

Method Consulting

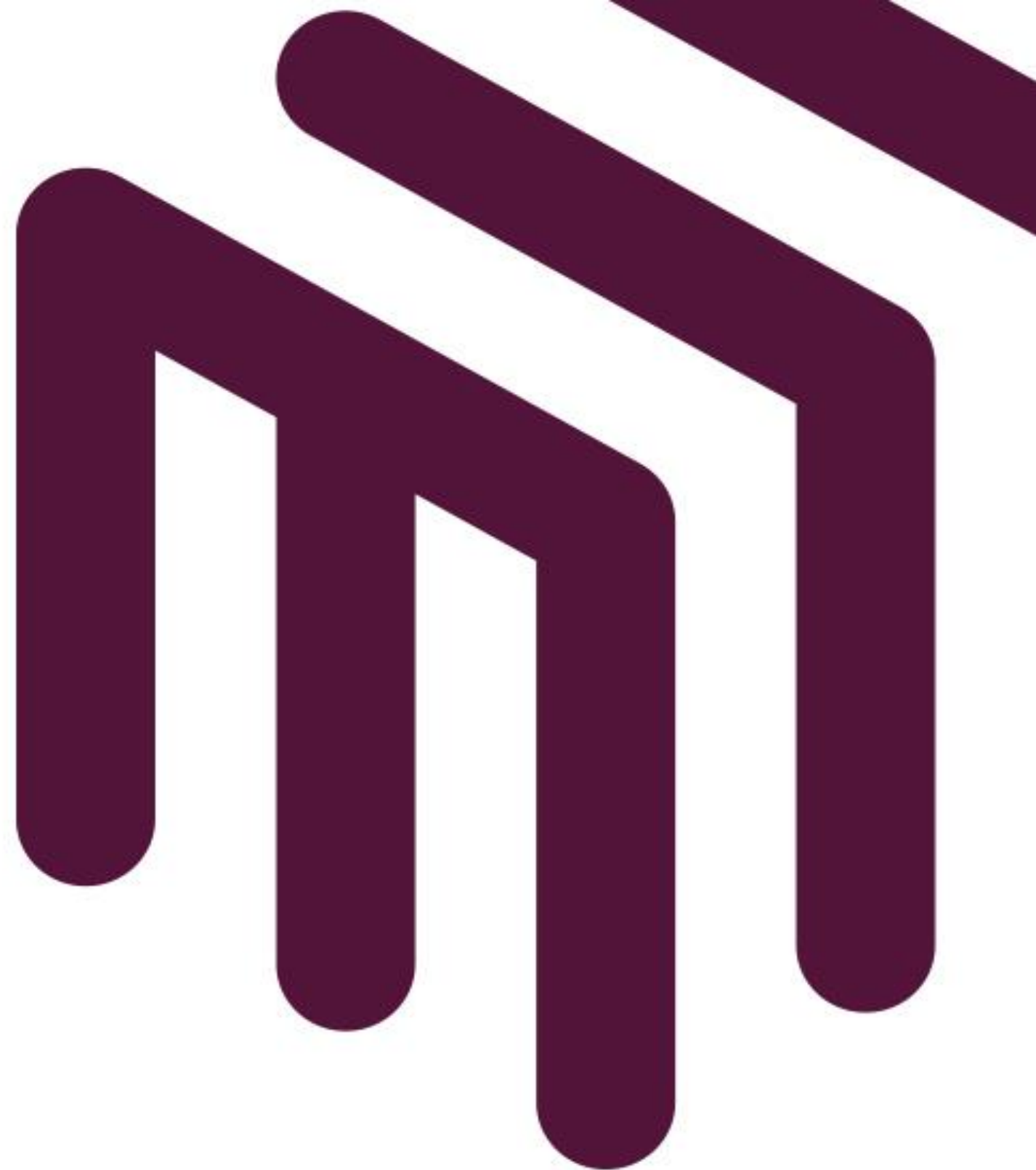
Intelligent engineering,
sustainable buildings

Kings Meadow View, Reading

Energy and Sustainability Statement

For Aberdeen Property Income Trust

April 2023



Document History

This document has been revised and issued as below:

Revision	Date	Description	Created by	Approved by
P01	05/04/2023	First Issue	RDM	RDM
P02	05/04/2023	Minor Amendments	RDM	RDM

Contents		
1	Executive Summary	
2	Introduction	
2.1	Background and Proposal	
2.2	Project Details	
2.3	Site Location	
2.4	Policy Context	
3	Energy Strategy	
3.1	Establishing Baseline CO ₂ Emissions	
3.2	Demand Reduction (Fabric Energy Efficiency)	
3.3	Heating Infrastructure (Decentralised Energy)	
3.4	Low and Zero Carbon Technologies for Energy Production (Be Green)	
3.5	LZC Options Summary	
3.6	Energy Strategy Summary	
4	Sustainability Statement	
4.1	Introduction	
4.2	Sustainable Transport	
4.3	Waste	
4.4	Energy / CO ₂	
4.5	Water	
4.6	Materials	
4.7	Health and Wellbeing	
4.8	Management	
4.9	Pollution	
4.10	Ecology	
4.11	Summary	15
5	Conclusion	15
	Appendix A – Carbon Summary	16
	Appendix B – Sustainability Checklist - Residential	17
	Appendix C – Sustainability Checklist - Commercial	18
	Appendix D – Supporting Energy Calculations	19
	Figure 1: Summary of Regulated CO ₂ Emissions	1
	Figure 2: Site Location Plan	2
	Figure 3: Proposed Site Layout (Squire & Partners).	4
	Figure 4: Summary of Regulated CO ₂ Emission Savings	12
	Table 1: U-values for typical building elements	5
	Table 2: Domestic Energy Efficiency Stage summary table.....	6
	Table 3: U-values for typical building elements	6
	Table 4: Non-Domestic Energy Efficiency Stage summary table.....	6
	Table 5: Sitewide Energy Efficiency Stage summary table	7
	Table 6: Sitewide Heating Infrastructure Stage summary table.....	8
	Table 7: Simple cost and payback calculation for PV based on 30p/kWh of electricity	9
	Table 8: Sitewide energy strategy summary table as required by Reading Borough Council	11

1 Executive Summary

Method Consulting LLP has been appointed to produce an Energy and Sustainability Statement as part of the Outline Planning Application for the proposed redevelopment of the Forbury Retail Park site in Reading, to be known as Kings Meadow View.

The development is for comprehensive redevelopment of the Forbury Retail Park, comprising a residential-led mixed use scheme of up to 820 units (Class C3) and up to 5,500 sqm of commercial uses (Class E) together with ancillary and associated development including new and enhanced pedestrian routes and vehicle access routes, open spaces, hard and soft landscaping, undercroft car parking providing up to 200 car parking spaces, up to 860 cycle parking spaces and servicing facilities, and associated works, with details of layout, scale, external appearance and landscaping reserved.

This report outlines the sustainable features to be incorporated into the design of the buildings that will be delivered at the reserved matters stage, to improve their overall environmental performance through both good building design and the implementation of renewable technologies. This report is written with particular reference to the Reading Borough Local Plan, and the supporting Sustainable Design and Construction SPD.

Reading's Local Plan Policy H5 sets a target for all new major residential developments to achieve zero carbon, providing a minimum 35% reduction in regulated CO₂ emissions on-site, and making up for any shortfall to zero carbon through a Carbon Offset Payment via a Section 106 agreement. Policies CC2, CC3, CC4, CC5, and EN18 also set out the sustainable design standards that are required to be implemented in new developments, and are detailed within this report.

The key findings of this report are associated with Policy H5, relating to CO₂ emissions and energy demand.

1.1.1 Policy H5 – Standards for New Housing

The development proposes to achieve a 50% reduction in regulated CO₂ emissions on site via use of a communal heating scheme, served by electric heat pumps. This is supplemented by an ~1850sqm array of solar panels situated across the roof areas of the development. A summary of the anticipated CO₂ emissions at each stage of the Energy Hierarchy is shown in Figure 1.

Approximately 426.9 tonnes of regulated CO₂ require offsetting after all on-site measures. This equates to an indicative Carbon Offset Payment of £763,920 at this stage of the design. It is likely that this figure will change once a reserved matters are submitted for approval.

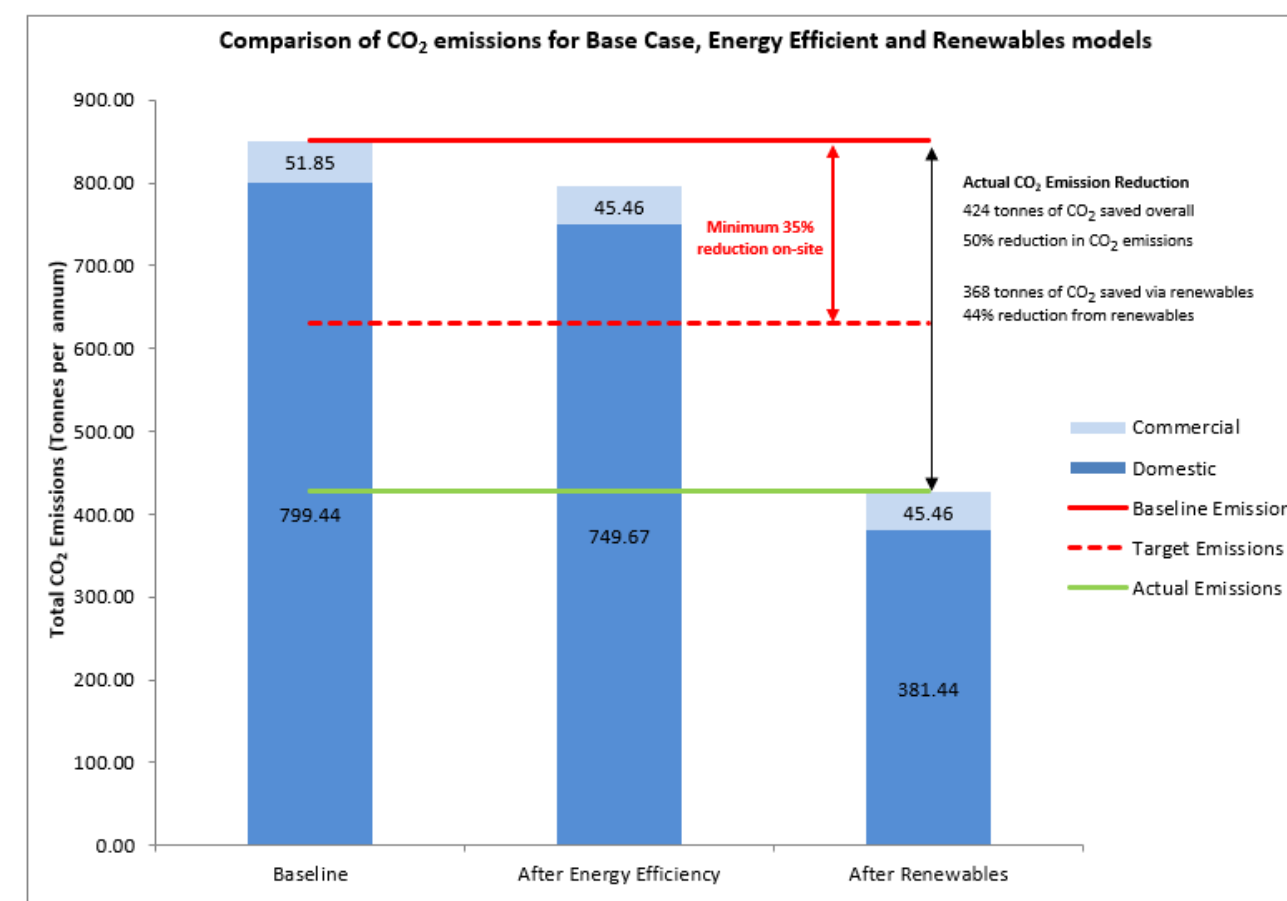


Figure 1: Summary of Regulated CO₂ Emissions

2 Introduction

2.1 Background and Proposal

Method Consulting LLP has been appointed to produce an Energy Demand Assessment and Sustainability Statement as part of the Planning Application for the proposed redevelopment of Forbury Retail Park, Reading.

This report outlines the sustainable features to be incorporated into the design of the building to improve the overall environmental performance through both good building design and the implementation of renewable technologies. This report is written with particular reference to the Reading Borough Council Local Plan, and specifically covers Policies H5, and Policies CC2 through CC5.

2.2 Project Details

The development is for comprehensive redevelopment of the Forbury Retail Park, comprising a residential-led mixed use scheme of up to 820 units (Class C3) and up to 5,500 sqm of commercial uses (Class E) together with ancillary and associated development including new and enhanced pedestrian routes and vehicle access routes, open spaces, hard and soft landscaping, undercroft car parking providing up to 200 car parking spaces, up to 860 cycle parking spaces and servicing facilities, and associated works, with details of layout, scale, external appearance and landscaping reserved.

2.3 Site Location

The proposed development site is situated off of the Forbury Road/Kenavon Drive junction, opposite the Huntley Wharf development and across from the Forbury Gardens public park and Reading prison. The site is located within close proximity to the Reading train station.

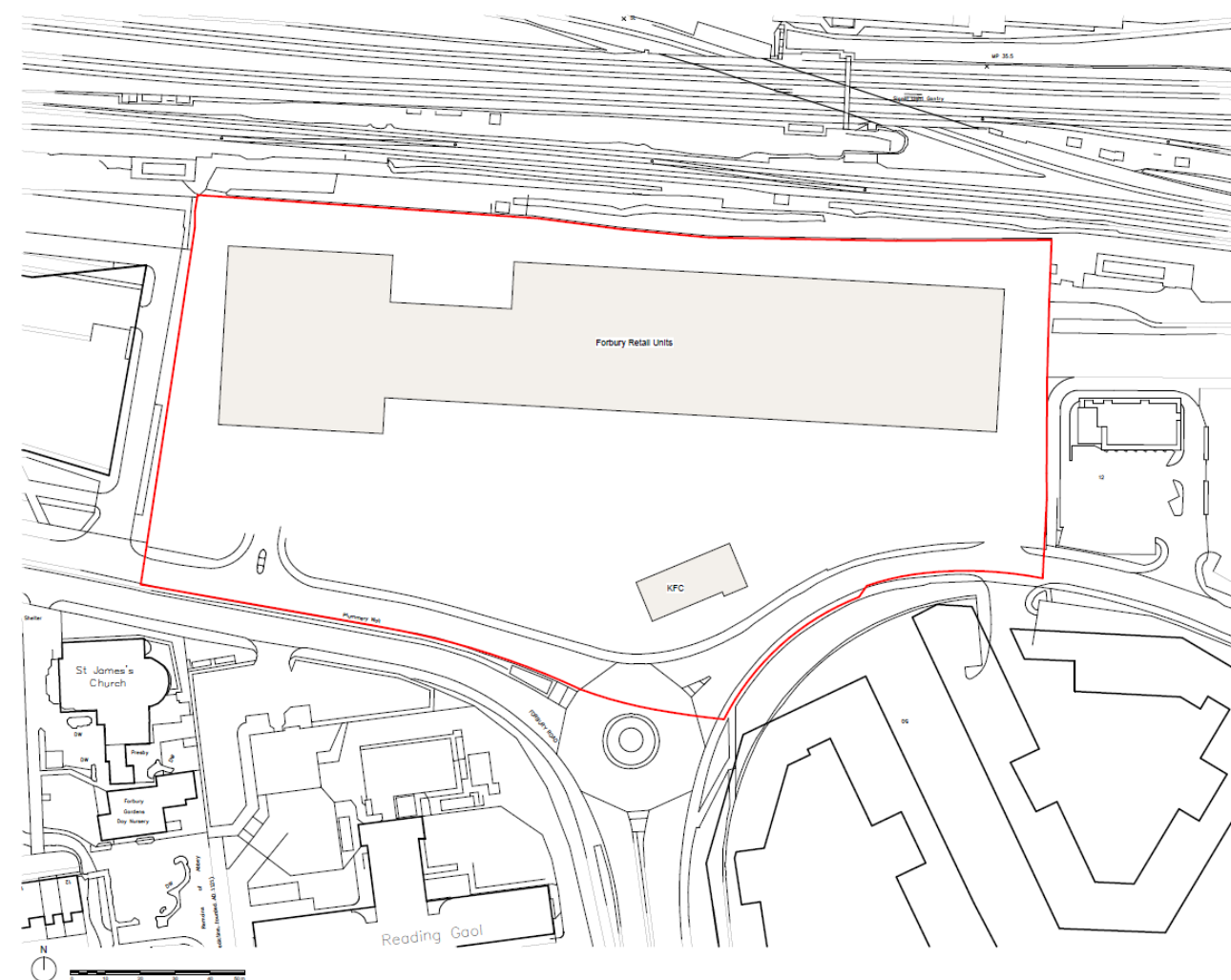


Figure 2: Site Location Plan

2.4 Policy Context

2.4.1 National Policy - NPPF

The National Planning Policy Framework (NPPF) was published on 27 March 2012 with updates in June 2019 and more recently, July 2021. This document sets the overarching policies for development in England and states that:

‘So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development.’ (NPPF, 2021). Paragraph 11 states, ‘... promote a sustainable pattern of development that seeks to: meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change (including by making effective use of land in urban areas) and adapt to its effects’.

The NPPF also references the 17 UN Sustainable Development Goals, which are illustrated below:



Key points within the NPPF of relevance and which have therefore been considered as part of this proposal are:

- Promoting sustainable transport;
- Making effective use of land;
- Achieving well-designed places;
- Meeting the challenge of climate change and flooding;
- Conserving and enhancing the natural environment.

2.4.2 Local Policy – Reading Borough Local Plan

The adopted Reading Borough Local Plan (November 2019) sets out clear standards and targets, with several of the policies specifically relating to energy and sustainability. Those policies relevant to this report are as below:

- **CC1 - Presumption in Favour of Sustainable Development:** This policy requires that planning decisions are taken in line with the Government's presumption in favour of sustainable development as articulated in the NPPF.
- **CC2 - Sustainable Design and Construction:** This policy seeks improved sustainability performance of buildings by setting out BREEAM requirements for non-residential developments conversions to residential. It also sets out the general principles of sustainability in new development that applies to both residential and non-residential uses.

- **CC3 - Adaptation to Climate Change:** This identifies measures including building orientation, shading, heating, ventilation, green or brown roofs and walls, planting and surface water run-off to deal with the effects of climate change.
- **CC4 - Decentralised Energy:** This policy requires developers to consider inclusion of decentralised energy infrastructure, increasing the amount of decentralised energy provision in the Borough.
- **CC5 - Waste Minimisation and Storage:** This policy requires developers to identify measures to minimise the generation of waste and to handle waste appropriately during the lifetime of a development.
- **CC9 - Securing Infrastructure:** This policy ensures that development proposals mitigate all relevant impacts on local infrastructure in order to ensure that they are sustainable.
- **EN16 - Pollution and Water Resources:** This policy seeks to prevent harmful development and mitigate the impacts of potentially polluting developments.
- **EN18 - Flooding and Drainage:** This policy directs development away from areas that are liable to flood. In areas of lower risk, development may move forward if it passes the exception test in the NPPF. It also requires major developments to incorporate Sustainable Drainage Systems (SuDS).
- **H5 - Standards for New Housing:** This policy outlines standards for new-build housing, including those for sustainable design and construction. All new-build housing must be built to the higher water efficiency standard under the Building Regulations. All major new-build residential should achieve zero carbon homes and all other new-build housing must achieve a minimum 19% improvement over the 2013 Building Regulations target.

2.4.3 Local Policy – Sustainable Design and Construction SPD

The Sustainable Design and Construction SPD sets out specific requirements to be adhered to by proposed developments, and also includes the Reading Sustainable Design Checklists for domestic and non-domestic developments. The SPD is broken down into five sections pertinent to this report:

- Energy Efficiency
- Climate Change Adaptation
- Water Management
- Waste Reduction
- Decentralised Energy and District Heating

3 Energy Strategy

In line with Policy H5, the proposed development is seeking to reduce carbon emissions by promoting the 'energy hierarchy' as follows:

- Prioritise being LEAN – use less energy, in particular by the use of sustainable design and construction measures
- Then CLEAN – supply energy efficiently and give priority to decentralised energy supply, and
- Then GREEN – use renewable energy

A detailed description of how these principles have been applied to the project can be found in the following sections of this report.

Policy H5 requires that for Major developments (greater than 10 dwellings), Zero Carbon is achieved by the proposed development. Alternatively, where this is not feasible on site, at least a 35% reduction in the Dwelling Emission Rate (averaged across the development) over the Target Emission Rate as set out in the Building Regulations. The remaining shortfall to Zero Carbon is then to be made up by means of a Carbon Offset scheme.

The planning policy states that developments shall use Building Regulations Part L 2013 in order to establish CO₂ emissions, and then amend the results using SAP 10 carbon factors. Section 3.34 of the Sustainable Design and Construction SPD (2019) states that reporting unaltered Part L 2013 results is no longer required, as this has since been superseded by Part L 2021, so only the SAP 10 results are shown in this report for the purposes of complying with planning policy.

The carbon factors for gas and electricity are reported below:

Fuel/Energy Source	Carbon Factor (Part L 2013) kgCO ₂ /kWh	Carbon Factor (SAP 10) kgCO ₂ /kWh	Carbon Factor (Part L 2021) kgCO ₂ /kWh
Natural Gas	0.216	0.210	0.210
Grid Electricity	0.519	0.233	0.136

In order to provide a comprehensive picture of predicted emissions, Part L 2021 results will also be provided at the end of this report to demonstrate performance against the latest Building Regulations.

3.1 Establishing Baseline CO₂ Emissions

As this is an outline planning application, full modelling has not yet been undertaken as the design is not in a position to enable meaningful results to be extracted from SAP and IES modelling. Instead, figures are based on similar higher density schemes that the design team has experience working on, to provide an indicative baseline and potential for energy demand and CO₂ emissions.

In this instance, values are extrapolated from sample of representative dwellings that had been previously modelled by Method, using approved SAP software (Stroma FSAP 2012, version 1.0.5.60 for Part L 2013, and Stroma SAP 10 version 1.0.78 for Part L 2021). These calculations have only been used to provide an insight into potential carbon and energy figures, and will need further examination at the reserved matters stage. In this case, the representative dwellings were all from a similarly high density scenario, with all dwellings being single-storey apartments.

The commercial and communal spaces within the development have also not been fully assessed, but instead a representative set of figures has been used utilising performance standards of similar schemes using the IES Virtual Environment modelling suite.



Figure 3: Proposed Site Layout (Squire & Partners).

3.2 Demand Reduction (Fabric Energy Efficiency)

3.2.1 Domestic Demand Reduction

In order to ensure that the sustainable aspirations of the development are met, the design team are aiming to exceed the fabric standards of the Notional Building as detailed in Part L 2021. This will also enable compliance with the minimum fabric performance standards of Part L1 of the Building Regulations 2021. For the purposes of establishing potential CO₂ reductions, the target U-values used within this report are listed in Table 1:

Element	Limiting 2021 U-value (W/m ² /K)	Notional 2021 U-value (W/m ² /K)	Target U-value (W/m ² /K)
Ground Floor	0.18	0.13	0.12
Exposed Floor (Above Commercial)	0.18	0.13	0.12
Walls	0.26	0.18	0.15
Party Walls	0.20	0.00	0.00
Flat Roof	0.16	0.11	0.12
Windows	1.60	1.20	1.20
Doors	1.60	1.00	1.60
	Limiting m ³ /h/m ²	Notional m ³ /h/m ²	Target m ³ /h/m ²
Air Permeability	8	5	3

Table 1: U-values for typical building elements

In addition to the incorporation of improved U-values, the development proposes to minimise thermal bridges where possible.

Thermal bridging plays a significant role in Part L 2021, requiring construction details to address thermal bridges and minimise heat loss. Under previous Building Regulations, it was possible to pass the Fabric Energy Efficiency requirements without much detail on thermal bridging. However, under Part L 2021, the requirements are far more stringent, and it is vital that designs account for this increased level of detailing needed.

The development proposes to examine junctions that typically have high heat losses, such as window lintels and jambs, separating floors between dwellings, and any balconies. Where possible, Enhanced Construction Details are recommended to be incorporated.

Reasonable assumptions regarding thermal bridging have been made for the purposes of these calculations, but this will need to be examined in more detail at a later stage.

This stage is also where passive design measures will be considered in order to reduce energy demand, and in order to provide resilience against climate change.

Thermal mass of the building is being considered, along with orientation of each block, opportunities for maximising winter solar gains whilst reducing the risk of overheating in the summer, and access to natural daylighting. Each of these measures will help to subsequently reduce heating demand, and reliance on artificial lighting.

3.2.2 Domestic System Description (Building Services)

All homes are proposed to be ventilated using System 4 ventilation, utilising high-efficiency MHVR systems to maintain ventilation rates and aid in maintaining thermal comfort, alongside openable windows for purge ventilation.

For the Be Lean case, heating and domestic hot water is assumed to be provided by a communal heating scheme, fed by an 89.5% efficient gas-fired boiler system located in a central plant area. This system is assumed in order to establish CO₂ and energy savings resulting from the building fabric and effective systems, before considering savings from low carbon technologies. The efficiency of the heating system is chosen in order to match that of the notional dwelling.

Lighting in all spaces is assumed to be 100% low energy fittings.

3.2.3 Domestic Demand Reduction Results

As a result of the above energy-efficient measures and building elements, the development is anticipated to achieve a reduction in both energy demand and carbon emissions over the notional building, when using the Reading Local Plan methodology for calculating carbon.

Supporting SAP calculations are provided to demonstrate a reduction in energy demand as a result of energy efficiency measures based on a typical layout.

Table 2 summarises the anticipated energy savings based on extrapolated figures when using the methodology detailed in the Sustainable Design and Construction SPD.

Domestic	Energy demand (kWh pa)	Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on baseline CO ₂ emissions (%)
Baseline (TER)	3,775,511		799,441	
After Energy Efficiency (DER)	3,213,350	15%	749,673	6%
Total savings on baseline emissions			49,768	6%

Table 2: Domestic Energy Efficiency Stage summary table

3.2.4 Non-Domestic Demand Reduction

As the proposed development also includes non-domestic aspects, these will also be assessed for their energy demand and associated carbon emissions. This will also ensure compliance with Part L2 of the Building Regulations 2021. The target U-values for the project are listed in Table 3:

Element	Limiting 2021 U-value (W/m ² /K)	Notional 2021 U-value (W/m ² /K)	Target U-value (W/m ² /K)
Ground Floor	0.18	0.22	0.12
External Walls	0.26	0.26	0.15
Roof	0.18	0.18	0.18
Windows & glazed doors	1.60	1.40	1.20
Personnel Doors	1.60	1.90	N/A
	Limiting m³/h/m²	Notional m³/h/m²	Target m³/h/m²
Air Permeability	8	3	3

Table 3: U-values for typical building elements

3.2.5 Non-Domestic System Description (Building Services)

The system and lighting specification for the development is shown in the tables below. Note that this specification is only for establishing the Be Lean demand, and is not representative of the final design. Commercial spaces are to be provided under Class E use, which covers a range of potential end-uses. For the purposes of calculating estimated energy consumption, the units have been assumed as retail spaces and restaurants/cafes, though the final end use remains to be confirmed.

The assumed services for these spaces are detailed below:

- Communal Spaces: heating via ASHPs, comfort cooling, mechanical ventilation with heat recovery
- Commercial Spaces: Shell and Core, with tenant fit out. Assumed ASHP for heating, MVHR for ventilation, comfort cooling, and electric point of use domestic hot water, except in assumed restaurant space which generates hot water via ASHPs.
- All: Low energy lighting throughout
- COPs/efficiencies to be confirmed, but assumed SCOPs of 3.2 for space heating and hot water, with SEERs of 5.7 for comfort cooling

3.2.6 Non-Domestic Demand Reduction Results

Using SAP 10 carbon factors as required in the Sustainable Design and Construction SPD results in a notable energy saving through use of good building fabric and efficient systems.

Table 4 shows the impact of the demand reduction measures for the non-domestic spaces.

Non-Domestic	Energy demand (kWh pa)	Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on baseline CO ₂ emissions (%)
Baseline (TER)	283,875		51,853	
After Energy Efficiency (BER)	214,875	24%	45,455	12%
Total savings on baseline emissions			6,398	12%

Table 4: Non-Domestic Energy Efficiency Stage summary table

3.2.7 Sitewide Demand Reduction Results

Table 5 shows the anticipated results when the domestic and non-domestic elements of the development are combined. Overall, a 6.6% reduction in regulated CO₂ emissions are anticipated at the Demand Reduction stage of the energy hierarchy.

Sitewide	Energy demand (kWh pa)	Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on baseline CO ₂ emissions (%)
Baseline (TER)	4,059,386		851,294	
After Energy Efficiency (DER)	3,428,225	15.5%	795,129	6.6%
Total savings on baseline emissions			56,165	6.6%

Table 5: Sitewide Energy Efficiency Stage summary table

3.3 Heating Infrastructure (Decentralised Energy)

Policy CC4 of the Local Plan states that developments of more than 20 dwellings, or non-residential development of over 1,000 sqm, should consider the use of decentralised energy provision within the site. There is also an expectation that major developments should connect to an existing district energy network, where one is present within the vicinity of the site, unless this is demonstrated not to be feasible.

3.3.1 Connection to Existing Heat Distribution Networks

Feasibility study – aware of, fully support – mention Figure 8.1 of SPD

At present, no existing district heat networks are within a reasonable proximity to the site, although the Sustainable Design and Construction SPD specifically highlights the Forbury Retail Park and surround area as an opportunity area for district heating. As a result of this, and in line with the requirements for provision of on-site communal heating strategies, the proposed Kings Meadow View development intends to use a site-wide communal heating scheme. The feasibility of later connecting this on-site network to a district heating network will also be explored at a later date.

3.3.2 Local Heat Network

The proposed development is situated in a position which enables consideration of a wide range of communal heating options. Reading Borough Council have employed AECOM to review the feasibility of future heat networks in the local area around the site, to which Method have provided information regarding potential heating loads and energy demands from the redevelopment of Forbury Retail Park. Whilst it is not known if a district heat network will be in place at the time the development would be constructed, it is the intention of the design to allow connection to such a network if the heating source is available at the time.

If such a network is not available, then alternative communal heating solutions will be further explored.

Close proximity to the River Kennet has also opened up opportunity to extract heat from the river, which has prompted investigations into the suitability of using this heat within the development.

Communal Air Source Heat Pumps are a likely candidate for provision of low carbon heating and hot water, and associated building plant can be located atop the roofs of individual blocks, in order to limit aesthetic and acoustic impacts on the site.

Under the latest Building Regulations, the very low carbon factor of grid electricity (136gCO₂/kWh) has resulted in heat pumps being a highly favourable solution for heating and hot water. For the purposes of this report, the carbon factor of 0.233gCO₂/kWh is used. As an example, a communal heating scheme with a conservative seasonal coefficient of performance (sCOP) of 2.09 should be capable of delivering a ~43% reduction in regulated CO₂ emissions before any provision for PV (when using the Sustainable Design and Construction SPD methodology).

3.3.3 Decentralised Energy Results Summary

Whilst a final heating and domestic hot water system has not been chosen at the time of submitting this outline application, it is likely that the development will seek to incorporate high-efficiency heat pumps in order to supply low carbon heating and hot water. As Air Source Heat Pumps typically achieve the lowest coefficient of performance out of all types of heat pump, a conservative estimate of a ~43% reduction in regulated CO₂ emissions over the baseline is anticipated at this stage in the design.

Sitewide	Energy demand (kWh pa)	Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on baseline CO ₂ emissions (%)
Baseline (TER)	4,059,386		851,294	
After Energy Efficiency (DER)	3,428,225	15%	795,129	6%
After Heating Infrastructure (Heat Pumps)	3,428,225	N/A	484,995	37%
Total savings on baseline emissions			366,299	43%

Table 6: Sitewide Heating Infrastructure Stage summary table

3.4 Low and Zero Carbon Technologies for Energy Production (Be Green)

Whilst provision of renewable energy technologies is not a requirement of the Reading Local Plan, it is required that developments review the feasibility of a range of technologies in order to determine those which are suitable, and those which are not appropriate for the site. Below is a summary of proposed technologies, followed by a breakdown of technologies that have been deemed to be inappropriate to the scheme.

3.4.1 Proposed Technology: Communal Heat Pumps

A heat pump uses the same ‘vapour compression’ technology that is used in a domestic refrigerator, but the cycle can be reversed to provide both heating and cooling to internal spaces. A heat pump uses electricity to transfer heat from one source to another rather than actually generating energy, with most of the energy coming from the ambient ground or water to which it is connected. The coefficient of performance (COP) is the ratio of the heat output to the electricity input. With most modern equipment the Seasonal COP will typically range from 3 to 5, i.e. for 1 kW of electrical input up to 5 kW of heating or cooling can be achieved.

Heat pumps are characterised depending on the source of the heat and the sink used for the heat. In the heating mode, energy can be extracted from the air, water or from the ground and delivered to the space via fan powered air supply or a water circuit (such as underfloor heating or radiators). It should be noted that high COPs are generally only obtained when the flow

temperature of the heating circuit to the building is relatively low, so they are often used with underfloor heating.

Suitability of heat pumps for the proposed development

An investigation into the suitability of various types of heat pumps has been undertaken as part of this outline planning application, and has been used to help inform potential options for the site.

Water Source Heat Pumps (WSHPs)

Due to the close proximity of the River Kennet, there is potential for extracting heat from the river in order to provide a fairly consistent base temperature for a heat pump system. Relative to an air source heat pump, the temperature of the river will generally fluctuate less than that of air, so there is potential for this to provide a lower average temperature delta between the water extracted from the river, and the hot water being pumped around the site. This in turn increases the seasonal coefficient of performance, and should be able to provide higher carbon emission savings than an air source heat pump alternative.

However, extracting water from a river has a host of environmental implications, such as consideration of wildlife disturbance, reducing water temperature below acceptable levels through extracting heat in the winter, and an ongoing maintenance concern. A further study of the thermal mass and thermal capacity of the river will need to be undertaken at a later stage in the design, along with the spatial requirements of the relevant building plant.

Use of water source heat pumps is a more novel solution, with limited suppliers and warranted equipment compared to more mainstream heating options.

There are still therefore some challenges still to overcome in order to assess the feasibility of using water-source heat pumps in this development.

Ground Source Heat Pumps (GSHPs)

An investigation into the viability of ground source heat pumps has been undertaken, as these systems typically provide the highest efficiencies of any heat pump system during winter months. This is due to the more consistent temperature of the ground, which at a depth of around 100m (the typical depth of a GSHP borehole) does not generally fluctuate beyond 10°C all year round, regardless of surface conditions. This provides an excellent base load during winter, but can result in a higher temperature delta in the summer, where domestic hot water demand is still present.

In order to establish viability for the development, geophysical surveys and detailed heat loss calculations will be required during next phase of design.

Air Source Heat Pumps (ASHPs)

A further option for meeting the development's space heating and domestic hot water demands comes in the form of air source heat pumps. This is an option that is tried and tested, is known to be feasible for meeting heating and hot water demands, and is a technology which is commonly available with well-established support networks.

These would typically be located at roof level for each block (or shared between blocks) in order to reduce the acoustic impact of the condensers on surrounding developments. Rooftop plant also reduces the amount of space required at ground level, opening up opportunities for increased amenity space, larger commercial spaces, or provision of additional dwellings at lower levels.

Whilst the sCOP of ASHPs tends to be lower than water- or ground-source alternatives, they are a proven technology capable of providing significant carbon savings. A typical heating and hot water heat pump may achieve an sCOP of between 2.5-3.5, depending on the temperature of delivered heat, which should allow the development to achieve a significant reduction in regulated CO₂ emissions respectively.

3.4.2 Proposed Technology: Photovoltaics

Solar energy can be converted to electricity using the photo-electric effect. Simply, Photo Voltaic (PV) cells use the energy from the sun to induce a current in a circuit. The cells are encapsulated between a sheet of toughened glass at the front and a moisture sealing membrane on the back to make them weatherproof.



In the UK PV panels are usually installed on roofs of buildings. The optimum position is facing south with a tilt angle of around 30°. PV cells can be purchased in the form of Building Integrated PV (BIPV) products such as roof tiles and glazing products. PV is potentially the easiest of all renewable energy technologies to embed into the built environment.

3.4.3 Suitability of Photovoltaics for the Proposed Development

As the development is spread over a relatively large footprint, despite the density of the development and provision of private roof-level terrace spaces, there is significant space available for PV panels. It is estimated at this stage that approximately 1,850sqm of PV could be accommodated across the elevated roof spaces which are not being used as private terraces or dedicated green roofs, already factoring in access and potential overshadowing between panels.

This equates to approximately 289 kWp of PV, based on 1 kWp per 6.4sqm of roof space as a standard rule of thumb. Using SAP guidance to estimate PV energy generation, approximately 863 kWh per 1 kWp of PV is anticipated to be generated per annum, giving a total estimated energy generation of 249,400 kWh/year.

The carbon savings from this energy generation are significant, saving around 58,100 kgCO₂/year. The breakdown of the output from the PV array, plus payback period, are detailed in Table 7.

Area of PV	Estimated Capital Cost	Annual energy generated (kWh)	Annual Carbon savings (kg)	Annual cost saving	Simple Payback (years)
1850m ²	£290,000.00	249,400	58,100	£75,000	4

Table 7: Simple cost and payback calculation for PV based on 30p/kWh of electricity

3.4.4 Discounted Technologies

The following low and zero carbon technologies have been reviewed, but discounted from inclusion within the site due to feasibility constraints.

3.4.5 Combined Heat and Power (CHP)

Combined Heat and Power (CHP) machines are in effect mini power stations. When a power station burns gas, coal or oil to generate electricity, large amounts of heat is given off as a by-product. Large power stations waste this heat (via large cooling towers – it is simply emitted to atmosphere). A CHP unit aims to make use of this waste heat by putting it into a hot water cylinder or heating system when it generates electricity. The electricity can either be used within the building or sold back to the national grid if output exceeds demand.



A 5.5kWe output and 12.5t CHP Machine

The sizing of a CHP unit is complex and requires accurate analysis of the likely thermal and electrical loads within a building. As a guide, a CHP unit will also be financially viable if it can usefully run for more than 4,500 hours per year.

3.4.6 Suitability of CHP for the Proposed Development

CHP is typically identified as being viable in large scale developments such as the Kings Meadow View development. CHP typically has a high capital cost, and increased maintenance requirements when compared with a traditional communal gas boiler, though when spread between many dwellings, each occupant will likely only see a negligible increase in costs, or none at all.

As a CHP uses waste heat to provide low-carbon electricity, it is possible to demonstrate a significant reduction in primary energy demand against an equivalent gas scheme. However, under the new Building Regulations, grid electricity has a much lower carbon factor associated with it, resulting in a gas-fired CHP emitting more CO₂ than a direct electric, or even all-gas alternative. CHPs are therefore generally no longer thought of as being low-carbon, but rather provide a means to reduce primary energy consumption.

Due to their relatively poor performance under the new Building Regulations, site-bound CHP engines are not proposed for this development.

3.4.7 Solar Hot Water Heating

There are two common types of solar collector that are used to provide hot water and space heating in domestic and commercial situations: flat plate collectors and evacuated tube collectors.

In flat plate collectors, the working fluid (typically a water/glycol mixture) is directly heated as it circulates through pipework within the collector. The absorber plate and associated pipe work usually sits below a glass cover within a heavily insulated enclosure to reduce heat loss.



Evacuated tube collectors increase the efficiency of the system by enclosing the absorber plate in a near vacuum. This dramatically reduces the heat loss by convection from the absorber surface. The fabrication of the glass tube is expensive and leads to a collector that will perform better, but at higher cost. Flat plate collectors are generally used on residential buildings and evacuated tube collectors on larger commercial buildings.

3.4.8 Suitability of Solar Hot Water Heating for the Proposed Development

Solar hot water has been discounted from the development due to the general incompatibility with a communal heating and hot water system such as the one proposed. Roof space is also

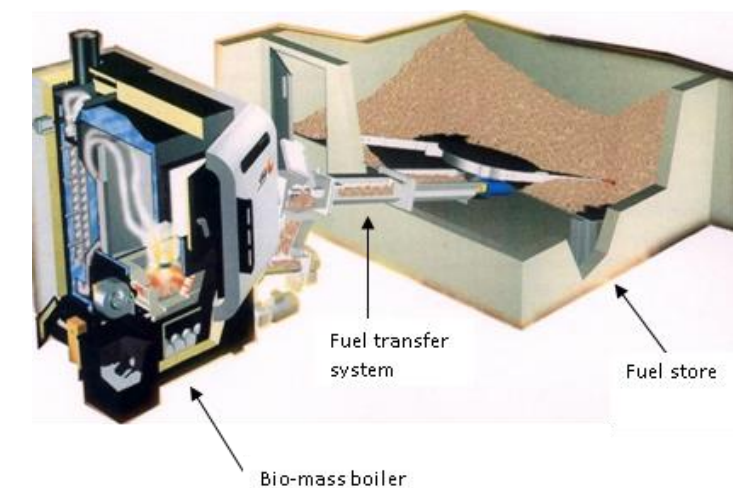
already allocated to standard PV panels, so this option is not suitable or viable for the proposed development.

3.4.9 Biomass Heating

Biomass refers to burning natural, vegetative matter to produce heat. This heat can be used both to temper the building, and to meet the hot water requirements. The fuel used for the boiler is typically wood, which comes in the form of either chips or pellets. The CO₂ released when burning this matter is equivalent to the CO₂ the trees have absorbed in their lifetime. Thus, the whole process becomes almost carbon neutral. The only additional emissions will be from processing and transportation of the fuel to the site.

Biomass, like any solid fuel, requires storage on site, and to minimise the frequency of deliveries, significant space needs to be allowed for storage of fuel on site and associated access for delivery. Wood pellets have a higher energy density and more consistent size, shape and moisture content so are better suited to smaller boiler installations and where fuel delivery access is restricted.

Currently the cost of woodchips is slightly cheaper than the cost of natural gas, whereas the cost of wood pellets is similar to that of oil. However, the price of natural gas and oil has been very volatile in recent years and for many customers has significantly increased in price due to the global energy crisis. In contrast the price of wood fuel has been much more stable, and it is thought that this is likely to remain the case in the medium to long term.



3.4.10 Suitability of Biomass for the Proposed Development

The key limitations for biomass are the spatial constraints for fuel storage and delivery, along with the negative effect on local air quality. Biomass boilers also have significantly higher

maintenance requirements, and result in an increase in transport-based emissions arising from the processing and delivery of the fuel pellets. Furthermore, biomass boilers are a combustion-based heating source, which would produce unwanted emissions from the site.

As a result of these issues, the use of biomass has been discounted.

3.4.11 Wind Turbines

Wind turbines use energy from the wind to produce electricity. This electricity can be used on site or sold back to the national grid. The suitability of installing wind turbines is largely dependent on local wind speeds. Accurately estimating the energy available from wind at a specific site is a complex task and requires knowledge of the long-term wind speeds at height, taking into account climatic variations, the effect of topographical features and ground friction factors. Average wind speeds of 7 m/s or above are required for large scale wind turbines, although average speeds in the region of 4-6m/s can be sufficient to make smaller turbines viable.



Turbines are rated by the power generated at a specific wind speed. At very low wind speeds turbines do not operate. When they reach their critical cut-in wind speed they generate at a lower level than the rating, and finally once the rated wind speed is reached the turbine is designed to maintain a fairly constant power output. As a turbine is not generating all of the time, and sometimes at part load, a good approximation of annual output is 20-30% of that expected if the turbine was operating continuously at its rated level throughout the year. This percentage is known as the capacity factor.

3.4.12 Suitability of Wind Turbines for the Proposed Development

Initial investigation into the suitability of wind turbines on this development indicate that due to the height of several cores, wind turbines would not be a suitable option for the site. Spatial limitations, along with noise and aesthetic issues, result in wind turbines being unviable for the site. The dense urban location has an impact on wind generation, and as a result eliminates the financial viability of such a technology.

3.5 LZC Options Summary

The most appropriate low or zero carbon technologies for this development are thought to be the use of communal heat pumps, paired with solar photovoltaics (PV). This would appear to be the most suitable method of achieving compliance with the minimum 35% carbon reduction

requirement on site, as detailed in Policy H5. Any remaining CO₂ emissions are to be offset via a Carbon Offset Payment.

3.6 Energy Strategy Summary

Table 8 summarises the energy and carbon savings that could be achieved by applying the energy strategy outlined above and demonstrates compliance with the Reading Borough Council Sustainable Design and Construction SPD.

Sitewide	Energy demand (kWh pa)	Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on baseline CO ₂ emissions (%)
Baseline (TER)	4,059,386		851,294	
After Energy Efficiency (DER)	3,428,225	15%	795,129	6%
After Heating Infrastructure (Heat Pumps)	3,428,225	N/A	484,995	37%
After Renewables (Roof Mounted PV)	3,428,225	N/A	426,895	7%
Total savings on baseline emissions			424,399	50%

Table 8: Sitewide energy strategy summary table as required by Reading Borough Council

As a result of the proposed energy efficiency measures, provision of heating and domestic hot water via heat pumps, and the incorporation of roof-mounted PV, the development is anticipated to produce approximately 426,895 kgCO₂ per annum, which is a 50% improvement over the baseline case – a significant improvement beyond the minimum on-site requirements of Policy H5.

Any remaining CO₂ emissions are to be addressed via a carbon offset payment via a Section 106 agreement.

Supporting calculations to demonstrate the methodology used to determine the carbon savings are included in Appendix A.

3.6.1 Carbon Offset Payment

The Reading Borough Council Sustainable Design and Construction SPD states that there is a price per tonne of CO₂ of £1,800 (broken down as £60/tonne over a 30 year period). As remaining CO₂ emissions are 424,399kgCO₂, a total of 424.4 tonnes of CO₂ remain to be offset.

This equates to an indicative Carbon Offset Payment of £763,920 at this stage of the design. It is likely that this figure will change once a detailed application is made.

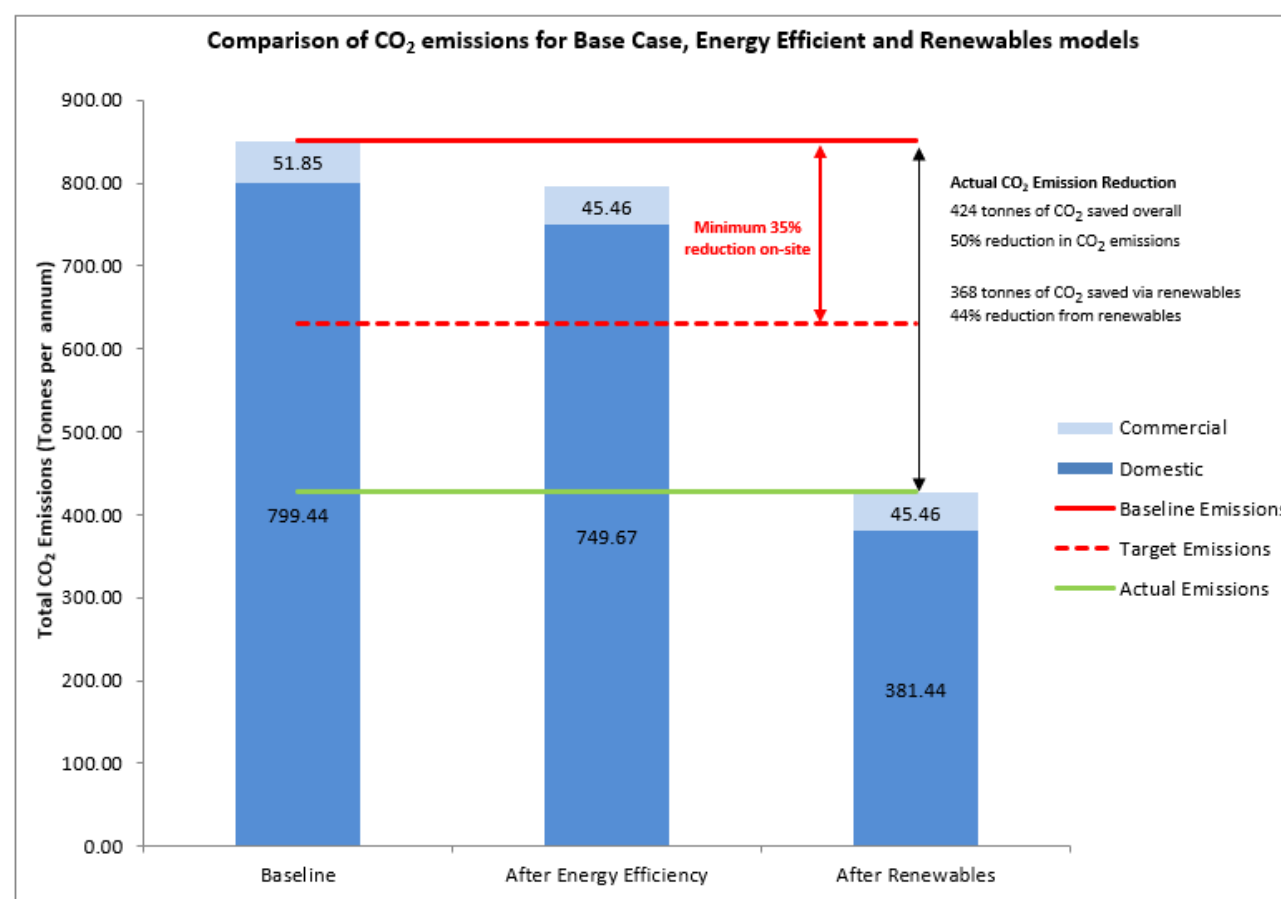


Figure 4: Summary of Regulated CO₂ Emission Savings

4 Sustainability Statement

4.1 Introduction

This section of the report will summarise the sustainable features which will be incorporated into the development. The aim is to demonstrate how the development will incorporate current best practice measures in the sustainable use of natural resources in line with the requirements of Policies CC2-CC5, EN18, and H5 of the Reading Local Plan.

4.2 Sustainable Transport

At least 860 cycle storage spaces will be provided to encourage sustainable travel locally, and the development is within close proximity to Reading Station to allow onward travel, helping to reduce reliance on cars, and to help provide access to the employment offered in Reading town centre. The development site is within walking distance of many of the town's amenities, including: various food outlets, Forbury Gardens Public Park and Oracle shopping centre. This further enables sustainable transport options. The development itself will also provide additional amenity as part of the design, accommodating a large supermarket and several smaller commercial spaces.

It is proposed that there will be around 200no parking spaces provided. Providing less spaces than dwellings will act to help discourage private car use, further encouraging use of sustainable transport measures.

4.3 Waste

In order to comply with Policy CC5 of the reading Local Plan, waste minimisation measures must be considered for all stages of the projects lifecycle, from construction to use and life of the development. Where possible materials should be procured locally to reduce the impact of any transportation whilst benefitting the local economy by investing within the Reading area.

The BREEAM assessment being undertaken as part of this development will target various elements of waste management including:

(a) Construction Waste

The Proposed Development will aim to minimise the waste produced from the site during the construction phase.

A comprehensive Construction Management Plan will be implemented from the outset of site works following the principles of the waste hierarchy.

The construction waste generated as part of the redevelopment will be segregated and monitored as per best practice, with suitable materials being recycled as part of this process, either to be reused on site or introduced back into the supply chain through recycling by a Licensed Contractor, therefore minimising the amount of waste being disposed of in landfill sites.

Where soil is excavated as part of the development, an opportunity to recycle soil for use in the planning schedule has been highlighted. Any trees which may require removal should be used for timber within the development if possible. If not, they should be taken to an appropriate facility.

Where waste will need to be disposed of, this will be done in line with the Waste Hierarchy, with as much as practicable being recycled, and the remainder being dealt with through a specialist waste contractor.

Careful review of materials is to be undertaken in order to reduce over-ordering and minimise waste. Low impact building materials may also be used in order to reduce wastes associated with both synthesis (i.e., aiming to use secondary aggregates) and eventual disposal (organic materials which can have energy recovered or will have no lasting impact of the environment).

(b) Operational Waste

All dwellings are to be provided with sufficient waste storage areas, with space available for general waste and recycling.

An information campaign (for example in the form of leaflets) could be undertaken to best prepare potential residents on how to effectively reduce, reduce, separate and recycle their waste in line with the waste hierarchy.

Composting facilities are not anticipated to be provided.

Suitable waste storage and recycling facilities are to be provided for all non-domestic areas of the development, encouraging the commercial elements of the development to separate out waste and increase uptake of recycling.

4.4 Energy / CO₂

Please refer to the Energy Demand Assessment section for details of the significant reductions in energy consumption achievable with the proposed energy efficiency measures and renewable technologies. Some of the proposed measures include:

(a) Building Services

Resource efficient building services plant will generally be specified for the development. This will include LED lighting, high-efficiency MVHR, and low-flow sanitaryware fittings.

(b) Low or Zero Carbon Technologies

A low carbon heating and domestic hot water system will be implemented on site, further supported by a suitably sized PV array. These technologies are anticipated to provide >90% of the development's regulated energy demand, equating to at least a 50% reduction in regulated CO₂ emissions.

(c) Building Form and Orientation

The design and layout of the site for practical use has been considered while trying to maximise internal daylight levels and create a residential development which is in keeping with the surrounding scale and aspect of other buildings in the vicinity.

The site designed to maximise the number of dual-aspect dwellings, allowing for cross ventilation and increased access to natural light, and is proposing to limit the number of north-facing dwellings as far as possible. This number has been reduced significantly during the evolution of the design. The development's massing is such that it is able to maximise solar gains within the dwellings, whilst also reducing the amount of single-aspect, south-facing dwellings to limit overheating risk.

It is noted that, the internal layout also has to make the most practical use of the site and also minimise overlooking to the surrounding residential dwellings. Therefore, not all dwellings are capable of incorporating south facing glazing, but north facing units have been minimised, with east and west glazing proposed. The site has therefore gone as far as practicable in maximising internal lighting gains.

The massing and building separation distances have also been improved to meet BRE2+ standards.

The buildings are designed to have a higher thermal mass than typical for similar specifications of development, reducing overheating risk during hot weather and retain thermal energy from heating systems in cold weather. Insulation will also be provided to a high specification to further aid this effect.

(d) Other Measures

In order to help occupants monitor energy use, it is recommended that smart meters be installed in dwellings, along with energy-efficient white goods where provided.

4.5 Water

In order to comply with Building Regulation 36(3) and Policy H5 of the Reading Local Plan, water saving devices are to be incorporated into residential dwellings. Irrigation for the planting

schedule is to be achieved using an intelligent system which measures moisture levels using sensors to better regulate water use.

Biodiversity roofs are to be employed to help retain rainwater in order to reduce the likelihood of flash flooding.

(a) Water Consumption

The proposed new dwellings will be designed to improve over the maximum daily water consumption allowance, seeking to minimise water consumption in use. The following low-flow sanitaryware items are suggested:

- WCs: 4/2.5 litre dual flush
- Basin taps: 4 litres/minute
- Showers: 10 litres/minute
- Baths: 140 litres
- Kitchen taps: 5 litres/minute
- Dishwasher: 2 litres/place setting
- Washing machine: 9 litres/kg

Using the BRE's average water efficiency calculator tool for domestic properties, a daily water consumption of 107.4 litres/person/day is predicted using the above fittings. This would represent a 14.08% improvement on the Building Regulations limit of ≤ 125 litres/person/day, and achieves the minimum standard of <110 litres/person/day as required in Policy 6

During construction, careful monitoring of water use through adequate metering will help to reduce water consumption and wastage.

Additional planting is anticipated as part of these works, and rainwater and greywater harvesting are not considered.

(b) Flooding and Surface water Run-Off Management

The site is located adjacent to a large Flood Zone 3 area. Whilst the risk is minimal to the development there is the possibility of disruption to site from flood, and therefore measure to avoid excessive runoff and flash flooding should be included where technical/ financial limitations do not exist. The development is to be designed for the 100-year rainfall events, allowing for a 40% increase in peak rainfall intensity to allow for the predicted effects of climate change. The existing site's discharge rate will be maintained or improved upon.

Rain gardens are recommended on the south side and boundary of the development. Again, green roofs may be incorporated as a way to absorb a significant amount of rainwater. Hard

landscaping specifications could also include permeable surfaces to further ensure that the risk of flooding is reduced. Further SuDS are proposed in the form of blue roofs and site attenuation.

4.6 Materials

The development will aim to use materials with a low life-cycle impact, seeking to follow the Green Guide to Specification and incorporate A or A+ rated construction materials where possible. The exact specification of constructions is yet to be determined so this will be reviewed in more detail as the design progresses. Materials will be durable and resilient, and the main contractor is recommended to follow a sustainable procurement plan. Embodied carbon relating to the non-domestic elements of the site is being considered as part of the BREEAM assessment, and the option for analysing the site's total embodied carbon impact could be reviewed.

In addition, responsibly sourced materials will be preferred, both for the main building elements and the internal finishes. Preference will be given to local manufacturers who can meet these requirements where possible. Priority will also be given to masonry which is in keeping with local architecture. This could be in the form of brickwork or indigenous low-carbon stone cladding.

All timber and timber-based products use on-site will be legally sourced with appropriate Chain of Custody certification to confirm this.

As standard industry best-practice, all insulation on the site will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of <5, further minimising the Proposed Developments effect on global Climate Change.

4.7 Health and Wellbeing

In order to maximise wellbeing and to meet the needs of future occupants, the following measures are planned to be incorporated:

Daylighting is to be optimised through liaison with a daylight consultant in order to maximise natural lighting into apartments, communal areas and landscaped areas. Other amenity areas, such as balconies, will also benefit from maximised provision of natural lighting and increased living space areas.

Acoustically proficient materials will be employed on the south and north faces of the development in order to provide a buffer from raised noise levels associated with the railway line and road network.

All dwellings are proposed to be M4(2) compliant, with at least 5% achieving M4(3) compliance.

4.8 Management

In line with the BREEAM requirements, the design team is liaising to set clear roles and responsibilities associated with delivering the scheme. The design team has engaged Method as the BREEAM assessors in order to help push for the required target rating.

During construction, the main contractor will be required to register the scheme with the Considerate Constructors Scheme, and to operate with an ISO 14001 certificate for environmental management. Any works on site will also be undertaken with consideration of best practice pollution prevention guidelines.

Security needs will also be assessed as part of the proposed development, with a security needs assessment being undertaken.

4.9 Pollution

In order to minimise damage to the environment through air, land, noise or light pollution, the following sustainable measures are suggested:

(a) Noise

Development will be well-insulated, limiting any noise from inside the building affecting the streetscape, whilst also minimising the impact of environmental noise on the quality of life of occupants.

All dwellings will meet and exceed the requirements of Building Regulations Part E, to minimise the transmission of sound between dwellings – enhancing quality of life.

Any external plant will be acoustically attenuated if required by the noise impact assessment. For non-domestic elements of the development, BREEAM credit POL05 will be targeted in order to help demonstrate this.

(b) Air

As electric heating is to be used, no local air pollution from combustion gases is expected. A prioritisation of sustainable transport should help reduce the movement of cars around the development, which will help reduce emissions from vehicles. There are roughly 200 parking spaces for residents, and up to 55 spaces for the commercial units, to further encourage sustainable transport. This is also addressed within the BREEAM assessment.

The impacts of construction on air quality are being considered, such as the movement of vehicles to and from site, any generators used for site electricity/lighting, and any potential dust from excavations.

(c) Light

Light Pollution will be minimised where possible through the careful specification and positioning of external lighting around the Proposed Development, ensuring minimal light pollution or overspill from the site. Special attention will be given to security lighting (where fitted) to ensure it is appropriately focussed and controlled. External lighting for the non-domestic elements of the site is also covered by the BREEAM assessment.

4.10 Ecology

Ecological surveys are to be conducted by an ecologist as part of the development. The results will then inform design in a number of areas such as any landscaping area and quality of soft landscaping and provision and strength of lighting. The need for any additional ecological features will also be determined by ant surveys which take place.

4.11 Summary

In line with the requirements of Policies CC2-CC5 and H5 from the Reading Local Plan, the above section outlines the sustainable features that will be incorporated as part of the development.

As required in the Sustainable Design and Construction SPD, the Reading Sustainability Checklists for both residential and non-domestic elements of the site are appended to this report.

5 Conclusion

This report outlines the sustainable features to be incorporated into the design of the proposed Forbury Park development to improve its overall environmental performance. This report is written with particular reference to the Reading Local Plan, Policies CC2-CC5 and H5.

The energy strategy demonstrates that energy efficiency measures in conjunction with high-efficiency heat pumps and supplementary PV is the most desirable energy strategy option for the development, and offers a significant reduction in CO₂ emissions, meeting the targets set out in Policy H5. The proposed energy strategy is anticipated to achieve a CO₂ emissions saving of at least 50% over the baseline.

This strategy is considered a good fit for the development as this will limit local air pollution and helps to push towards the decarbonisation of the housing sector.

This report demonstrates that the proposed development is in compliance with Policies CC2-CC5, EN18, and H5.

Appendix A – Carbon Summary

SAP Calculation Summary - Reading Forbury Stewide

Type	Number	Measured Floor Area (m ²)	Dwelling Base Case (Notional)		Total Base Case (Notional)		Dwelling Energy Efficient		Total Energy Efficient		% kWh reduction	% CO ₂ reduction	Base Case Emissions (kgCO ₂ /m ²)		Base Case Total kgCO ₂	Energy Efficient Emissions (kgCO ₂ /m ²)		Energy Efficient Total kgCO ₂	ASHP Emissions (kgCO ₂ /m ²)		ASHP Total kgCO ₂
			Energy Consumption (kWh)	Consumption (kWh)	Energy Consumption (kWh)	Consumption (kWh)	Energy Consumption (kWh)	Consumption (kWh)	Base Case Emissions (kgCO ₂ /m ²)	Base Case Total kgCO ₂			Energy Efficient Emissions (kgCO ₂ /m ²)	Energy Efficient Total kgCO ₂		ASHP Emissions (kgCO ₂ /m ²)	ASHP Total kgCO ₂				
Sample 1	5	95.95	6952.91	34764.55	6149.34	30746.7	11.6%	2.5%	15.34	7357.51	14.95	7173.16	8.79	4217.14							
Sample 2	5	50.3	4363.53	21817.65	3765.01	18825.05	13.7%	4.9%	18.36	4618.50	17.46	4393.93	10.17	2556.55							
Sample 3	5	77.28	6681.5	33407.5	5825.95	29129.75	12.8%	3.8%	18.28	7062.89	17.59	6796.11	10.19	3936.25							
Sample 4	5	95.95	5678.86	28394.3	4542.65	22713.25	20.0%	11.9%	12.54	6017.71	11.04	5298.71	6.66	3197.17							
Sample 5	5	50.3	3823.6	19118	3070.64	15353.2	19.7%	11.6%	16.11	4051.58	14.24	3581.84	8.43	2119.22							
Sample 6	5	70.58	4757.22	23786.1	3741.27	18706.35	21.4%	13.4%	14.29	5042.19	12.37	4364.03	7.39	2607.27							
Sample 7	5	70.58	4798.69	23993.45	3823.68	19118.4	20.3%	12.3%	14.41	5083.75	12.64	4460.20	7.51	2651.69							
Sample 8	5	77.28	5612.76	28063.8	4493.92	22469.6	19.9%	11.8%	15.37	5940.71	13.57	5242.08	8.02	3097.30							
Sample 9	5	95.95	5678.86	28394.3	4542.65	22713.25	20.0%	11.9%	12.54	6017.71	11.04	5298.71	6.66	3197.17							
Sample 10	5	50.3	3823.6	19118	3070.64	15353.2	19.7%	11.6%	16.11	4051.58	14.24	3581.84	8.43	2119.22							
Sample 11	5	70.58	4757.22	23786.1	3741.27	18706.35	21.4%	13.4%	14.29	5042.19	12.37	4364.03	7.39	2607.27							
Sample 12	5	70.58	4798.69	23993.45	3823.68	19118.4	20.3%	12.3%	14.41	5083.75	12.64	4460.20	7.51	2651.69							
Sample 13	5	77.28	5612.76	28063.8	4493.92	22469.6	19.9%	11.8%	15.37	5940.71	13.57	5242.08	8.02	3097.30							
Sample 14	5	95.95	5678.86	28394.3	4542.65	22713.25	20.0%	11.9%	12.54	6017.71	11.04	5298.71	6.66	3197.17							
Sample 15	8	50.3	4363.53	34908.24	3765.01	30120.08	13.7%	4.9%	18.36	7389.61	17.46	7027.10	10.17	4090.48							
Sample 16	8	70.58	5524.48	44195.84	4725.26	37802.08	14.5%	5.7%	16.57	9356.50	15.62	8819.24	9.14	5163.22							
Sample 17	8	70.58	5544.7	44357.6	4780.33	38242.64	13.8%	5.0%	16.63	9387.30	15.80	8922.67	9.22	5206.75							
Sample 18	8	77.28	6417.56	51340.48	5511.18	44809.44	14.1%	5.3%	17.56	10857.21	16.64	10286.21	9.67	5980.80							
Sample 19	8	69.17	5773.21	46185.68	5146.58	41172.64	10.9%	1.7%	17.66	9770.75	17.36	9605.75	10.07	5570.52							
Sample 20	8	71.56	6269.55	50156.4	5101.7	40813.6	18.6%	10.2%	18.52	10604.90	16.63	9521.89	9.70	5552.12							
Sample 21	8	50.35	4872.96	38983.68	4091.68	32733.44	16.0%	7.4%	20.47	8243.47	18.96	7636.91	10.95	4409.03							
Sample 22	8	69.17	4603.92	36851.36	3998.81	31990.48	13.1%	4.4%	14.11	7806.34	13.49	7470.29	7.98	4413.89							
Sample 23	8	71.56	5106.34	40850.72	4025.08	32200.64	21.2%	13.2%	15.11	8650.71	13.12	7512.20	7.80	4467.19							
Sample 24	8	50.35	3998.75	31990	3241.25	25930	18.9%	10.7%	16.82	6774.80	15.02	6049.44	8.82	3552.05							
Sample 25	8	69.17	5360.41	42883.28	4800.64	38405.12	10.4%	1.3%	16.40	9077.24	16.19	8960.00	9.44	5221.90							
Sample 26	8	71.56	5932.64	47461.12	5034.25	40274	15.1%	6.4%	17.54	10038.89	16.41	9395.99	9.58	5484.16							
Sample 27	8	50.35	4556.43	36451.44	3955.55	31644.4	13.2%	4.3%	19.15	7711.70	18.33	7382.80	10.61	4271.86							
Sample 28	8	56.97	4021.76	32119.36	3415.88	27415.84	11.9%	2.9%	18.67	6807.79	18.13	8762.69	10.50	4783.77							
Sample 29	8	57.01	4716.29	37730.32	4122.25	31278	12.6%	3.7%	17.52	7988.89	16.87	7693.83	9.84	4487.29							
Sample 30	8	76.28	6283.3	50266.4	4930.42	39443.36	21.5%	13.5%	17.42	10632.69	15.08	9202.15	8.83	5387.53							
Sample 31	8	70.33	6393.68	51149.44	5213.79	41710.32	18.5%	10.0%	19.22	10812.60	17.30	9731.20	10.03	5641.25							
Sample 32	8	71.67	6403.42	51227.36	5138.72	41109.76	19.8%	11.8%	18.89	10830.82	16.73	9591.05	9.72	5573.53							
Sample 33	8	50.76	4597.81	36782.48	3791.14	30329.12	17.5%	9.1%	19.16	7781.52	17.42	7075.90	10.12	4108.31							
Sample 34	8	50.76	4028.08	32224.64	3561.61	28032.88	11.6%	2.6%	16.81	6826.50	16.17	6647.42	9.56	3881.78							
Sample 35	8	49.75	4586.08	36688.64	4048.38	32387.04	11.7%	2.7%	19.50	7762.96	18.99	7556.08	10.98	4368.19							
Sample 36	8	56.97	4024.67	32197.36	3591.32	28730.56	10.8%	1.8%	14.97	6824.34	14.71	6702.79	8.65	3941.66							
Sample 37	8	57.01	3762.47	30099.76	3161.91	25295.28	16.0%	7.6%	14.00	6386.47	12.94	5901.19	7.72	3519.55							
Sample 38	8	76.28	5098.79	40790.32	3859.54	30876.32	24.3%	16.7%	14.16	8842.72	11.80	7203.17	7.06	4308.37							
Sample 39	8	70.33	5212.97	41703.76	4139.44	33115.52	20.6%	12.5%	15.69	8829.00	13.73	7725.75	8.10	4546.60							
Sample 40	8	71.67	5200.21	41601.68	4048.55	32388.48	22.1%	14.2%	15.36	8809.43	13.18	7556.08	7.89	4474.95							
Sample 41	8	50.76	3822.4	30579.2	3001.41	24011.28	21.5%	13.5%	15.95	6478.83	13.79	5601.74	8.16	3312.50							
Sample 42	8	50.76	3310.67	26485.36	2739.12	21912.96	17.3%	9.1%	13.84	5621.25	12.59	5112.11	7.52	3054.94							
Sample 43	8	49.75	3710.1	29680.8	3273.94	26191.52	11.8%	2.9%	15.81	6291.31	15.35	6110.46	9.01	3587.76							
Sample 44	8	56.97	4659.38	37275.04	4270.79	34166.32	8.3%	-1.0%	17.31	7890.66	17.49	7971.14	10.15	4626.37							
Sample 45	8	57.01	4766.08	38128.64	4210.61	33684.88	11.7%	2.0%	17.70	8072.53	17.23	7858.77	10.03	4576.34							
Sample 46	8	76.28	6000.43	48003.44	4973.62	39788.96	17.1%	8.6%	16.65	10157.47	15.21	9282.79	8.90	5431.06							
Sample 47	8	70.33	6055.13	48441.04	5163.14	41305.12	14.7%	5.9%	18.21	10243.83	17.13	9636.66	9.94	5590.20							
Sample 48	8	71.67	6053.66	48429.28	5017.35	40138.8	17.1%	8.6%	17.87	10243.22	16.33	9364.49	9.51	5451.23							
Sample 49	8	50.76	4390.59	35124.72	3731.6	29852.8	15.0%	6.3%	18.31	7433.39	17.15	6964.76	9.97	4048.31							
Sample 50	8	50.76	3836.52	30662.66	3447.79	27415.84	13.7%	1.9%	16.02	6504.69	15.85	6344.96	9.26	3769.28							
Sample 51	8	49.75	4264.36	34114.88	3832.3	30658.4	10.1%	1.0%	18.15	7222.47	17.97	7152.73	10.43	4150.43							
Sample 52	8	93.6	6745.36	53962.88	5785.24	46281.92	14.2%	5.4%	15.25	11417.63	14.42	10797.51	8.47	6344.40							
Sample 53	8	50.33	4391.38	35131.04	3659.07	29272.56	16.7%	8.1%	18.46	7434.40	16.96	6829.37	9.87	3972.98							
Sample 54	8	50.33	4826.33	38610.64	3998.51	31988.08	17.2%	8.6%	20.28	8165.12	18.54	7463.00	10.72	4315.05							
Sample 55	8	50.33	4740.58	37924.64	3863.61	30908.88	18.5%	10.1%	19.93	8023.08	17.91	7211.16	10.40	4185.50							
Sample 56	8	63.73	5688.36	45506.88	5836.54	38036.32	16.4%	7.8%	18.17	9621.11	17.41	8874.04	10.09	5146.95							
Sample 57	8	66.61	5237.19	41897.52	4712.52	37700.16	10.0%	0.8%	16.64	8867.16	16.51	8795.55	9.60	5117.89							
Sample 58	8	61.81	5103.64	40829.12	4752.09	38016.72	6.9%	-2.7%	17.47	8639.41	17.94	8869.45	10.41	5149.14							
Sample 59	8	93.6	5260.25	42082	4328.67	34629.36	17.7%	9.5%	11.92	8922.64	10.79	8078.58	6.51	4878.58							
Sample 60	8	50.33	3835.32	30682.56	3050.47	24403.76	20.5%	12.4%	16.14	6500.22	14.14	5693.32	8.34	3359.68							
Sample 61	8	50.33	3955.26	31642.08	3199.22	25593.76	19.1%	10.9%	16.64	6701.72	14.83	5970.99	8.72	3509.58							
Sample 62	8	50.33	3861.65	30893.2	3064.43	24515.44	20.6%	12.6%	16.26	6546.48	14.20	5719.36	8.39	3380.14							
Sample 63	8	63.73	4617.51	36940.08	3737.06	29896.48	19.1%	10.9%	15.35	7824.08	13.68	6974.74	8.08	4120.51							

Appendix B – Sustainability Checklist - Residential

Sustainable Design Checklist - Residential	Notes
Energy/CO2	
Aim: To conserve energy, in particular carbon dioxide emissions and maximise the use of energy efficient techniques.	
1. How has the development been designed to optimise the use of the energy from the sun and limit heat losses?	Solar gains optimised via west/east-facing facades as a majority, limiting south-facing and north-facing facades to reduce overheating risk in summer, and to avoid increasing heating demand in winter. Available roof areas not being used for terrace areas or building plant will be allocated for use of PV panels. Approximately 1850sqm of PV can be accommodated based on assumptions made at this stage, allowing 289 kWp of generation. Energy-efficient fabric is proposed, with good detailing on thermal bridges around balconies and thresholds, thermally massive material, and a good standard of insulation.
2. How has the development been designed to optimise natural daylighting, energy efficient lighting, external lighting and natural ventilation?	Layouts are optimised to reduce north facing single aspect units. Layouts have also been optimised to locate living spaces across dual-aspects where possible. The massing and building separation distances have been improved to meet BRE2+ standards. Lower ground car park to be naturally ventilated to reduce energy demand. External lighting design will be developed side by side with landscape proposals and take into account any wildlife requirements. All lighting is to be LED throughout. Daylight consultants have been appointed to review natural daylight and provide recommendations to minimise reliance on artificial lighting. All flats are to be mechanically ventilated with high-efficiency MVHR (mechanical ventilation with heat recovery) to provide a good standard of internal air quality.
3. How will the design of the building make efficient use of energy? (e.g. use of thermally massive materials, levels of insulation, energy efficient white goods and use of green/brown roofs etc.).	Improved thermal mass and better than average insulation, energy efficient white goods and good use of green and brown roofs as well as PV on roof spaces. Where provided, biodiversity roofs will be designed with integrated PV. The frame is proposed to be reinforced concrete, which will provide thermal mass. The design is to be reviewed as exposed concrete provides the best thermal mass, but there are design implications regarding site heritage, aesthetic, etc.
4. Has local energy generation from renewables and/or decentralised energy been considered as part of the scheme?	A communal heat pump heating system is proposed, which will provide low carbon heating and domestic hot water. This is supported with a large 289 kWp PV array.
5. How have cycle storage facilities been considered?	Proposal aims to provide more than the policy requirements as listed in the Reading Local Plan. Planning Policy requires 0.5 spaces for every 1-2 bed and 1 space per every 3 bed, but the final number of proposed spaces will exceed this. Further attention will be paid to optimise the proposal to improve easy access to cycle storage so as to further encourage sustainable transportation. Opportunity for provision of a cycle hub is being reviewed.
6. Does the development meet the requirements of policies H5? Is this clearly illustrated?	Water efficient fittings are proposed in order to achieve no more than 110L/person/day. As shown in the Energy Strategy, a 50% reduction in regulated carbon emissions is anticipated, with the remainder to be offset via a Carbon Offset Contribution. All dwellings are designed in line with M4(2), with 5% minimum to achieve M4(3).
Policy H5 requires:	
- All new build housing to be built to the higher water efficiency standard of Building Regs (110 L/person/day)	
- All major new build housing to achieve zero carbon	
- All new build house to be accessible in line with M4(2) unless built in line with M4(3)	
- On developments >20 dwellings, at least 5% of dwellings will need to be in line with M4(3) for wheelchair users.	
7. Is a Section 106 contribution required? If so, what amount?	Yes, this is estimated at £763,920 based on £1,800 per tonne of remaining carbon dioxide emissions.
Water	
Aim: To improve efficiency in the use of water, conserve water resources and minimise vulnerability to flooding.	
8. How will the development incorporate the use of water saving devices to achieve the higher water efficiency standard under Regulation 36(3) of the Building Regulations?	Irrigation used for landscaping is to be an intelligent system, i.e. with moisture sensors to regulate water usage. The scheme is reviewing the potential for rainwater harvesting if viable. Water consumption within the residential elements of the development is to achieve no more than 110L/person/day.
9. How will the development incorporate recycling rainwater and reduce the use of potable water?	The feasibility of rainwater harvesting is being explored, but is unlikely to provide significant benefits due to use of biosolar roofs and external planting for interception. Rainwater harvesting for maintaining planting is likely to be viable.
10. Has the collection, treatment and re-use of grey water been considered? If so, how will these facilities be incorporated within the development?	This option has not yet been fully explored due to the outline nature of this application. This will be considered further and the viability of a greywater harvesting system will be reviewed as design progresses.

Materials	
Aim: To retain local character and promote the use of materials with a low environmental impact.	
11. How will the selected materials help retain local character, ensure long life and ensure a low environmental impact, including consideration of embodied energy?	Embodied energy associated with the commercial elements of the development is considered as part of the BREEAM assessment, and will likely undergo review using IMPACT-compliant LCA modelling software. The local architectural character is one dominated by brick. The proposed redevelopment will use a mixture of brick and stone for the facade. The durability and longevity of brick allows its embodied energy to be dissipated over many years leading to a potentially lower carbon footprint than other hard-wearing alternatives. The scheme will also look to propose a low carb indigenous natural stone cladding.
Surface Water Run-Off	
Aim: To reduce flooding, pollution and other environmental damage.	
12. How has the development considered flooding and pollution?	Flood risk on the site has been reviewed and the following are identified as needing to be considered - Ground water risk - Foul water flooding from sewer failure The surface water drainage regime will utilise the SuDS components and other pertinent methods to ensure surface water runoff quality is maintained and any potential pollution risk mitigated. Further exploration into mitigating flood risk is to be undertaken at the next stages of design.
13. Has the design considered the use of sustainable drainage systems (SuDS) and how will they be incorporated within the development?	SuDS systems are proposed, including blue roofs, green roofs, some site attenuation, and rain gardens are proposed for inclusion within the detailed design. The final discharge rate will be lower than the existing and will be targeted as close as practically possible to the calculated greenfield rate taking into account all site constraints.
14. Does the development meet the requirements of policy EN18?	The development is to be designed for the 100-year rainfall events with a 40% increase in peak rainfall intensity to allow for the currently predicted effects of climate change, whilst maintaining/improving on the existing discharge rate to ensure compliance.
Waste	
Aim: To minimise the production of waste and maximise re-use and recycling.	
15. How will the development minimise waste sent to landfill?	Construction waste will be raised with potential Contractors in order to establish a waste minimisation programme. Operational waste facilities will be sized and situated to encourage recycling in order to reduce the volume of general waste reaching landfill.
16. How will the development make the maximum use of construction and demolition waste?	Pre-demolition audit is recommended in order to establish potential for reuse and recycling of demolition waste. Steel/metal content of superstructures on site should be close to fully recyclable for reuse elsewhere. Concrete/masonry on site should be suitable for crushing on site & reuse as hardcore/fill under new buildings and in back-filling new excavations/under roadways etc. Construction waste can be addressed through a Resource Management Plan which the main Contractor will be required to operate under.
17. How will the development make maximum use of re-used and recycled materials?	The development will seek to recycle and re-use concrete and rubble from demolition of existing buildings - use for permeable paving for walkways, driveways, and other outdoor hard surfaces; bed foundation material for trenches containing underground utility lines and aggregate for mixing new concrete. Steel/metal content of superstructures on site should be close to fully recyclable for reuse elsewhere. Concrete/masonry on site should be suitable for crushing on site & reuse as hardcore/fill under new buildings and in back-filling new excavations/under roadways etc. There may be opportunity to recycle site won soil subject to soil analysis. Felled trees can be recycled for ecology features within the new landscaping proposals.
18. How will provision be made for the storage and recycling of waste for all users of the site?	Operational waste facilities will be sized and situated to encourage recycling in order to reduce the volume of general waste reaching landfill. The commercial areas will have their operational waste requirements assessed under the BREEAM criteria, and will further encourage recycling.
Pollution	
Aim: To minimise damage to the environment through air, ground/surface water, land, noise or light pollution.	
19. What measures have been incorporated to ensure that noise and light pollution will be minimised through the development?	The development will be designed to comply with the ILP guidance notes and noise assessment. No uplifts are currently proposed as part of the design. Noise breakout from building plant will be mitigated via an appropriate attenuation strategy.
20. What measures have been incorporated to reduce nitrogen oxide emissions and reduce the global warming potential of insulants?	No gas currently proposed.
21. What measures have been incorporated to reduce the release of pollution into the atmosphere?	Currently ~200 car parking spaces for residents, encouraging sustainable transport. An all-electric development will result in no local NOx emissions.
Health and Well-Being	
Aim: To improve the quality of life in homes through good daylighting, improved sound insulation, provision of outdoor space with good accessibility.	
22. How has the development been designed to maximise natural lighting, reduce the likelihood of noise complaints, incorporate private outdoor space and ensure the layout of the development can be easily adapted to meet the needs of future occupants?	The proposal will use sunlight daylight consultant's input in maximising natural daylight into apartments, landscaped areas and communal areas. The proposal also looks to provide balconies and similar immediate amenity space that will benefit from natural lighting, but also provide with additional living space that may be adaptable. The proposal will use good quality acoustic materials to buffer from the noise levels to the north and south, taking particular note of the railway lines to the northern boundary and the main road to the south. The risk of noise ingress during summer months when windows may be open to reduce overheating risk is being considered, and it is likely that some elevations will not be able to open windows overnight in order to provide night time purge. In such cases, ventilation systems will be designed to help reduce overheating risk overnight by providing increased ventilation rates where needed. A variety of private and public amenity spaces are proposed. There are numerous flexible open spaces for the public and residents.
Management	
Aim: To manage the site in an environmentally and socially considerate manner.	
23. What measures have been taken to ensure the construction of the site is managed in an environmentally and socially considerate manner, mitigating environmental impacts?	The main Contractor will be required to operate with an Environmental Management System and follow best practice pollution prevention guidance. The site is recommended to be registered with the Considerate Constructors Scheme.
24. How has the development been designed to ensure people feel safe and secure?	A Security Needs Assessment is being undertaken in order to identify potential risks to the development, as well as potential risks from the development itself. This will be further reviewed as design progresses.
Ecology	
Aim: To retain, protect and enhance wildlife habitats and natural features.	
25. How have the wildlife habitats and natural features on and adjacent to the site been considered and how will they be retained, protected and enhanced?	Surveys are to be undertaken by the appointed ecologists, and will be used to identify measures to protect and enhance biodiversity where possible. The existing site is understood to have limited ecological value.

Appendix C – Sustainability Checklist - Commercial

Sustainable Design Checklist - Commercial		Notes
Management		
Aim: To recognise and encourage environmentally and socially considerate development.		
1. Will guidance for the non-technical building user be provided so they can understand and operate the building efficiently and understand how the design reduced the overall environmental impact of the building and raise environmental awareness?	As the development will likely only provide shell only spaces for future tenant fit-out, there is limited opportunity to provide detailed information to end users. However, guidance on how to operate the space efficiently will be provided once design develops.	
2. What consideration has been given to resource use, energy consumption and pollution in terms of the construction site impacts?	The main Contractor will be required to operate with an Environmental Management System and follow best practice pollution prevention guidance. The site is recommended to be registered with the Considerate Constructors Scheme.	
3. Will site investigation and appropriate remedial action be undertaken?	A site remediation strategy will be developed and agreed with planning when Phase 2 SI is completed. Basement construction is likely to provide 'capping' to any potential hazardous contaminants below habitable/occupied areas.	
4. Will the community and stakeholders be involved in the design process encouraging flexibly designed buildings which cater for shared use with the local community?	Yes, amenity spaces and community space provisions will be informed by public consultations.	
5. How has the building been designed to reduce the opportunity for and the fear of crime?	A Security Needs Assessment is being undertaken in order to identify potential risks to the development, as well as potential risks from the development itself. This will be further reviewed as design progresses. This is also being addressed in the BREEAM assessment.	
6. What consideration has been given to the maintenance of the building?	The client and design team will develop a maintenance strategy for the building at a later stage of design, once a more thorough understanding of the commercial spaces is established.	
Health and Well-Being		
Aim: To ensure a good quality amenity level is afforded to occupants of buildings.		
7. How has the development been designed to ensure users have sufficient daylight, an external view, adequate and appropriate lighting, ventilation, air quality and drinking water?	As commercial spaces will be shell only, or shell and core, there is limited opportunity to cover these items as the tenant fit-out will determine internal light levels and air quality based on the equipment installed, etc. Daylighting will be maximised in the shell only/shell and core design through provision of suitable glazing.	
Energy		
Aim: To conserve energy and maximise the use of energy efficiency techniques.		
8. How has the building been designed to minimise CO2 emissions associated with their operational energy consumption?	Improved thermal mass and better than average insulation will help to reduce energy demand.	
	The option of providing some energy from the PV arrays to the commercial spaces will be considered as the design progresses. The building services strategy will be dependant on end use and tenant fit-out, but recommendations will be provided to potential end users to help steer towards an energy-efficient fit-out.	
9. How has the development been designed to optimise the use of the energy from the sun, natural daylighting and controlled natural ventilation?	The proposal will use sunlight daylight consultant's input in maximising natural daylight into landscaped areas and communal areas.	
	The proposal will use good quality acoustic materials to buffer from the noise levels to the north and south. Smaller community space may be naturally ventilated to reduce energy demand. Commercial spaces are dependant on final tenant fit-out.	
10. How will the design of the building make efficient use of energy? (e.g. use of thermally massive materials, levels of insulation and use of green/brown roofs etc.).	The frame is proposed to be reinforced concrete, which will provide thermal mass. The design is to be reviewed as exposed concrete provides the best thermal mass, but there are design implications regarding site heritage, aesthetic, etc. Biodiversity roofs are proposed but these are generally only applicable to the residential elements of the scheme.	
11. Have renewable energy sources or decentralised energy been considered for this development and if so, how would they be incorporated within the development?	The site proposes to use communal heat pumps for heating and domestic hot water, with a large solar PV array at roof level. As the commercial units are shell and core, or shell only, the option of connecting to the communal network will be provided, but ultimately the fit-out will be down to the tenant.	
Transport		
Aim: To reduce the need to travel through appropriately located development.		
12. How has the design and layout incorporated measures to reduce the need to travel, especially by car, and promote alternative and sustainable modes of transport such as walking, cycling and the use of public transport?	The site is well linked via pedestrian routes to Reading Station, and is located within close proximity to bus stops providing onward travel. A 4.5m wide shared cycle path is also located on the southern boundary.	
	The scheme is reviewing potential for a pedestrian and cycle crossing across Forbury Road to further enable safe travel. Cycle storage is to be provided for commercial spaces.	
13. How have public transport networks been considered in terms of the location of the development and proximity to local amenities?	There are numerous existing facilities and amenities within fairly close proximity of the site, and public transport is highly accessible via the bus network, cycle routes, and proximity to Reading Station.	
14. How have deliveries and the manoeuvring of delivery vehicles been considered?	At this stage of design, the number of deliveries, as well as tracking for refuse and deliveries has been considered. This has been benchmarked against similar schemes to provide an initial input into the design, and will be addressed as the design develops.	
Water		
Aim: To improve efficiency in the use of water, conserve water resources and minimise vulnerability to flooding.		
15. How will the development incorporate the use of water saving devices to achieve a maximum consumption of 5.5 cubic m per year per person for office developments? (or the most appropriate benchmark for other types of development).	Any planting associated with the commercial spaces will be irrigated via an intelligent system such as use of moisture sensors. Whilst the commercial spaces are shell only, or shell and core, there is limited scope for reducing water consumption as part of the design. However, recommendations for low flow fittings can be made as part of the building information pack for prospective tenants.	
16. Will the development and access to and from it such as roads and paths be located away from areas of potential flooding?	The adjacent highway and the access routes to the commercial areas are generally above the main site levels, and as such they are likely to have a very low risk of flooding.	
17. How will the development incorporate harvesting and re-use of rainwater?	Rainwater harvesting for planting irrigation is considered, whilst the scope of the commercial units themselves limits investigations into meeting WC flushing demand at this time.	
18. Does this development meet the requirements of EN18? - Flooding and sustainable drainage. Site should be at low risk of flooding accounting for potential effects of climate change. - All major developments must incorporate SuDS as appropriate. SuDS should maximise ecological benefits, link into the existing Green Network, incorporate tree planting and landscaping, and avoid damage to existing trees.	The scheme is to be designed for the 100-year rainfall events with a 40% increase in peak rainfall intensity to allow for the currently predicted effects of climate change , whilst maintaining/improving on the existing discharge rate should ensure compliance.	

Materials	
Aim: To retain local character and promote the use of materials with a low environmental impact.	
19. How will the selected materials help retain local character, ensure long life and ensure a low environmental impact, including consideration of embodied energy?	Embodied energy associated with the commercial elements of the development is considered as part of the BREEAM assessment, and will likely undergo review using IMPACT-compliant LCA modelling software. The local architectural character is one dominated by brick. The proposed redevelopment will use a mixture of brick and stone for the facade. The durability and longevity of brick allows its embodied energy to be dissipated over many years leading to a potentially lower carbon footprint than other hard-wearing alternatives. The scheme will also look to propose a low carb indigenous natural stone cladding.
20. What consideration has been given to reusing materials in-situ, responsibly sourcing materials and re-using existing structures?	The development will seek to recycle and re-use concrete and rubble from demolition of existing buildings - use for permeable paving for walkways, driveways, and other outdoor hard surfaces; bed foundation material for trenches containing underground utility lines and aggregate for mixing new concrete. Steel/metal content of superstructures on site should be close to fully recyclable for reuse elsewhere. Concrete/masonry on site should be suitable for crushing on site & reuse as hardcore/fill under new buildings and in back-filling new excavations/under roadways etc. There may be opportunity to recycle site won soil subject to soil analysis. Felled trees can be recycled for ecology features within the new landscaping proposals. Contractors will be encouraged to source materials responsibly via a sustainable procurement plan.
Waste	
Aim: To minimise the production of waste and maximise re-use and recycling.	
21. Has an audit of the materials present on the site been conducted with an assessment of the extent to which materials could be re-used?	A full pre-demolition audit is to be undertaken at a later stage. Steel/metal content of superstructures on site should be close to fully recyclable for reuse elsewhere. Concrete/masonry on site should be suitable for crushing on site & reuse as hardcore/fill under new buildings and in back-filling new excavations/under roadways etc. (reinforcing steel can be recovered, recycled and reused elsewhere).
22. How will the development make the maximum use of construction, demolition waste and recycled materials?	Pre-demolition audit is recommended in order to establish potential for reuse and recycling of demolition waste. Steel/metal content of superstructures on site should be close to fully recyclable for reuse elsewhere. Concrete/masonry on site should be suitable for crushing on site & reuse as hardcore/fill under new buildings and in back-filling new excavations/under roadways etc. Construction waste can be addressed through a Resource Management Plan which the main Contractor will be required to operate under.
23. How will provision be made for the storage and recycling of waste for all users of the site?	Operational waste facilities will be sized and situated to encourage recycling in order to reduce the volume of general waste reaching landfill. The commercial areas will have their operational waste requirements assessed under the BREEAM criteria, and will further encourage recycling.
Land Use and Ecology	
Aim: To retain, protect and enhance wildlife habitats and natural features.	
24. How have the wildlife habitats and natural features on and adjacent to the site been considered and how will they be retained, protected and enhanced?	Surveys are to be undertaken by the appointed ecologists, and will be used to identify measures to protect and enhance biodiversity where possible. The existing site is understood to have limited ecological value.
25. What consideration has been given to not using previously undeveloped land?	The footprint of the proposed site is entirely previously developed.
26. What consideration has been given to the removal of contamination from the land?	Soil analysis is required at a later stage, and any invasive species that are identified in the associated surveys will be remediated. Phase 1 SI (desk study) identifies potential contaminants on site - Phase 2 required to confirm presence and distribution of such and inform remediation strategy. Phase 1 report includes preliminary source-receptor pathway risk analysis to be developed after Phase 2 to ensure safety of residents and the public.
Pollution	
Aim: To minimise damage to the environment through air, ground/surface water, land, noise or light pollution.	
27. What measures have been incorporated to ensure that noise and light pollution plus pollution transported through surface water runoff or infiltration will be minimised through the development?	The development will be designed to comply with the ILP guidance notes and noise assessment. No uplights are currently proposed as part of the design. Noise breakout from building plant will be mitigated via an appropriate attenuation strategy. Where risk of contamination of water sources is present (e.g. car parks), petrol interceptors will be installed where necessary.
28. What measures have been incorporated to ensure that light pollution will be minimised through the development?	The development will be designed to comply with the ILP guidance notes. No uplights are currently proposed as part of the design. External lighting for the commercial spaces will be designed not to operate outside of operational hours unless required for security.
29. What consideration has been given to reducing refrigerants and minimising nitrogen dioxide emissions?	No combustion heating/hot water sources are proposed on site. Any refrigerants will be specified such that risk of emissions is limited as far as possible. Leak detection systems may be suitable pending further review as design develops.
30. How has the development been sited to minimise the impact of flooding?	Reuse of an existing, brownfield site, with modern SUDs drainage will improve local flood resilience.
31. How has the design considered the use of sustainable drainage systems (SuDS) and how will they be incorporated within the development?	Permeable surface materials are proposed. SuDS systems including blue roofs, green roofs, some site attenuation, rain gardens are proposed for inclusion within the detailed design. The final discharge rate will be lower than the existing and will be targeted as close as practically possible to the calculated greenfield rate taking into account all site constraints.
Innovation	
Aim: To recognise innovation in the field of sustainability.	
32. What consideration has been given to innovative sustainability measures in terms of a procurement strategy, design feature, management process or technological?	The development proposes to exceed policy for minimum cycle storage standards, along with providing a low-carbon heating and hot water system for the wider scheme. At this time it is too early to look at further expanding upon innovative features, so this will be addressed at the next stages.

Appendix D – Supporting Energy Calculations

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:08

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 95.95m²

Site Reference : Forbury Example ASHP

Plot Reference: A001

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.22 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.98 kg/m²

Fail

Excess emissions = 0.76 kg/m² (4.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

51.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

52.7 kWh/m²

Fail

Excess energy = 1.00 kg/m² (01.9 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.12 (max. 0.25)

0.12 (max. 0.70)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	3.36m ²
Windows facing: South	5.5m ²
Windows facing: East	2.52m ²
Windows facing: South	2.25m ²
Ventilation rate:	2.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.12 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:07

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.3m²

Site Reference : Forbury Example ASHP

Plot Reference: A003

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.67 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.75 kg/m²

Fail

Excess emissions = 0.08 kg/m² (0.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

52.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.12 (max. 0.25)

0.12 (max. 0.70)

OK

Roof

(no roof)

-

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Medium	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: West	2.25m ²
Ventilation rate:	2.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.12 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:06

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 77.28m²

Site Reference : Forbury Example ASHP

Plot Reference: A006

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.29 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.77 kg/m²

Fail

Excess emissions = 0.48 kg/m² (2.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

63.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

60.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.12 (max. 0.25)

0.12 (max. 0.70)

OK

Roof

(no roof)

-

Openings

1.36 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: North	4.5m ²
Windows facing: East	5.5m ²
Windows facing: East	2.25m ²
Ventilation rate:	3.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.12 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:06

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 95.95m²

Site Reference : Forbury Example ASHP

Plot Reference: A102

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

14.29 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

13.71 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

37.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.7 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: East	6.72m ²	
Windows facing: South	5.5m ²	
Windows facing: East	2.52m ²	
Windows facing: South	2.25m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:05

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.3m²

Site Reference : Forbury Example ASHP

Plot Reference: A104

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.35 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.26 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

40.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

38.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	High	Fail
Based on:		
Overshading:	Average or unknown	
Windows facing: West	5.5m ²	
Windows facing: West	2.25m ²	
Ventilation rate:	2.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:04

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.58m²

Site Reference : Forbury Example ASHP

Plot Reference: A105

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.32 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.16 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

39.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.5 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: West	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:03

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.58m²

Site Reference : Forbury Example ASHP

Plot Reference: A106

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.37 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.41 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

40.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

38.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	11m ²
Windows facing: West	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:03

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 77.28m²

Site Reference : Forbury Example ASHP

Plot Reference: A107

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.3 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.41 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

48.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

43.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.15 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.36 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: North	4.5m ²
Windows facing: East	5.5m ²
Windows facing: East	2.25m ²
Ventilation rate:	6.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:03

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 95.95m²

Site Reference : Forbury Example ASHP

Plot Reference: A202

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

14.29 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

13.71 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

37.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.7 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: East	6.72m ²	
Windows facing: South	5.5m ²	
Windows facing: East	2.52m ²	
Windows facing: South	2.25m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:01

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.3m²

Site Reference : Forbury Example ASHP

Plot Reference: A204

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.35 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.26 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

40.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

38.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	High	Fail
Based on:		
Overshading:	Average or unknown	
Windows facing: West	5.5m ²	
Windows facing: West	2.25m ²	
Ventilation rate:	2.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:15:00

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.58m²

Site Reference : Forbury Example ASHP

Plot Reference: A205

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.32 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.16 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

39.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.5 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: West	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:59

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.58m²

Site Reference : Forbury Example ASHP

Plot Reference: A206

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.37 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.41 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

40.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

38.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	11m ²
Windows facing: West	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:59

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 77.28m²

Site Reference : Forbury Example ASHP

Plot Reference: A207

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.3 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.41 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

48.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

43.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.15 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.36 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: North	4.5m ²
Windows facing: East	5.5m ²
Windows facing: East	2.25m ²
Ventilation rate:	6.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:58

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 95.95m²

Site Reference : Forbury Example ASHP

Plot Reference: A302

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.56 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.16 kg/m²

Fail

Excess emissions = 0.6 kg/m² (3.6 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

49.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

50.0 kWh/m²

Fail

Excess energy = 0.79 kg/m² (01.6 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	6.72m ²
Windows facing: South	5.5m ²
Windows facing: East	2.52m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:58

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.3m²

Site Reference : Forbury Example ASHP

Plot Reference: A304

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.67 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.75 kg/m²

Fail

Excess emissions = 0.08 kg/m² (0.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

52.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Medium	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: West	2.25m ²
Ventilation rate:	2.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:57

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.58m²

Site Reference : Forbury Example ASHP

Plot Reference: A305

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.67 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.69 kg/m²

Fail

Excess emissions = 0.02 kg/m² (0.1 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

51.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

50.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: West	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:56

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.58m²

Site Reference : Forbury Example ASHP

Plot Reference: A306

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.65 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.83 kg/m²

Fail

Excess emissions = 0.18 kg/m² (1 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

52.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	11m ²
Windows facing: West	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:56

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 77.28m²

Site Reference : Forbury Example ASHP

Plot Reference: A307

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.55 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.74 kg/m²

Fail

Excess emissions = 0.19 kg/m² (1 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

59.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

56.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.15 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.36 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.5m ²
Windows facing: North	4.5m ²
Windows facing: East	5.5m ²
Windows facing: East	2.25m ²
Ventilation rate:	6.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:55

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 69.17m²

Site Reference : Forbury Example ASHP

Plot Reference: B101

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.74 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.53 kg/m²

Fail

Excess emissions = 0.79 kg/m² (4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

56.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

55.9 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.13 (max. 0.25)

0.16 (max. 0.70)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	4.5m ²
Windows facing: West	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:55

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.56m²

Site Reference : Forbury Example ASHP

Plot Reference: B102

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.58 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.80 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

62.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

54.5 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.08 (max. 0.25)

0.16 (max. 0.70)

OK

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: West	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:55

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.35m²

Site Reference : Forbury Example ASHP

Plot Reference: B103

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

22.77 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

22.30 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

64.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

57.3 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.10 (max. 0.25)

0.16 (max. 0.70)

OK

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:54

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 69.17m²

Site Reference : Forbury Example ASHP

Plot Reference: B201

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.09 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.34 kg/m²

Fail

Excess emissions = 0.25 kg/m² (1.6 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

37.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

40.0 kWh/m²

Fail

Excess energy = 2.14 kg/m² (05.7 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	4.5m ²
Windows facing: West	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:54

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.56m²

Site Reference : Forbury Example ASHP

Plot Reference: B202

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.07 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.00 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

44.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

40.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: West	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:53

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.35m²

Site Reference : Forbury Example ASHP

Plot Reference: B203

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.02 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.03 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

44.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

41.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North	11m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:53

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 69.17m²

Site Reference : Forbury Example ASHP

Plot Reference: B301

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.45 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.26 kg/m²

Fail

Excess emissions = 0.81 kg/m² (4.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

50.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.1 kWh/m²

Fail

Excess energy = 1.08 kg/m² (02.2 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	4.5m ²
Windows facing: West	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:52

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.56m²

Site Reference : Forbury Example ASHP

Plot Reference: B302

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.57 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.56 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

57.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

53.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: West	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:52

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.35m²

Site Reference : Forbury Example ASHP

Plot Reference: B303

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21.41 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.62 kg/m²

Fail

Excess emissions = 0.21 kg/m² (1 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

57.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

54.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:51

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 56.97m²

Site Reference : Forbury Example ASHP

Plot Reference: C101

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.88 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.40 kg/m²

Fail

Excess emissions = 0.52 kg/m² (2.5 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

57.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

55.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.08 (max. 0.25)

0.08 (max. 0.70)

OK

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:51

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 57.01m²

Site Reference : Forbury Example ASHP

Plot Reference: C102

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.76 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.09 kg/m²

Fail

Excess emissions = 0.33 kg/m² (1.7 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

50.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

50.5 kWh/m²

Fail

Excess energy = 0.06 kg/m² (0.1 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.13 (max. 0.25)

0.16 (max. 0.70)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:50

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 76.28m²

Site Reference : Forbury Example ASHP

Plot Reference: C103

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.45 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.04 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

57.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

49.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.08 (max. 0.25)

0.08 (max. 0.70)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:50

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.33m²

Site Reference : Forbury Example ASHP

Plot Reference: C104

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21.3 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.44 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

65.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

57.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.08 (max. 0.25)

0.08 (max. 0.70)

OK

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	16.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:49

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.67m²

Site Reference : Forbury Example ASHP

Plot Reference: C105

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.98 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.83 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

63.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

54.9 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.10 (max. 0.25)

0.16 (max. 0.70)

OK

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:49

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.76m²

Site Reference : Forbury Example ASHP

Plot Reference: C106

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21.42 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.64 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

57.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.08 (max. 0.25)

0.08 (max. 0.70)

OK

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:48

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.76m²

Site Reference : Forbury Example ASHP

Plot Reference: C107

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.07 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.54 kg/m²

Fail

Excess emissions = 0.47 kg/m² (2.5 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

43.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

45.9 kWh/m²

Fail

Excess energy = 2.00 kg/m² (04.6 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.13 (max. 0.25)

0.16 (max. 0.70)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:48

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.75m²

Site Reference : Forbury Example ASHP

Plot Reference: C108

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21.84 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

22.37 kg/m²

Fail

Excess emissions = 0.53 kg/m² (2.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

57.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

56.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.11 (max. 0.25)

0.16 (max. 0.70)

OK

Roof

(no roof)

-

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:46

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 56.97m²

Site Reference : Forbury Example ASHP

Plot Reference: C201

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.08 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.69 kg/m²

Fail

Excess emissions = 0.61 kg/m² (3.6 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

37.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

41.8 kWh/m²

Fail

Excess energy = 4.30 kWh/m² (11.5 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:46

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 57.01m²

Site Reference : Forbury Example ASHP

Plot Reference: C202

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.15 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.83 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

31.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

34.2 kWh/m²

Fail

Excess energy = 2.51 kg/m² (07.9 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

Floor

(no floor)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:45

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 76.28m²

Site Reference : Forbury Example ASHP

Plot Reference: C203

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.09 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

14.49 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

40.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

35.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:45

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.33m²

Site Reference : Forbury Example ASHP

Plot Reference: C204

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.68 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.58 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

46.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

42.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North	16.5m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:44

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.67m²

Site Reference : Forbury Example ASHP

Plot Reference: C205

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.35 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.99 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

45.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

40.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:44

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.76m²

Site Reference : Forbury Example ASHP

Plot Reference: C206

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.12 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.70 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

40.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North	11m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:44

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.76m²

Site Reference : Forbury Example ASHP

Plot Reference: C207

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.01 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.44 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

27.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

29.6 kWh/m²

Fail

Excess energy = 1.83 kg/m² (06.6 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

Floor

(no floor)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:43

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.75m²

Site Reference : Forbury Example ASHP

Plot Reference: C208

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.04 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.43 kg/m²

Fail

Excess emissions = 0.39 kg/m² (2.2 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

38.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

41.2 kWh/m²

Fail

Excess energy = 3.20 kg/m² (08.4 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:43

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 56.97m²

Site Reference : Forbury Example ASHP

Plot Reference: C301

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.48 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.70 kg/m²

Fail

Excess emissions = 1.22 kg/m² (6.3 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

50.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

53.2 kWh/m²

Fail

Excess energy = 3.24 kWh/m² (06.5 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:42

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 57.01m²

Site Reference : Forbury Example ASHP

Plot Reference: C302

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.95 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.48 kg/m²

Fail

Excess emissions = 0.53 kg/m² (2.7 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

51.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

52.0 kWh/m²

Fail

Excess energy = 0.59 kg/m² (01.1 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:41

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 76.28m²

Site Reference : Forbury Example ASHP

Plot Reference: C303

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.65 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.18 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

53.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

49.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:41

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.33m²

Site Reference : Forbury Example ASHP

Plot Reference: C304

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.26 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.26 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

59.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

56.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	16.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:40

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.67m²

Site Reference : Forbury Example ASHP

Plot Reference: C305

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.92 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.40 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

58.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

53.3 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:40

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.76m²

Site Reference : Forbury Example ASHP

Plot Reference: C306

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.54 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.34 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

52.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

50.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:39

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.76m²

Site Reference : Forbury Example ASHP

Plot Reference: C307

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.25 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.97 kg/m²

Fail

Excess emissions = 0.72 kg/m² (3.9 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

39.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

43.8 kWh/m²

Fail

Excess energy = 4.16 kWh/m² (10.5 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:39

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.75m²

Site Reference : Forbury Example ASHP

Plot Reference: C308

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.45 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.27 kg/m²

Fail

Excess emissions = 0.82 kg/m² (4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

50.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

52.1 kWh/m²

Fail

Excess energy = 1.51 kg/m² (03.0 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:38

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 93.6m²

Site Reference : Forbury Example ASHP

Plot Reference: D101

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.07 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.33 kg/m²

Fail

Excess emissions = 0.26 kg/m² (1.5 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

51.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

49.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.09 (max. 0.25)

0.16 (max. 0.70)

OK

Roof

(no roof)

-

Openings

1.36 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	11m ²
Windows facing: South	2.25m ²
Windows facing: North	5.5m ²
Ventilation rate:	6.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:38

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D102

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.71 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.14 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

53.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

49.5 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.08 (max. 0.25)

0.08 (max. 0.70)

OK

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:38

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D103

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

22.57 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.84 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

63.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

55.9 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.08 (max. 0.25)

0.08 (max. 0.70)

OK

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:37

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D104

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

22.27 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.20 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

60.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

53.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.10 (max. 0.25)

0.16 (max. 0.70)

OK

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	5.5m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:36

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 63.73m²

Site Reference : Forbury Example ASHP

Plot Reference: D105

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.58 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

61.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

56.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.08 (max. 0.25)

0.08 (max. 0.70)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: East	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:36

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 66.61m²

Site Reference : Forbury Example ASHP

Plot Reference: D106

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.68 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.60 kg/m²

Fail

Excess emissions = 0.92 kg/m² (4.9 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

51.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

52.1 kWh/m²

Fail

Excess energy = 0.70 kg/m² (01.4 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.15 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.12 (max. 0.25)

0.16 (max. 0.70)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: East	4.5m ²
Windows facing: South	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:35

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 61.81m²

Site Reference : Forbury Example ASHP

Plot Reference: D107

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.57 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.24 kg/m²

Fail

Excess emissions = 1.67 kg/m² (8.5 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

53.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

56.2 kWh/m²

Fail

Excess energy = 2.46 kg/m² (04.6 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.13 (max. 0.25)

0.16 (max. 0.70)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	11m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:35

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 93.6m²

Site Reference : Forbury Example ASHP

Plot Reference: D201

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

13.64 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

13.40 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

34.6 kWh/m²

Fail

Excess energy = 1.12 kg/m² (03.3 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

Floor

(no floor)

Roof

(no roof)

Openings

1.36 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	11m ²
Windows facing: South	2.25m ²
Windows facing: North	5.5m ²
Ventilation rate:	6.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:34

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D202

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.32 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.08 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

41.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

37.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North	11m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:34

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D203

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.84 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.83 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

43.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

40.7 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:33

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D204

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.5 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.19 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

41.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

37.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	5.5m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:33

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 63.73m²

Site Reference : Forbury Example ASHP

Plot Reference: D205

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.37 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.55 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

43.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

40.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: East	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:32

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 66.61m²

Site Reference : Forbury Example ASHP

Plot Reference: D206

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

15.21 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.21 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

34.8 kWh/m²

Fail

Excess energy = 1.51 kg/m² (04.5 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.15 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

Floor

(no floor)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: East	4.5m ²
Windows facing: South	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:31

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 61.81m²

Site Reference : Forbury Example ASHP

Plot Reference: D207

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.17 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.20 kg/m²

Fail

Excess emissions = 1.03 kg/m² (6.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

35.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

40.4 kWh/m²

Fail

Excess energy = 4.48 kg/m² (12.5 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	11m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:31

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 93.6m²

Site Reference : Forbury Example ASHP

Plot Reference: D301

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

15.97 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.00 kg/m²

Fail

Excess emissions = 1.03 kg/m² (6.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

45.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

48.4 kWh/m²

Fail

Excess energy = 3.07 kWh/m² (6.8 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.36 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	11m ²
Windows facing: South	2.25m ²
Windows facing: North	5.5m ²
Ventilation rate:	6.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:30

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D302

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20.71 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.66 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

53.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.5 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:30

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D303

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21.22 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.41 kg/m²

Fail

Excess emissions = 0.19 kg/m² (0.9 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

56.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

54.3 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:29

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: D304

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21.13 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.84 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

54.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.7 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	5.5m ²
Windows facing: North	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:29

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 63.73m²

Site Reference : Forbury Example ASHP

Plot Reference: D305

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21.65 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.41 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

65.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

59.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.08 (max. 0.25)

0.08 (max. 0.70)

OK

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11m ²
Windows facing: East	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.08 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:28

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 66.61m²

Site Reference : Forbury Example ASHP

Plot Reference: D306

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.33 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.52 kg/m²

Fail

Excess emissions = 1.19 kg/m² (6.9 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

44.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

47.9 kWh/m²

Fail

Excess energy = 3.57 kg/m² (08.1 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.15 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: East	4.5m ²
Windows facing: South	4.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:28

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 61.81m²

Site Reference : Forbury Example ASHP

Plot Reference: D307

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.36 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.06 kg/m²

Fail

Excess emissions = 1.7 kg/m² (9.3 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

47.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.6 kWh/m²

Fail

Excess energy = 4.20 kg/m² (08.9 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	11m ²
Windows facing: South	2.25m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:27

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: G001

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

20 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.69 kg/m²

Fail

Excess emissions = 0.69 kg/m² (3.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

48.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

49.4 kWh/m²

Fail

Excess energy = 0.55 kg/m² (01.1 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.12 (max. 0.25)

0.12 (max. 0.70)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Medium	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.16m ²
Windows facing: West	2.16m ²
Ventilation rate:	2.00
Blinds/curtains:	Dark-coloured curtain or roller blind
	Closed 100% of daylight hours

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.12 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:27

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 93.3m²

Site Reference : Forbury Example ASHP

Plot Reference: G004

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.15 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.40 kg/m²

Fail

Excess emissions = 0.25 kg/m² (1.5 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

49.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

48.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.12 (max. 0.25)

0.12 (max. 0.70)

OK

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	11.49m ²
Ventilation rate:	2.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.12 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:27

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 92.15m²

Site Reference : Forbury Example ASHP

Plot Reference: G006

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.43 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.49 kg/m²

Fail

Excess emissions = 2.06 kg/m² (12.5 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

46.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

52.0 kWh/m²

Fail

Excess energy = 5.45 kg/m² (11.7 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.12 (max. 0.25)

0.12 (max. 0.70)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	9m ²
Windows facing: South	5.5m ²
Ventilation rate:	2.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.12 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:26

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: G101

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.64 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.11 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

36.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

35.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.16m ²
Windows facing: West	2.16m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:26

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.01m²

Site Reference : Forbury Example ASHP

Plot Reference: G104

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.06 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.06 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

38.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

35.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	12.96m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:25

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: G204

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.9 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.16 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

32.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

31.7 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.16m ²
Windows facing: West	2.16m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:25

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.01m²

Site Reference : Forbury Example ASHP

Plot Reference: G207

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.06 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.06 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

38.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

35.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	12.96m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:24

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.33m²

Site Reference : Forbury Example ASHP

Plot Reference: G304

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.6 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.21 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

36.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.18 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.31 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	5.16m ²
Windows facing: West	2.16m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:24

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J003

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

21.2 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

22.53 kg/m²

Fail

Excess emissions = 1.33 kg/m² (6.3 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

55.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

57.2 kWh/m²

Fail

Excess energy = 1.53 kg/m² (02.7 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.12 (max. 0.25)

0.12 (max. 0.70)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Medium	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	9m ²
Ventilation rate:	2.00
Blinds/curtains:	Dark-coloured curtain or roller blind
	Closed 100% of daylight hours

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.12 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:23

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J101

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.99 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

21.23 kg/m²

Fail

Excess emissions = 1.24 kg/m² (6.2 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

49.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

52.3 kWh/m²

Fail

Excess energy = 2.90 kg/m² (05.9 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.16 (max. 0.25)

0.16 (max. 0.70)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	9m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:23

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J102

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.89 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.12 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

32.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: East	9m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:22

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J103

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.64 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.32 kg/m²

Fail

Excess emissions = 0.68 kg/m² (3.6 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

42.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

45.0 kWh/m²

Fail

Excess energy = 2.52 kg/m² (05.9 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.16 (max. 0.25)

0.16 (max. 0.70)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	9m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:22

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J105

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.89 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.12 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

32.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: West	9m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:21

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.63m²

Site Reference : Forbury Example ASHP

Plot Reference: J109

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.28 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.94 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

55.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

50.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.06 (max. 0.25)

0.06 (max. 0.70)

OK

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Medium	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North	13.5m ²
Windows facing: East	2.25m ²
Ventilation rate:	3.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.06 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:21

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.63m²

Site Reference : Forbury Example ASHP

Plot Reference: J110

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.91 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.06 kg/m²

Fail

Excess emissions = 1.15 kg/m² (6.8 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

43.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

46.0 kWh/m²

Fail

Excess energy = 2.57 kg/m² (05.9 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.06 (max. 0.25)

0.06 (max. 0.70)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	13.5m ²
Windows facing: East	2.25m ²
Ventilation rate:	3.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Floors U-value	0.06 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:20

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J201

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.68 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.22 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

37.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: East	9m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:20

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J202

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.89 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.12 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

32.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	9m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:19

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J203

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.4 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.42 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

30.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

29.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: East	9m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:19

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J205

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.89 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.12 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

32.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	9m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:19

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J301

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

17.68 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.22 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

37.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: East	9m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:18

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J302

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.89 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.12 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

32.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: East	9m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:18

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J401

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.99 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.72 kg/m²

Fail

Excess emissions = 0.73 kg/m² (3.7 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

49.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

50.3 kWh/m²

Fail

Excess energy = 0.90 kg/m² (01.8 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	9m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:17

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: J402

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.16 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.57 kg/m²

Fail

Excess emissions = 0.41 kg/m² (2.1 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

45.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

46.0 kWh/m²

Fail

Excess energy = 0.83 kg/m² (01.8 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	9m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:17

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.44m²

Site Reference : Forbury Example ASHP

Plot Reference: K107

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

14.19 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

14.17 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

27.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

30.5 kWh/m²

Fail

Excess energy = 2.63 kg/m² (09.4 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

Floor

(no floor)

Roof

(no roof)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	4.5m ²
Ventilation rate:	3.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:16

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 72.31m²

Site Reference : Forbury Example ASHP

Plot Reference: K110

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

15.8 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.26 kg/m²

Fail

Excess emissions = 0.46 kg/m² (2.9 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

38.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

39.9 kWh/m²

Fail

Excess energy = 1.41 kg/m² (03.7 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

(no roof)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Windows facing: West	2.25m ²
Windows facing: West	5.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:16

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 71.44m²

Site Reference : Forbury Example ASHP

Plot Reference: K207

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.57 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.93 kg/m²

Fail

Excess emissions = 1.36 kg/m² (8.2 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

40.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

45.2 kWh/m²

Fail

Excess energy = 4.90 kWh/m² (12.2 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.33 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	4.5m ²
Ventilation rate:	3.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:15

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 72.31m²

Site Reference : Forbury Example ASHP

Plot Reference: K210

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.06 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.72 kg/m²

Fail

Excess emissions = 1.66 kg/m² (9.2 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

50.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

53.2 kWh/m²

Fail

Excess energy = 3.14 kg/m² (06.3 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.35 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South	5.5m ²
Windows facing: South	2.25m ²
Windows facing: West	2.25m ²
Windows facing: West	5.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:15

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 86.03m²

Site Reference : Forbury Example ASHP

Plot Reference: L003

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.97 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.16 kg/m²

Fail

Excess emissions = 0.19 kg/m² (1.1 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

47.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

46.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.15 (max. 0.30)

0.15 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.12 (max. 0.25)

0.12 (max. 0.70)

OK

Roof

(no roof)

-

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	4.5m ²
Windows facing: East	2.25m ²
Windows facing: West	4.5m ²
Ventilation rate:	3.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Party Walls U-value	0 W/m ² K
Floors U-value	0.12 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:14

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 69.89m²

Site Reference : Forbury Example ASHP

Plot Reference: M102

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

14.55 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

13.78 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

31.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

29.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.17 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	13.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:14

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: M304

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.89 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.12 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

32.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs OK

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: West	9m ²	
Ventilation rate:	4.00	

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:13

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 69.89m²

Site Reference : Forbury Example ASHP

Plot Reference: M402

Address :

Client Details:

Name:

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.19 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.37 kg/m²

Fail

Excess emissions = 0.18 kg/m² (0.9 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

54.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

52.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.16 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

OK

Openings

1.34 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

6 Controls

Space heating controls

Charging system linked to use of community heating, programmer and TRVs **OK**

Hot water controls:

No cylinder thermostat

No cylinder

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: East	13.5m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60
Printed on 11 July 2023 at 11:14:13

Project Information:

Assessed By: Ross Macgregor (STRO032375)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 49.86m²

Site Reference : Forbury Example ASHP

Plot Reference: M404

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c), Mains gas (c)

Fuel factor: 1.55 (electricity (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.16 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.57 kg/m²

Fail

Excess emissions = 0.41 kg/m² (2.1 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

45.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

46.0 kWh/m²

Fail

Excess energy = 0.83 kg/m² (01.8 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.18 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.12 (max. 0.35)

Openings

1.32 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals

3.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Community heating schemes - Heat pump

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

No cylinder

N/A

Regulations Compliance Report

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.41	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Severn valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: West	9m ²
Ventilation rate:	4.00

10 Key features

Air permeability	3.0 m ³ /m ² h
Doors U-value	1 W/m ² K
Roofs U-value	0.12 W/m ² K
Party Walls U-value	0 W/m ² K
Community heating, heat from electric heat pump	



Swindon Office
Berkeley House
Hunts Rise
Swindon SN3 4TG

Bristol Office
22-24 Queen Square
Bristol
BS1 4ND

Cornwall Office
Victoria Offices & Conference Centre
Station Approach
Victoria, St. Austell, PL26 8LG