes)			□-2 ✓ -
5 5.1 Mitig a.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes)	k all that apply)		□-2 ☑ -
5 5.1 Mitiga a. b.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes) Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick Store rainwater for later use	k all that apply)		□-2 ☑ -
5 5.1 Mitig a. b.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes) Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick Store rainwater for later use Use of infiltration techniques such as porous surfacing materials to allow	k all that apply)	- 	□-2 ☑ - □ 5 ☑ 3
5 5.1 Mitiga a. b.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes) Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick Store rainwater for later use Use of infiltration techniques such as porous surfacing materials to allow Attenuate rainwater in ponds or open water features	k all that apply) ow drainage on-sit	ïe	□-2 √ - □ 5 √ 3 ↓ 4
5 5.1 Mitig a. b.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes) Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick Store rainwater for later use Use of infiltration techniques such as porous surfacing materials to allow Attenuate rainwater in ponds or open water features Store rainwater in tanks for gradual release to a watercourse	k all that apply) ow drainage on-sit		□-2 ☑ - □ 5 ☑ 3 □ 4 □ 3
5 5.1 Mitig a. b.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes) Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick Store rainwater for later use Use of infiltration techniques such as porous surfacing materials to allow Attenuate rainwater in ponds or open water features Store rainwater in tanks for gradual release to a watercourse Discharge rainwater directly to watercourse	k all that apply) ow drainage on-sit	ie	□-2 √ - 5 √ 3 1 4 3 2
5 5.1 Mitig a. b.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes) Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick Store rainwater for later use Use of infiltration techniques such as porous surfacing materials to allow Attenuate rainwater in ponds or open water features Store rainwater in tanks for gradual release to a watercourse Discharge rainwater to surface water drain	k all that apply) ow drainage on-sit	ie	□-2 √ - □ 5 √ 3 □ 4 □ 3 □ 2 □ 1
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5 5.1 Mitig a. b.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes) Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick Store rainwater for later use Use of infiltration techniques such as porous surfacing materials to allow Attenuate rainwater in ponds or open water features Store rainwater in tanks for gradual release to a watercourse Discharge rainwater to surface water drain Discharge rainwater to combined sewer	k all that apply) bw drainage on-sit	е	□-2 √ - □ 5 √ 3 □ 4 □ 3 □ 2 □ 1 √ 0
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5 5.1 Mitig a. b.	FLOODING AND DRAINAGE ating the risks of flooding and other impacts of climate change in the borough Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes) Have you submitted a Flood Risk Assessment? (Indicate if yes) Which of the following measures of the drainage hierarchy are incorporated onto your site? (ticl Store rainwater for later use Use of infiltration techniques such as porous surfacing materials to allow Attenuate rainwater in ponds or open water features Store rainwater in tanks for gradual release to a watercourse Discharge rainwater to surface water drain Discharge rainwater to combined sewer Please give the change in area of permeable surfacing which will result from your development Please provide details of the permeable surfacing below	k all that apply) ow drainage on-sit proposal: <i>plea</i> :	ie se represent a loss in permeable area as	□ -2 ☑ - □ 5 ☑ 3 □ 4 □ 3 □ 2 □ 1 ☑ 0 sqm a negative number Subtotal
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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]

	If so, what percentage of demolition waste will be reused in the new development?	20 %	
	What percentage of demolition waste will be recycled?	80 %	
b.	Does your site have any contaminated land?	<u> </u>	
	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	
6.2 Re	ducing 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	J 1	
	Use of water efficient A or B rated appliances	J 1	
	Rainwater harvesting for internal use		
	Greywater systems	□ 4	
	Fit a water meter	J 1	
		Subtotal	3
Please	e give any additional relevant comments to the Improving Resource Efficiency Section below		-

7		
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?	J 1
	If the standards are not met, in the space below, please provide details of the functionality of the internal space and layout	
	The standards of the SPD will be met.	
AND		
b.	If the development is residential, will it meet Building Regulation Requirement M4 (2) 'accessible and adaptable dwellings'?	✓ <u>2</u>
	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	V 1
	M4 (3) 'wheelchair user dwellings'?	
OR		
c.	If the development is non-residential, does it comply with requirements included in Richmond's Design for Maximum Access SPG	2
	Please provide details of the accessibility measures specified in the Maximum Access SPG that will be included in the	
	development	
		1
		Subtotal 4
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) Score Rating Significance Project strives to achieve highest standard in energy efficient sustainable development 80 or more A+ Makes a major contribution towards achieving sustainable development in Richmond 71-79 Α 51-70 Helps to significantly improve the Borough's stock of sustainable developments В 36-50 С Minimal effort to increase sustainability beyond general compliance 35 or less FAIL Does not comply with SPD Policy

LBRUT Sustainable Construction Checklist- Scoring Matrix for New Construction

Residential new-build

Score	Rating	Significance
81 or more	A++	Project strives to achieve highest standard in energy efficient sustainable development
64-80	A+	Project strives to achieve highest standard in energy efficient sustainable development
55-63	A	Makes a major contribution towards achieving sustainable development in Richmond
35-54	В	Helps to significantly improve the Borough's stock of sustainable developments
20-34	С	Minimal effort to increase sustainability beyond general compliance
19 or less	FAIL	Does not comply with SPD Policy

43

TOTAL

Authorisation:

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

Signature

Date