

**Environmental Standards
Statement
Ref: Z26387**

Proposed 106No. Dwellings

at

**Bellamy Court,
420 Abbey Hey Lane,
Manchester,
M18 8DU**

for

Rowlinson Construction Limited



Energy Council

Viridor House

No.3 Bolholt Terrace

Bury/Gtr Manchester

BL8 1PP

Tel: +44 (0)161-762 1055

Fax: +44 (0)161-761 1094

E-mail: mail@energycouncil.co.uk

Web: www.energycouncil.co.uk

Reference: Z26387			Date
Produced by:		Paul Ahern	04 June 2020
Checked by:		Tony Turner	04 June 2020
Approved by:		Matthew Gibson	04 June 2020

Disclaimer

This report has been prepared by Energy Council with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our Standard Terms and Conditions of Business and taking into account the resources devoted to it by agreement with the Client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own discretion and risk.

Contents

1. Introduction	7
1.1. Location	8
1.2. Floor Plans	9
2. Policy Drivers for Sustainable Development	13
2.1. National Policy	13
2.2. Local Policy	14
3. Methodology	20
4. District & Communal Heating Networks	22
4.1. Decentralised Heating Networks	22
5. Renewable Energy Technologies	24
5.1. Photovoltaics (PV)	24
5.2. Solar Thermal HW Panels	25
5.3. Ground Source Heat Pump (GSHP)	26
5.4. Air Source Heat Pump/Exhaust Air Heat Pump	27
5.5. Micro Wind Power	27
5.6. Biomass	28
6. Energy Assessment of Proposed Scheme	30
7. Sustainable Design & Construction	34
7.1. Management	34
7.2. Health and Wellbeing	34
7.3. Energy	34
7.4. Transport	35
7.5. Water	35
7.6. Materials	35
7.7. Waste	36
7.8. Ecology and Land-use	36
7.9. Pollution	36
8. Conclusions	37
8.1. Low/ Zero Carbon Technologies Review	37
9. Appendices	40
9.1. Energy Model Inputs for Part L1A (2016) Compliance	40

Index of Figures and Tables

Figure 1 – Location plan for the proposed Bellamy Court Extra Care development	8
Figure 2 – Proposed floor and roof plans for the Bellamy Court Extra Care on Abbey Hey Lane	12
Figure 3 – Location of site (marked in red) in relation to current local heat networks.....	23
Figure 4 - Performance of photovoltaic panel orientation.....	24
Figure 5 - Photovoltaic array on a pitched roof	25
Figure 6 - The principles of a solar thermal system	25
Figure 7 - Principles of a GSHP system.....	26
Figure 8 - Principles of an ASHP system.....	27
Figure 9 - Mounted wind turbine.....	28
Figure 10 - Biomass boiler and hopper	29
Table 1 - Proposed development CO ₂ emissions against Building Regulations Part L1A (2013).....	6
Table 2 – Key National Planning Policy Requirements and Design Responses.....	13
Table 3 – Key Local Planning Policy Requirements and Design Responses	14
Table 4 - Fabric efficiency for the preliminary ADL1A Bellamy Court Extra Care residential development.....	30
Table 5 - Results of preliminary model Part L1A (2013) calculations	31
Table 6 - Recommend water consumption for residential fittings	35
Table 7 - Summary of Carbon Emissions.....	38

Executive Summary

This document evaluates the technical and economic feasibility of using both passive and low and zero carbon technologies and assesses the practical levels of CO₂ reduction possible for this development to comply with the following Manchester City Council planning requirements:

- Manchester City Council's Core Strategy 2012 - 2027 (2012) policies EN4 - EN7 &
- Future Manchester Climate Change Framework 2020-25
- Principles of The Guide to Development in Manchester SPD (2007)
- National Planning Policy Framework (2019)

The following low and zero carbon technologies are evaluated:

- Solar Photovoltaic
- Solar Hot Water
- Biomass
- Wind
- Biogas
- Combined Heat & Power (CHP)
- Heat Pumps: Air Source, Ground Source and Exhaust Air

The approach for the proposed Bellamy Court residential development is to embed sustainability into the heart of the development through a range of design measures based on the 'Be Lean, Be Clean, Be Green' design hierarchy. Measures will include:

- 1) Enhanced building fabric to meet Building Regulation ADL1A (2013)
- 2) Enhanced air tightness and thermal bridging
- 3) Heating will be provided by communal ground source heat pumps with a heat interface unit to each dwelling
- 4) Hot water will be provided by the communal ground source heat pumps.
- 5) Ventilation will be provided through a System 3 type MEV extract system
- 6) Lighting will be provided to all areas by LED-type fittings
- 7) A photovoltaic panel array is provided totalling 3.25kWp mounted on the roof of the apartment block

An assessment of CO₂ emissions is made based on the Standard Assessment Procedure (SAP) methodology to comply with Approved Document Part L1A (2013) and in line with the requirements of Manchester City Council planning policy. The development will be provided with energy savings through the use of passive improvement measures, such as improved energy efficiency. This passive approach to compliance will complement the integrated approach to the sustainable energy objectives of the national and local policies.

A 15% improvement in Bldg regs ADL1A 2010 was the target set by current core strategy energy policy EN6 2012-27. 2010 Building regs is not current. Importantly policy EN6 2012-27 predates the changes to building regs in 2013, which is why the core strategy doesn't align with current Bldg regs. Building Regs was updated in 2013 and these are the current regs. 2013 regs are circa 6% uplift on 2010 regs, which means that a 9% uplift on current regs is equivalent to a 15% improvement in 2010 regs. The Future Manchester Climate Change Framework 2020-25 requires a commitment to achieve a minimum 15% improvement over current building regulations needs to be achieved and therefore the benchmark has now been raised.

The principles of a 'Be Lean, Be Clean, Be Green' design philosophy have been applied, which results in a 44.29% improvement over Building Regulations Part L1A (2013), as indicated in Table 1.

Table 1 - Proposed development CO₂ emissions against Building Regulations Part L1A (2013)

	Total CO₂ Emissions (KgCO₂/Yr)	
Baseline Emissions of Development (pre-improvement)	144,387	
Proposed Strategy	80,436	
Total Reduction in Carbon (KgCO₂/yr)		63,951
Percentage Improvement in Carbon Emissions (over Building Regulations ADL1A 2013)		44.29%

A full design specification that confirms inputs used within the Part L1A (2013) calculations is provided within the appendices of this report.

The development has also been assessed to maximise its sustainability and environmental credentials. This strategy considers many aspects of the design and construction of the development and the following issues have been identified:

- | | |
|-------------------------------------|---|
| 1. Energy Efficiency | 6. Ecological Aspects (Land Use and Ecology) |
| 2. Transport | 7. Health and Wellbeing |
| 3. Pollution | 8. Sustainable Management of the Construction Process |
| 4. Construction Materials and Waste | |
| 5. Water Consumption | |

1. Introduction

This Environmental Standards Statement has been developed in support of the planning application for the proposed development of Bellamy Court Extra Care in Manchester on the site of Abbey Hey Lane.

The proposed development consists of a four-storey extra care facility comprising 106 apartments, café, restaurant, beauty and ancillary areas. The development is required to achieve compliance under Building Regulations Approved Document Part L1A (2013).

This assessment has been undertaken to strategically look at the technical and economic feasibility of energy and sustainability measures to maximise the scheme's sustainable and environmental credentials and in accordance with the following planning policies:

- Manchester City Council's Core Strategy 2012 - 2027 (2012) policies EN4 - EN7
- Future Manchester Climate Change Framework 2020-25
- Principles of The Guide to Development in Manchester SPD (2007)
- National Planning Policy Framework (2019)

A range of sustainable design principles are explored for this development to minimise the adverse effects of development on the environment at global and local scales, whilst promoting healthy indoor conditions for the occupants. Throughout this report, passive design techniques, energy efficient equipment and appropriate low carbon technologies will also be appraised in line with the 'Be Lean, Be Clean, Be Green' philosophy of relevant planning documents and the Energy Hierarchy.

An assessment of CO₂ emissions is made based on the calculation methodology of the Standard Assessment Procedure (SAP) to comply with Approved Document Part L1A (2013) and in line with the requirements of Manchester City Council planning policy.

1.1. Location

The area of land for the proposed development off Abbey Hey Lane is highlighted by the red line boundary shown in Figure 1. Manchester city centre is located four miles to the west of the site.

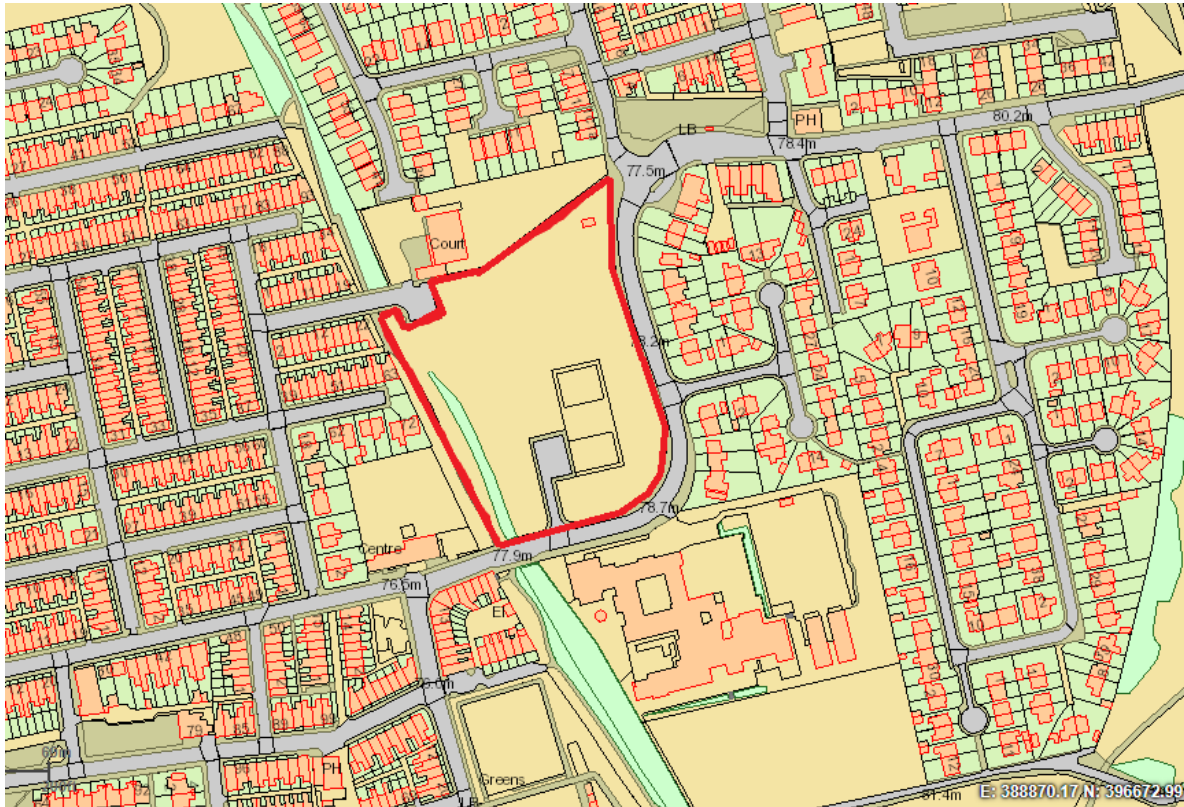


Figure 1 – Location plan for the proposed Bellamy Court Extra Care development

The site is located off Abbey Hey Lane, with Abbey Hey Primary Academy to the South of the site. The proposed site is in a predominantly residential area.

1.2. Floor Plans

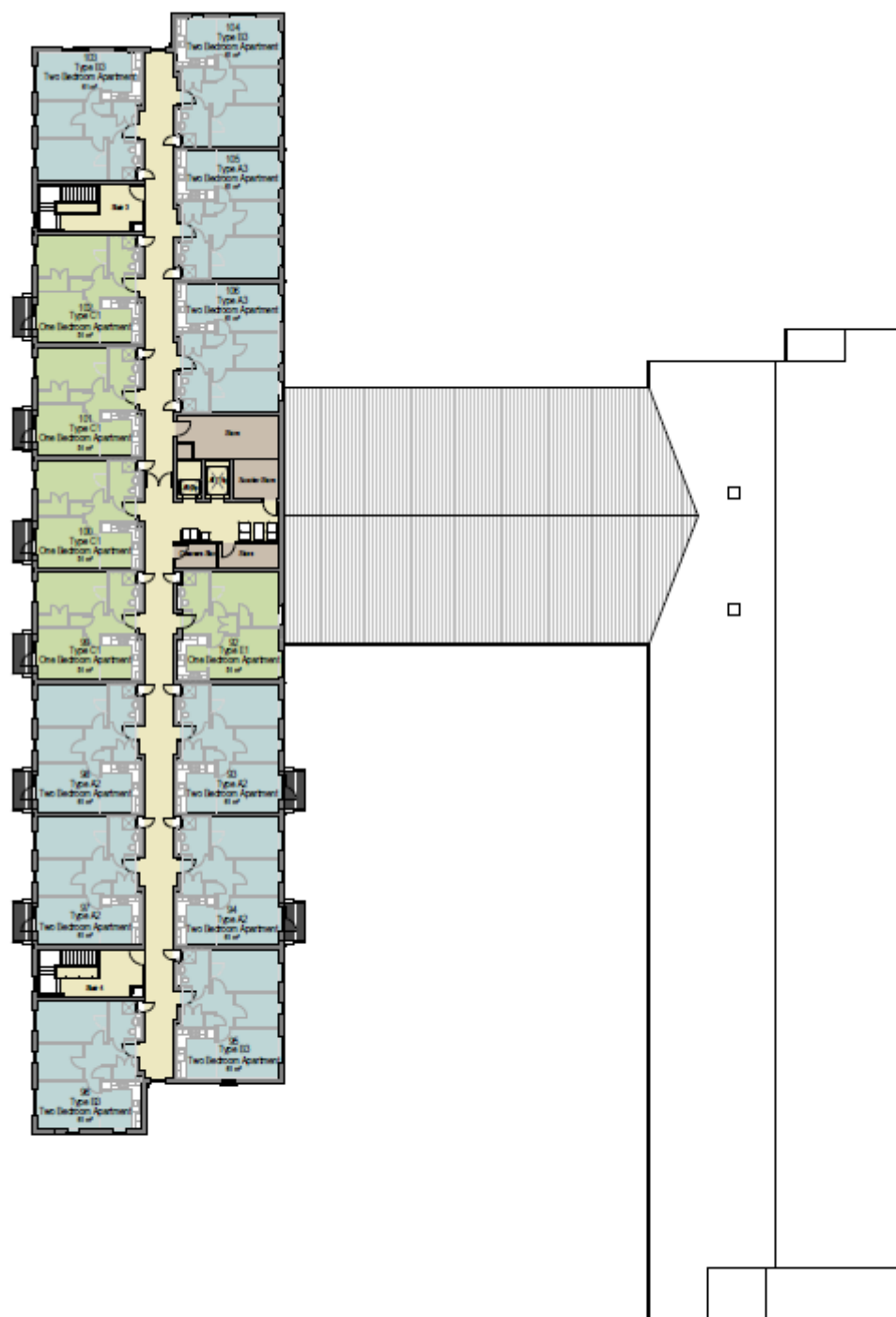




First Floor Plan



Second Floor Plan



Third Floor Plan

Figure 2 – Proposed floor and roof plans for the Bellamy Court Extra Care on Abbey Hey Lane

The proposed development consists of 106 apartments across four floors, with café/restaurant and beauty facilities located on the ground floor.

2. Policy Drivers for Sustainable Development

This section presents a range of sustainable planning policy that is applicable to the proposed Bellamy Court residential development, at both a national and a local level.

2.1. National Policy

The National Planning Policy Framework, published in February 2019, sets out the government's planning policies for England and they should be applied. Table 2 sets out the relevant sustainability standards for new developments and provides an indication of the design response to be provided.

Table 2 – Key National Planning Policy Requirements and Design Responses

Section	Policy Requirements	Design Response
14. Meeting the challenge of climate change, flooding and coastal change	The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: Shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.	This development will follow the principles set out in Manchester City Council's Core Strategy 2012 – 2027 (2012), using a 'Be Lean, Be Clean, Be Green' approach in reducing operational carbon emissions. An overview of current decentralised energy schemes around the Manchester area and an assessment on the potential for future schemes in relation to this development is provided in Section 4 of this report. This environmental standards statement appraises site specific information to determine the most appropriate approach to minimise energy consumption.

2.2. Local Policy

The adopted Manchester Core Strategy 2012 – 2027 (2012) and the Supplementary Planning Document and Planning Guidance (2007) provide a set of guidelines for new development. All relevant energy and sustainability policy within these documents are provided within this section together with a design response.

Table 3 – Key Local Planning Policy Requirements and Design Responses

Manchester Core Strategy 2012 – 2027 (2012) & Future Manchester Climate Change Framework 2020-25		
Section	Policy Requirements	Design Response
EN 4 - Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development	All development must follow the principle of the Energy Hierarchy, being designed: - to reduce the need for energy through design features that provide passive heating, natural lighting and cooling - to reduce the need for energy through energy efficient features such as improved insulation and glazing - to meet residual energy requirements through the use of low or zero carbon energy generating technologies Wherever possible new development and retrofit projects, including energy generation plant, must be located and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies. Where possible new development and retrofit projects will be used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings. Where appropriate new development and retrofit projects will be required to connect to and/or make contributions to low or zero carbon energy schemes and/or to incorporate provision to enable future connection to any existing / potential decentralised energy schemes. The use of building materials with low embodied carbon in new development and refurbishment schemes.	The proposed Bellamy Court Extra Care development will follow the principles of the energy hierarchy by adopting a passive fabric-first approach to design before the use of renewable technologies. A full energy strategy is provided in Section 6 of this report, following an appraisal of a range of site specific measures in line with the 'Be Lean, Be Clean, Be Green' approach. A review of district heating opportunities is provided in Section 4 of this report, in line with current local development. The proposed development will be designed and constructed in line with the principles of BREEAM 2014,

		to ensure environmental impact is minimised where possible.
Policy EN 5 – Strategic Areas for low and zero carbon decentralised energy infrastructure	Within Manchester it is considered that the following strategic areas, indicated on the key diagram, will have a major role to play in achieving an increase in the level of decentralised, low and zero carbon energy supplies available: • The Regional Centre, which also includes the Oxford Road Corridor and Eastlands • District Centres and associated major development sites • Airport Strategic Site • Strategic housing location • Strategic employment locations Within these areas' new development, regeneration and retrofit projects, will be expected to take place in the context of more detailed proposals for decentralised low and zero carbon energy infrastructure in the form of energy proposals plans. The Council will work with all relevant stakeholders, which may include developers, landowners, residents, community groups, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward such plans. Where investment or development is being undertaken into or adjacent to a public building/asset or district heating network, full consideration shall be given to the potential role that these can have in providing an anchor load within a decentralised energy network or in creating opportunities for CO2 reduction funded by contributions.	The proposed Extra Care development on Abbey Hey Lane does not fall within a Strategic Area for decentralised development, as defined within the Manchester City Council Core Strategy 2012 – 2027. The proximity of the site to current decentralised energy networks is illustrated within Section 4 of this report.
Future Manchester Climate Change Framework 2020-25	A 15% improvement in current Building regs is the target set by MCCs new, unratified future energy policy.	The scheme will meet these objectives by utilising enhanced building fabric a communal ground source heat pump system to provide heating and hot water, along with low energy ventilation system

Policy EN 6 - Target Framework for CO2 reductions from low or zero carbon energy supplies	Applications for residential development of 10 or more units and all other development over 1,000m² will be expected as a minimum to meet the target for the defined areas below. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO₂ emissions for all phases of the development. The target framework relates to three broad development locations and their potential for low and zero carbon, decentralised energy. The areas are defined as follows: • Target 1 Network development areas: Locations where the proximity of new and existing buildings, the mix of uses and density of development provide the right conditions to support district heating (and cooling). • Target 2 Electricity intense areas: Locations where the predominant building type has an all-electric fit-out such as retail units and leisure complexes. • Target 3 Micro-generation areas: Locations where lower densities and a fragmented mix of uses tend to mean that only building scale solutions are practical. <table><tr><th>Target</th><th>% Minimum Requirement</th></tr><tr><td>Target 1: Network development area</td><td>CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010.</td></tr><tr><td>Target 2: Electricity intense buildings</td><td>+10% increase on Part L 2010</td></tr><tr><td>Target 3: Micro generation area</td><td>+15% increase on Part L 2010</td></tr></table>	Target	% Minimum Requirement	Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010.	Target 2: Electricity intense buildings	+10% increase on Part L 2010	Target 3: Micro generation area	+15% increase on Part L 2010	The proposed development consists of 106No. dwellings and is therefore within the threshold of a major development. The site does not sit within an area defined for development of low and zero carbon, decentralised energy. An overview of the site in relation to current decentralised networks in the region is provided in Section 4. The development will seek to provide emissions savings through a fabric first and energy efficiency approach. The use of highly efficient communal ground source heat pumps and an LED lighting scheme ensure energy consumption is minimised, prior to the application of a photovoltaic array.
Target	% Minimum Requirement									
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010.									
Target 2: Electricity intense buildings	+10% increase on Part L 2010									
Target 3: Micro generation area	+15% increase on Part L 2010									
Policy EN 7 – Energy Infrastructure opportunities	There will be a general presumption in favour of low and zero carbon decentralised energy schemes, subject to the following considerations: That any new generating plant capable of producing heat and cooling as well as electricity should be located in a way that facilitates future connection to a local distributed energy system.	An overview of the site in relation to current decentralised networks in the region is provided in Section 4, which confirms that no district heating / decentralised energy								

	• That any energy centre, including generating plant, standby/boiler plant and substations, shall be located and designed to a high quality so as to integrate with and contribute to the townscape. • Biofuels should be obtained from sustainable sources and processes and in a way that minimises transport impacts, following a sequential approach in order to minimise CO2 emissions – firstly prioritising local and regional sources, followed by national, European and international. • Consideration should be given to biofuel delivery by rail and waterways where possible. Where large-scale fuel or feedstock delivery is required by road the energy centre must be located in or adjacent to light industrial, industrial or leisure uses with any impact on local residential amenity minimised. • The cumulative impact of energy schemes will be taken into account when considering applications, to include modelled impacts on air quality and landscape character, with reference to Policy EN16. • Flood risk, through the Manchester-Salford-Trafford Strategic Flood Risk Assessment. In determining proposals for development, consideration will be given to the need to safeguard strategic energy sites and network routes, both proposed or existing, where these have been identified as having strategic significance for the delivery of low or zero carbon energy infrastructure or, would be required in order to achieve the successful regeneration of an area in line with targets for reducing carbon emissions.	schemes are currently within connection distance of the proposed development.
Policy EN 8 – Adaptation to Climate Change	All new development will be expected to be adaptable to climate change in terms of the design, layout, siting and function of both buildings and associated external spaces. In achieving developments which are adaptable to climate change developers should have regard to the following, although this is not an exhaustive list:	Sustainable design and construction measures for the proposed Extra Care facility are provided within Section 7. The proposed development will be designed and

	- Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rainwater permeability - Reduction in urban heat island effect through the use of Green Infrastructure such as green roofs, green walls, increased tree cover and waterways - The need to control overheating of buildings through passive design - The opportunity to provide linked and diverse green space to enhance natural habitats which will assist species adaptation Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street trees and waterways to contribute to compliance with CO2 mitigation under Policy EN6, subject to sufficient evidence to quantify their contribution to compliance.	constructed in line with the principles of BREEAM 2014. The design team will ensure that areas such as flood risk, passive design and a variety of ecological aspects, such as soft landscaping design, habitat management and habitat creation, are reviewed accordingly to minimise impact.
Supplementary Planning Document and Planning Guidance (2007)		
Section	Policy Requirements	Design Response
4.5 – Energy Efficiency	Part 1 Policy E1.5 encourages high standards of energy efficiency in new development. In the Environmental Standards Statement, developers should show how they have considered the steps necessary to reduce energy demand at the earliest stages of design. Developers should aim to reduce CO2 emissions by at least 25% more than the requirements of the current Building Regulations, which at present are Building Regulations: Approved Document L (2006) – ‘Conservation of Fuel and Power.’ The following design principles will assist developers in achieving energy efficiency targets: - Minimise reliance on energy-using equipment for heating, cooling, lighting and natural ventilation - Position trees and soft landscaping on and around the development and within buildings to provide natural shading, insulation and air conditioning - Integrate energy efficient micro-generation and community heating schemes, such as combined heat and power (CHP)	In line with the principles of the Be Lean, Be Clean, Be Green design philosophy, the proposed Bellamy Court Extra Court residential development seeks to provide a sufficient design solution that provides compliance with Building Regulations Part L1A. An early stage overview of these calculations is provided in Section 6. A review of decentralised energy and its feasibility for this site is also provided in Section 4.

	• Site layout and building design principles should maximise the capture and use of daylight and passive solar energy, whilst avoiding excessive solar gain in summer • Specify energy and water efficient appliances and systems	
4.6 – Renewable Energy	To reduce energy demand and the harmful impact of using energy from non-renewables, in line with UDP Part 1 Policy E1.5, developers should aim for at least 20% of final site energy demand to be met by on-site renewable energy technologies. Renewable energy targets can be achieved more readily by undertaking the measures suggested above reducing the total energy demand of the building. It is possible to produce developments that use 50% and even 100% energy from renewable sources. To achieve this, developers should: • Assess opportunities for integrating small- and large-scale renewable energy generation systems to improve the energy security of occupants and the neighbourhood, including siting of energy generation businesses on-site and export of surplus energy • Use a mix of technologies to help generation patterns match demand • Investigate energy generation opportunities before designing building envelopes or fixing their location, to optimise utilisation of wind, solar and geothermal resources • Consider final energy demand rather than building energy consumption in the selection and sizing of generation equipment • Explore opportunities to tackle waste and energy issues collectively through use of anaerobic digesters linked to CHPs (Combined Heat and Power devices) • Consider private wire networks as an alternative to grid connection and availability charges on larger developments.	A full appraisal of low and zero carbon technologies is provided in Section 5 of this report. Achieving compliance with Building Regulations Part L1A will be demonstrated through a passive fabric-first approach. A communal ground source heat pump system will be utilised to provide heating and hot water to all dwellings via a heat interface unit. An 3.25kW photovoltaic array will be installed to the landlords area, with energy generation confirmed below in Section 5 This ensures that the highest standards of fabric efficiency and energy efficiency are achieved, prior to applying renewable technologies to the development. The levels of the energy hierarchy are defined below in Section 3.

3. Methodology

The first step of the full energy strategy assessment has been to undertake a baseline energy assessment. The baseline energy assessment consists of calculating the total CO₂ emissions of the development to meet Building Regulations and then compare the proposed improvement measures against this baseline. Building Regulations Part L1A 2013 (SAP) applies to the development and provides carbon emissions from regulated energy.

The building can then be benchmarked/thermally modelled using the energy hierarchy:

1. Be Lean <i>A reduction in energy use as a result of passive design and energy efficiency</i>
Thermal performance of envelope (U-values) Glazing design Airtight construction Efficient mechanical ventilation and heat recovery Variable speed fans and pumps Energy Efficient lighting
2. Be Clean <i>A focus on supplying energy to the development through efficient means</i>
Connect to low carbon heat networks Develop site wide heat network from single energy centre On site CHP Provide energy efficient individual heating
3. Be Green <i>The installation of renewable technologies to meet energy demand where possible</i>
Consider the feasibility of renewable energy technologies Assess the integration of renewable technologies based on the above measures

The development must be provided with energy savings through the use of thermal improvements to fabric (a 'fabric first' approach), followed by other clean energy solutions (energy efficiency improvements, district heating, etc...) and finally the use of renewable energy technologies, where

practical. This hierarchy complements the integrated approach to the sustainable energy objectives advocated through Manchester City Council local policy.

The planning policies require a full review of the technical and economic feasibility of the following renewable technologies:

- Biomass heating
- Biomass combined heat and power
- Solar hot water
- Solar photovoltaic
- Ground source heat pumps
- Air source heat pumps / exhaust air heat pumps
- Wind power

To achieve the targets set the development must achieve a balance between fabric, heating and control, ventilation and air leakage improvements, the amount of zero or low carbon technology installed and the capital, life cycle and running costs and maintenance and operation.

Feasible renewable energy technologies have been considered during the assessment to ensure the most suitable renewable energy is chosen for the demands of this scheme. The pros and cons of each technology with respect to this site are considered as part of this statement.

4. District & Communal Heating Networks

This section outlines how consideration of energy supplied efficiently from a district heating network can be provided to the development in line with the energy hierarchy.

4.1. Decentralised Heating Networks

The energy policy reaffirms the view that energy generated by centralised power stations and transmitted through the national grid is highly inefficient and wasteful.

One of the priorities for reducing CO₂ emissions is to reduce reliance on centralised power stations. This means increasing the use of local, low-carbon energy supplies through de-centralised energy systems.

De-centralised plant generally means any heating and hot water and/or electricity generation provided on a district wide (DHN) or site wide (CHN) basis. DHN and CHN can typically include combined heat and power equipment (CHP). CHP is an engine which, when running, generates electricity and heats water which can then be distributed around a development.

Benefits of district heating networks can include:

- Provision of low carbon / lower cost heat to domestic and commercial customers
- Diversification of the energy mix
- Reductions in region-wide carbon emissions
- Targeting and reduction of fuel poverty
- Potential long-term revenue streams for local authorities
- Alignment with regeneration programmes
- Driving the growth of the low carbon services sector

However, there are currently no existing district heating networks within proximity to the site, and the development of a decentralised system would not be feasible or beneficial for a project of this scale. An extract from The Association for Decentralised Energy's District Heating Installation Map is provided in Figure 3. This confirms that the nearest existing network is an existing residential network in Longsight, around three miles west of the Abbey Hey Lane site.

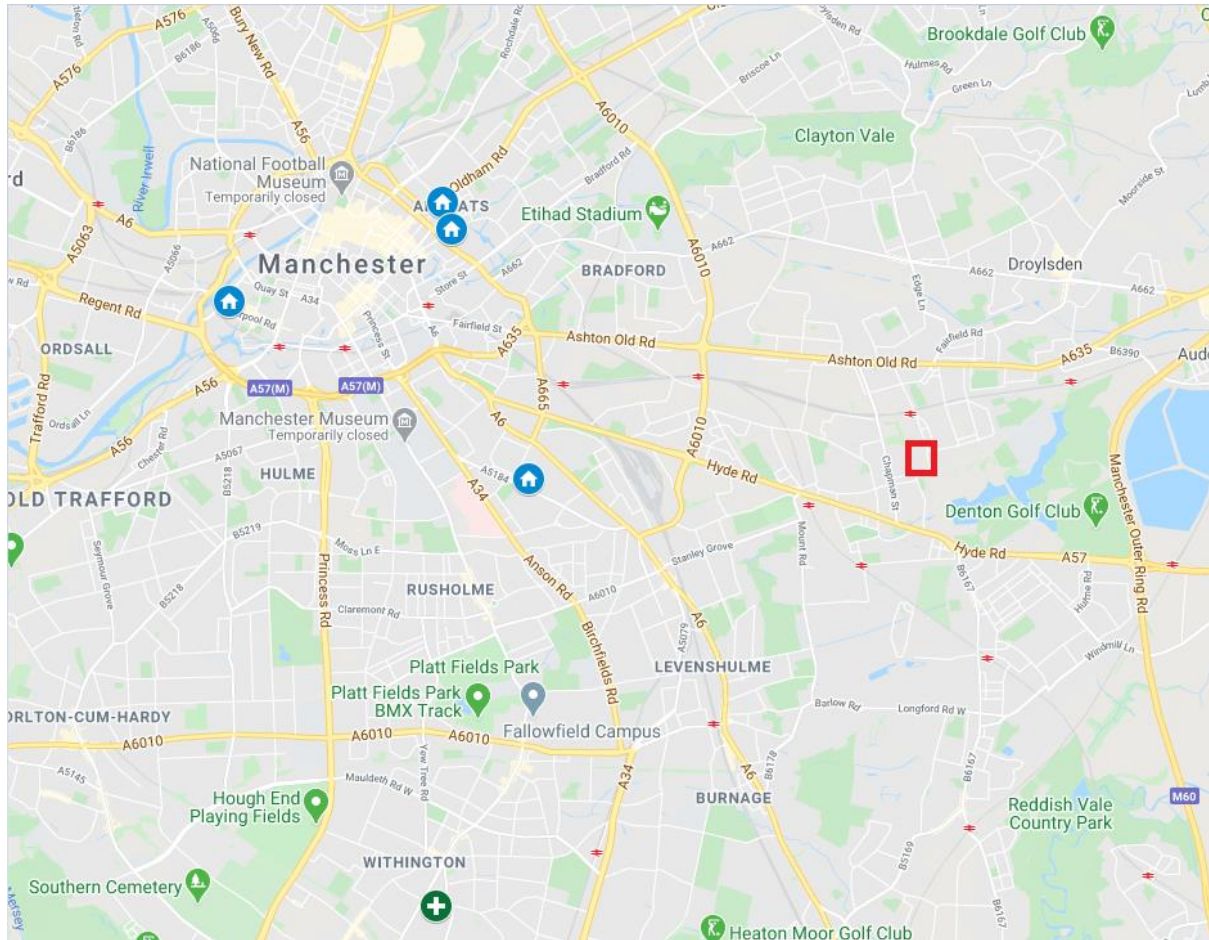


Figure 3 – Location of site (marked in red) in relation to current local heat networks

5. Renewable Energy Technologies

Energy Council have reviewed options for the use of on-site renewable energy / Low or Zero Carbon Technology (LZCT) in line with the policy aspirations of Manchester City Council.

This renewable energy statement/strategy reviews the technical and economic feasibility of the following technologies –

- Solar Photovoltaic
- Solar Hot Water
- Ground Source Heat Pumps
- Air Source Heat Pumps / Exhaust Air Heat Pumps
- Micro Wind Power
- Biomass

5.1. Photovoltaics (PV)

Photovoltaic panels convert sunlight into electricity to run lights and appliances. Photovoltaic panels use cells to convert light into electricity. A PV cell normally consists of 1 or 2 layers of a semi conducting material such as silicon. When light shines on a cell it generates energy causing electricity to flow, the higher the light intensity is, the more electricity flows.

The amount of energy PV cells generate is referred to as Kilowatt Peak (KWp). PV arrays now come in a variety of shapes and

colours, ranging from grey 'solar tiles' that look like roof tiles to panels and transparent cells that you can use on conservatories and glass to provide shading as well as generating electricity. Solar panels are not light and the roof must be strong enough to take their weight, especially if the panel is placed on top of existing tiles. For flat roofs the panels can be mounted on A-frames to give the optimum angle.

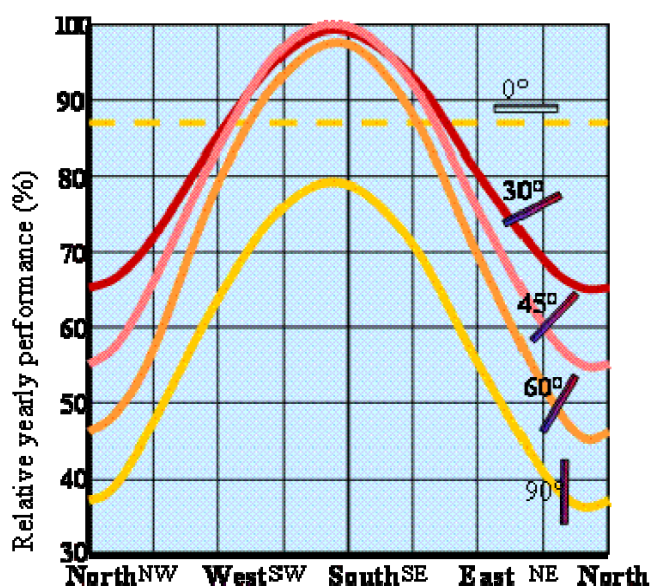


Figure 4 - Performance of photovoltaic panel orientation

The optimum panel inclination for solar collection is 35°, oriented due south; however panels that are inclined between 35° and 45° and oriented south of west or east are generally suitable. If solar collectors are oriented away from due south then a larger surface area will be required to generate a set amount of energy. The effect of non-optimal orientation is illustrated by the graph in Figure 4.



Figure 5 - Photovoltaic array on a pitched roof

A rooftop photovoltaic panel array has been specified for this development, due to the minimal installation and maintenance requirements. A 3.25kWp total array roof mounted on the apartments facing South provides a reduction on carbon emissions and has been applied to the communal aspect of the development. 3.25kWp of PV equates area of approximately 21m².

5.2. Solar Thermal HW Panels

Solar panel heating uses the radiant energy from the sun to heat water, most commonly for domestic hot water needs. There are two types of collectors used for solar water heating – flat plate collectors and evacuated tubes collectors. The systems function successfully in all parts of the UK, as they can work in diffuse light conditions. The collector should be mounted on a 10-60 degrees pitch facing south, although other variations can be used, south is the most efficient.

The cost of installing the system is dependent on the distance between the solar collector and the hot water storage and therefore costs vary. The closer the collectors are to the water storage, the less pipe work will be required. Annual maintenance

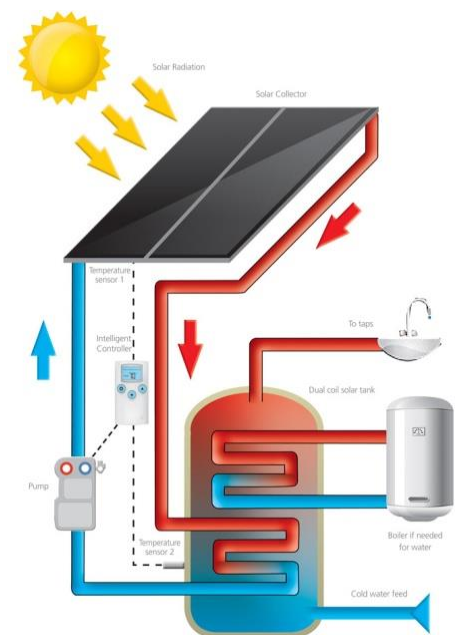


Figure 6 - The principles of a solar thermal system

checks are recommended. The solar collectors are connected to a condensing boiler via a HW cylinder with twin coil.

They are a 'simple' and guaranteed technology which will act as a pre-heat for the Hot Water and Heating usage. Payback between capital cost and energy saving can normally be achieved within 12 – 20 years, subject to usage type.

The use of solar thermal panels work best in conjunction with individual heating systems for dwellings. The orientation of the development is fine for the utilisation of solar water heating to provide domestic hot water however it is not expected to achieve significant carbon savings due to the levels of hot water usage.

5.3. Ground Source Heat Pump (GSHP)

GSHPs have been developed specifically for the housing market and are now considered to be an established reliable technology. The GSHP would be sized to cater for the heating and domestic hot water requirements. Typically, they are more suited to apartments as a centralised system would be installed with multiple bore holes to a depth of up to 125 metres depending on the ground conditions. GSHPs use a heat exchanger to extract heat from the earth.

The efficiency of ground source heat pumps is measured by Co-efficient of Performance (CoP), this is the ratio of units of heat output for each unit of electricity used to drive the compressor and pump for the ground loop. Average CoP is around 2-4 although some systems may produce a greater rate of

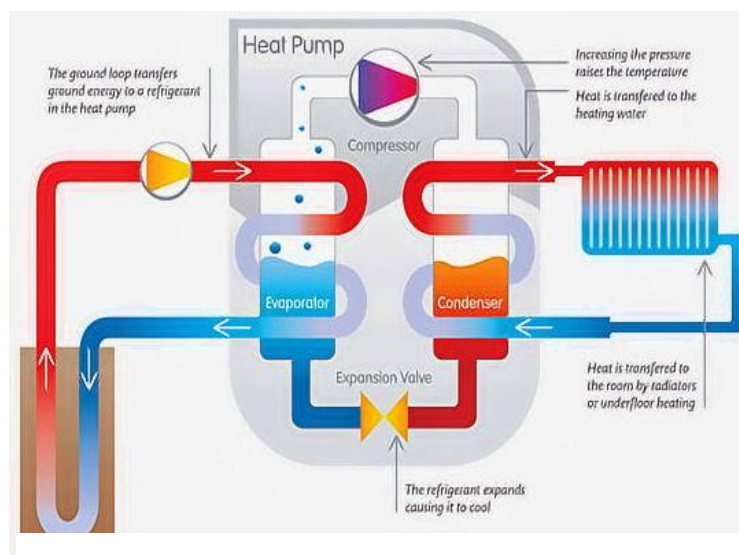


Figure 7 - Principles of a GSHP system

efficiency. This means that for every unit of electricity used to pump the heat, 2-4 units of heat are produced, making it an efficient way of heating a building. If grid electricity is used for the compressor and pump, then there is the opportunity to consider a range of energy suppliers to benefit from the lowest running costs, for example by choosing an economy 10 or economy 7 tariff.

Due to the scale of this development, GSHPs are considered an appropriate design solution and have been utilised within the design of the apartments. A communal ground source heat pump system has been designed to provide heating and hot water to each apartment via individual heat interface units

5.4. Air Source Heat Pump/Exhaust Air Heat Pump

Air source heat pumps (ASHP) and exhaust air heat pumps (EAHP) work in a similar way to GSHP. Air source heat pumps can be fitted on the external façade or in the roof space. An air source heat pump uses small amounts of electricity to take in large quantities of air and extract heat. The efficiency of ASHP is measured by Coefficient of Performance (CoP); this is the ratio of units of heat output for each unit of electricity used to drive the system. Average CoP is around 2-4 although some systems may produce a greater rate of efficiency.

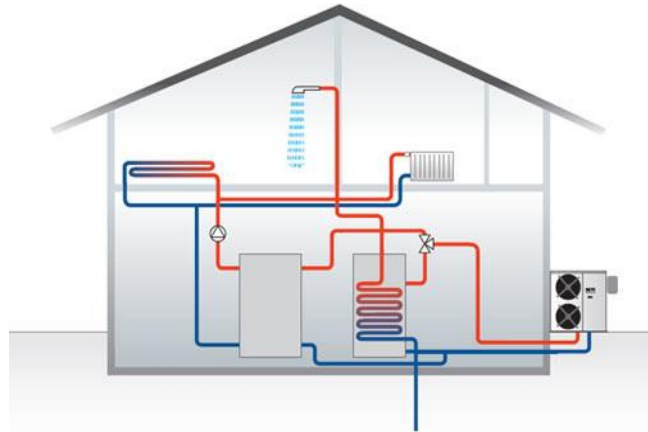


Figure 8 - Principles of an ASHP system

Exhaust air heat pumps such as the NIBE F370 work in a similar manner to ASHP units but have only indoor units (no outdoor compressors) and in addition they also recover heat from their integral exhaust air ventilation system. These units work well on apartment blocks and dwellings where mains gas is unavailable or unsuitable for a development. They are expensive in terms of capital cost of the equipment, installation and the enhanced structural requirements.

ASHPs are not required for this development, as there is not likely to be sufficient cooling demand. The use of high-efficiency combi boilers will instead be used with a high level of thermal efficiency in line with the principles of the 'Be Lean, Be Clean, Be Green' energy hierarchy.

5.5. Micro Wind Power

Wind power is one of the cleanest and safest methods of generating electricity. However, wind power is unfeasible due to the fact the development is in an urban area and local wind conditions would not be sufficient to provide enough power. Most small wind turbines generate Direct Current (DC) electricity. Systems that are not connected to the national grid require battery storage and an inverter to convert DC electricity into Alternating Current (AC) which is mains electricity.

There are two types of wind turbine available:

- Roof mounted – Installed on the roof of the development
- Mast mounted – Which are free standing

Important issues to consider when using wind turbines are:

- Wind speed increases with height so it's best to have the turbine high on a mast or tower.
- The ideal site is a smooth top hill with a flat, clear exposure, free from excessive turbulence and obstructions such as large trees, dwellings or other buildings.
- Small scale wind power is particularly suitable for remote off grid locations where conventional methods of supply are expensive or impractical.
- Where the local annual average wind speed is 6 m/s or more.
- Where there are no significant nearby obstacles such as buildings, trees or hills that are likely to reduce the wind speed or increase turbulence



Figure 9 - Mounted wind turbine

As this development is in an urban area there will be obstacles which reduce wind speed. The average wind speed in this area is 4.7 m/s at a height of 10 metres, which is less than the 6 m/s required. Therefore, micro wind is not a viable technology for this development.

5.6. Biomass

Biomass is a generic name for any fuel produced from organic sources and falls into mainly two categories:

- Woody biomass- forest products, untreated wood products, energy crops and wood pellets
- Non-wood biomass – liquid biofuels (such as biodiesel, bioethanol) or animal waste industrial municipal products and high energy crops such as rape seed, sugar cane and maize.

For domestic properties the fuel used is normally wood pellets, wood chips or wood logs. For larger applications, biomass boilers replace conventional fossil fuel boilers and come with an automated feed by screw drives from hoppers.

Biomass systems require more cleaning than gas or oil boilers and they must be capable of being taken out of service for cooling and cleaning whilst maintaining the building heating supply particularly in communal heating systems. Centralised gas boilers are therefore still required to support the biomass

boiler, which would be the lead boiler. The size of the dedicated plant rooms is substantial. Fuel availability, delivery and storage are also important issues to consider.

Air quality issues are also an important factor when looking to install biomass. The cost of the fuel depends on the type, delivery distances and whether it is obtained as simple waste product or from another organisation. The cost of wood pellets is currently a little more expensive than mains gas, and woodchip is approx. 30% cheaper, however prices are fluctuating rapidly in the bio-fuel market at the present time creating uncertainty over their take up.



Figure 10 - Biomass boiler and hopper

Biomass CHP is still relatively new to the UK market and is more suitable to large developments where energy demand does not require significant modulation. There are technical issues with small scale Biomass CHP and until these can be resolved and proven the take up of these systems in the UK and Europe has been slow.

Overall carbon savings of 40%+ are achievable with biomass technology. Biomass is more suited to a communal heating system; there is insufficient space to accommodate the equipment and fuel storage to facilitate a biomass boiler. Furthermore, there are noise and air quality issues associated with this type of technology. For this reason, biomass is discounted.

6. Energy Assessment of Proposed Scheme

Energy Council have undertaken a preliminary emissions assessment based on current Building Regulations ADL1A (2013) and using the SAP 2012 assessment methodology, taking into account solutions that must not only be energy efficient but also practical, reliable and user friendly.

The proposed Bellamy Court Extra Care development has adopted the principles of the 'Be Lean, Be Clean, Be Green' approach. The thermal performance of the modelled elements in the proposed development is indicated in Table 4. Full specification details are provided within section 9.1.

Table 4 - Fabric efficiency for the preliminary ADL1A Bellamy Court Extra Care residential development

	U-value (W/m ² K)	G-Value
Ground Floor	0.16	n/a
External Wall	0.25	n/a
Conventional Roofs	0.09	n/a
Sloping + Flat Roofs	0.15	n/a
External Glazing	1.50	0.63 North 0.48 South/East/West
Door	1.40	n/a

Energy Council have carried out design SAP 2012 calculations for the dwellings. To meet compliance with Building Regulations Part L1 (2013), the Dwelling Emissions Rate (DER) must be lower than or equal to the Target Emissions Rate (TER). SAP 2012 is the Governments Standard Assessment Procedure (SAP) for calculating the energy aspects of a dwelling. SAP is a measure of fuel costs for heating, hot water and lighting for a dwelling. SAP 2012 can also be used to ascertain the energy requirements of a development.

To assess the baseline emissions (TER), we must make an estimation of the energy demands based on the current Building Regulations methodology in order to set a target upon which the actual development can be compared.

All 106 plots have been calculated as a benchmark to establish an accurate assessment.

The most practical and economically feasible solution for the development is a good quality thermally insulated fabric, airtight envelope, passive improvements and the use of highly efficient building services to condition spaces.

The results in Table 5 indicate that a 17.9% improvement can be achieved through the adoption of passive design techniques, energy efficiency systems and finally the use of low or zero carbon technologies. This provides a 2,398 kg reduction in annual carbon emissions above Part L1A (2013) compliance.

Table 5 - Results of preliminary model Part L1A (2013) calculations

Ref.	Type	Area (m ²)	SAP	TER	DER	Improv. Factor (%)	Target Carbon Emissions (Kg CO ₂ /yr)	Designed Carbon Emissions (Kg CO ₂ /yr)
Z26387	Flat 1	61.23	83	24.57	13.72	44.16	1,504	840
Z26388	Flat 2	61.23	83	23.59	13.88	41.15	1,444	850
Z26389	Flat 3	61.23	83	23.59	13.88	41.15	1,444	850
Z26390	Flat 4	61.23	83	23.59	13.88	41.15	1,444	850
Z26391	Flat 5	61.39	82	26.46	15.29	42.22	1,624	939
Z26392	Flat 6	61.44	83	25.35	14.68	42.09	1,558	902
Z26393	Flat 7	52.58	83	24.66	14.29	42.05	1,297	751
Z26394	Flat 8	52.58	83	24.66	14.29	42.05	1,297	751
Z26395	Flat 9	52.58	83	24.66	14.29	42.05	1,297	751
Z26396	Flat 10	52.58	83	25.76	14.72	42.85	1,354	774
Z26397	Flat 11	59.99	84	22.28	13.27	40.44	1,337	796
Z26398	Flat 12	61.22	83	23.57	13.88	41.12	1,443	850
Z26399	Flat 13	61.22	83	23.57	13.88	41.12	1,443	850
Z26400	Flat 14	61.22	83	25.01	14.62	41.55	1,531	895
Z26401	Flat 15	61.44	83	25.41	14.8	41.75	1,561	909
Z26402	Flat 16	62.28	83	23.35	13.76	41.07	1,454	857
Z26403	Flat 17	62.28	83	23.35	13.76	41.07	1,454	857
Z26404	Flat 18	51.42	83	25.17	14.5	42.4	1,294	746
Z26405	Flat 19	51.42	83	25.17	14.5	42.4	1,294	746
Z26406	Flat 20	51.42	83	25.17	14.5	42.4	1,294	746
Z26407	Flat 21	51.42	83	25.17	14.5	42.4	1,294	746
Z26408	Flat 22	61.39	83	25.16	14.82	41.1	1,545	910
Z26409	Flat 23	61.44	82	25.59	15.11	40.95	1,572	928
Z26410	Flat 24	61.23	83	23.58	13.88	41.13	1,444	850
Z26411	Flat 25	51.42	83	24.95	14.44	42.12	1,283	743
Z26412	Flat 26	57.1	83	26.96	14.15	47.51	1,539	808
Z26413	Flat 27	62.9	83	27.13	14.62	46.1	1,706	920
Z26414	Flat 28	62.65	84	24.72	13.2	46.6	1,549	827
Z26415	Flat 29	62.65	85	20.23	11.13	44.99	1,267	697
Z26416	Flat 30	62.65	85	20.23	11.13	44.99	1,267	697
Z26417	Flat 31	62.65	85	20.23	11.13	44.99	1,267	697
Z26418	Flat 32	62.65	85	20.23	11.13	44.99	1,267	697

Z26419	Flat 33	64.34	85	21.75	12.03	44.69	1,399	774
Z26420	Flat 34	62.9	84	22.18	12.31	44.51	1,395	774
Z26421	Flat 35	51.42	85	21.54	11.6	46.15	1,108	596
Z26422	Flat 36	51.42	85	21.54	11.6	46.15	1,108	596
Z26423	Flat 37	51.42	85	21.54	11.6	46.15	1,108	596
Z26424	Flat 38	51.42	85	21.54	11.6	46.15	1,108	596
Z26425	Flat 39	59	84	23.79	12.7	46.63	1,404	749
Z26426	Flat 40	61.22	84	23.05	12.51	45.74	1,411	766
Z26427	Flat 41	61.22	84	23.05	12.51	45.74	1,411	766
Z26427	Flat 42	59.3	86	19.21	10.56	45.03	1,139	626
Z26429	Flat 43	61.2	85	20.21	11.1	45.08	1,237	679
Z26430	Flat 44	61.2	85	20.21	11.1	45.08	1,237	679
Z26431	Flat 45	62.7	85	21.62	11.93	44.81	1,356	748
Z26432	Flat 46	62.92	84	22.2	12.37	44.27	1,397	778
Z26433	Flat 47	61.22	85	20.21	11.1	45.07	1,237	680
Z26434	Flat 48	61.22	85	20.21	11.1	45.07	1,237	680
Z26435	Flat 49	51.42	85	21.78	11.67	46.41	1,120	600
Z26436	Flat 50	51.42	85	21.78	11.67	46.41	1,120	600
Z26437	Flat 51	51.42	85	21.78	11.67	46.41	1,120	600
Z26438	Flat 52	51.42	85	21.78	11.67	46.41	1,120	600
Z26439	Flat 53	62.87	84	22.97	12.65	44.93	1,444	795
Z26440	Flat 54	62.92	84	23.62	13.09	44.59	1,486	824
Z26441	Flat 55	62.7	85	20.52	11.3	44.94	1,287	709
Z26442	Flat 56	52.89	85	21.87	11.84	45.86	1,157	626
Z26443	Flat 57	52.89	82	27.61	15.47	43.97	1,460	818
Z26444	Flat 58	51.36	83	27.32	14.2	48.03	1,403	729
Z26445	Flat 59	57.1	83	25.68	13.98	45.57	1,466	798
Z26446	Flat 60	62.9	83	25.66	14.38	43.96	1,614	905
Z26447	Flat 61	62.65	84	23.56	13.05	44.61	1,476	818
Z26448	Flat 62	62.65	84	23.56	13.05	44.61	1,476	818
Z26449	Flat 63	62.65	84	23.56	13.05	44.61	1,476	818
Z26450	Flat 64	62.65	84	23.56	13.05	44.61	1,476	818
Z26451	Flat 65	62.65	84	23.56	13.05	44.61	1,476	818
Z26452	Flat 66	64.34	83	24.64	13.52	45.13	1,585	870
Z26453	Flat 67	62.9	82	27.29	15.41	43.54	1,717	969
Z26454	Flat 68	51.42	84	24.99	13.67	45.31	1,285	703
Z26455	Flat 69	51.42	84	24.99	13.67	45.31	1,285	703
Z26456	Flat 70	51.42	84	24.99	13.67	45.31	1,285	703
Z26457	Flat 71	51.42	84	24.99	13.67	45.31	1,285	703
Z26458	Flat 72	59	84	23.35	13.08	43.98	1,378	772
Z26459	Flat 73	61.22	84	22.04	12.44	43.55	1,349	762
Z26460	Flat 74	61.22	84	22.04	12.44	43.55	1,349	762
Z26461	Flat 75	59.3	84	22.75	12.79	43.78	1,349	758
Z26462	Flat 76	61.2	85	20.21	11.1	45.07	1,237	679

Z26463	Flat 77	61.2	85	20.21	11.1	45.07	1,237	679
Z26464	Flat 78	62.7	85	21.62	11.93	44.81	1,356	748
Z26465	Flat 79	62.92	84	22.2	12.35	44.36	1,397	777
Z26466	Flat 80	61.22	85	20.2	11.1	45.06	1,237	680
Z26467	Flat 81	61.22	85	20.2	11.1	45.06	1,237	680
Z26468	Flat 82	51.41	85	21.54	11.6	46.15	1,107	596
Z26469	Flat 83	51.41	85	21.54	11.6	46.15	1,107	596
Z26470	Flat 84	51.41	85	21.54	11.6	46.15	1,107	596
Z26471	Flat 85	51.41	85	21.54	11.6	46.15	1,107	596
Z26472	Flat 86	62.87	84	22.97	12.65	44.93	1,444	795
Z26473	Flat 87	62.92	84	23.69	13.13	44.57	1,491	826
Z26474	Flat 88	62.7	85	20.52	11.3	44.94	1,287	709
Z26475	Flat 89	52.89	85	21.87	11.84	45.86	1,157	626
Z26476	Flat 90	52.89	83	26.35	14.33	45.62	1,394	758
Z26477	Flat 91	51.4	84	23.52	13.14	44.14	1,209	675
Z26478	Flat 92	52.89	83	25.34	13.9	45.14	1,340	735
Z26479	Flat 93	61.2	84	23.58	13.06	44.6	1,443	799
Z26480	Flat 94	61.2	84	23.58	13.06	44.6	1,443	799
Z26481	Flat 95	62.7	83	24.3	13.5	44.44	1,524	846
Z26482	Flat 96	62.92	83	24.76	13.77	44.39	1,558	866
Z26483	Flat 97	61.22	84	23.57	13.06	44.6	1,443	800
Z26484	Flat 98	61.22	84	23.57	13.06	44.6	1,443	800
Z26485	Flat 99	51.41	84	24.99	13.67	45.31	1,285	703
Z26486	Flat 100	51.41	84	24.99	13.67	45.31	1,285	703
Z26487	Flat 101	51.41	84	24.99	13.67	45.31	1,285	703
Z26488	Flat 102	51.41	84	24.99	13.67	45.31	1,285	703
Z26489	Flat 103	62.87	83	25.73	14.24	44.65	1,618	895
Z26490	Flat 104	62.92	83	26.39	14.65	44.49	1,660	922
Z26491	Flat 105	62.7	84	23.6	13.03	44.79	1,480	817
Z26492	Flat 106	62.7	84	23.6	13.03	44.79	1,480	817
Total						44.29%	144,387	80,436

7. Sustainable Design & Construction

The design currently includes a number of components that gives the scheme a solid grounding in relation to sustainability. The list below is not exhaustive but spans a range of areas covered within the now-withdrawn Code for Sustainable Homes assessment methodology.

7.1. Management

- The contractor will utilise the Considerate Constructors Scheme and aim for a best practise standard, which is a score of 35+ with a minimum score of 7 in each category, at the final CCS visit.
- The contractor will manage and monitor environmental issues during construction process. This will include the monthly monitoring and management of energy and water consumption of site activities, separation, streaming and recycling of waste, the reduction of air, dust and ground pollution.

7.2. Health and Wellbeing

- External lighting to the proposed development will be highly efficient and will comply with all current guidelines and regulations.
- Safety issues will incorporate recommendations from a CPDA or ALO input no later than RIBA stage 2, wherever practicable.

7.3. Energy

- The development will be designed and constructed to achieve low energy and carbon dioxide emissions, improving upon current Building Regulations Part L 2016 using the Be Lean, Be Clean, Be Green energy hierarchy.
- Sub-metering of all major energy consuming systems will be provided to differentiate between energy loads for heating and hot water, lighting and small power consumption.
- Dedicated energy efficient lighting will be installed internally and externally. Movement and daylight-controlled lighting will be introduced, where practicable. The efficacy and colour rendering index ratings will be considered.
- Unregulated energy demand will be assessed and minimised where possible through the selection of energy-efficient appliances and systems.

7.4. Transport

- A travel plan has not been carried out at the preliminary stages of the project due to the small scale and low trip rates of the development, however a transport assessment has been carried out.

7.5. Water

- The proposed development will be fitted with a water meter and units will incorporate water saving and efficiency measures that comply with Regulation 36(2)(b) of Part G2 of the Building Regulations to ensure that a maximum of 105 litres of water is consumed per person per day. Suggested water appliance details are shown in Table 6.
- Internal water consumption will be reduced using low flush/ flow appliances. This will include appliances such as aerated/ flow regulated taps, low-flow showers, low-flush WC's, low-flush urinals, PIR control on main water supply to all toilet areas, etc. and where practicable.
- Flow control devices will be installed to sanitary fittings, where practicable.
- Where areas use more than 10% of the buildings predicted total water usage, sub-metered pulsed output meters will be considered.

Table 6 - Recommend water consumption for residential fittings

Sanitary fittings	Flow rate or capacity		Consumption (L/person/day)
WC (Full Flush)	4	L/flush	13.53
WC (Half Flush)	2.6	L/flush	
Hand Basin Tap	3	L/min	6.32
Shower	6	L/min	43.7
Bath	140	L/capacity	15.40
Kitchen Tap	4	L/min	12.12
Washing Machine	8.17	L/kg dry load	17.16
Dishwasher	1.25	L/place setting	4.50
Total	Incl. normalization factor 0.91		104.18

7.6. Materials

- All building and construction materials used on the schemes will aim to be sought from environmentally managed accreditation schemes, (such as EMAS/ ISO 14001 accreditation). All timber will be sourced from a certified chain of custody. All other building materials on this project will be responsibly sourced, where practicable.

- The building will incorporate suitable durability and protection measures or designed features/solutions to prevent damage to vulnerable parts of the internal and external building and landscaping elements
- Insulation will have low environmental impact in use and during manufacture. This is measured via the insulation index rating.

7.7. Waste

- A SWMP will be used on this site, with at least 80% of all waste being diverted from landfill.
- Construction waste will be minimised where possible, with a target of >8 tonnes/100m² GIFA. Where possible, initiatives to maximise the re-use or recycling of waste will be encouraged.

7.8. Ecology and Land-use

- The contractor will enlist the help of a suitably qualified ecologist to recommend appropriate ecological features that will positively enhance the ecology of the site.
- Protection and mitigation measures will be introduced, where practicable, to reduce the impact of the development on the existing site and to enhance the development.
- Ecological improvement will be undertaken to enhance the ecological value of the site once the development is built, wherever practicable.

7.9. Pollution

- A flood risk assessment has been undertaken, with the results of which guiding a drainage design that ensures surface water run-off, flooding in the case of drainage failure and watercourse pollution are minimised.
- A surface drainage plan and report is also provided.
- Reduction of night-time light pollution using ILE compliant light fittings will be installed, where practicable.

8. Conclusions

The approach for the proposed Bellamy Court Extra Care development is to embed sustainability into the heart of the development through the 'Be Lean, Be Clean, Be Green' design hierarchy. The proposed design is predicted to reduce the total carbon emissions by 63,951 Kg/CO₂/yr from the baseline emissions of 144,387 kg/CO₂/yr. This equates to a 44.29% carbon reduction from the calculated baseline regulated emissions. Measures will include:

- 1) Enhanced building fabric to meet Building Regulation ADL1A (2013)
- 2) Enhanced air tightness and thermal bridging
- 3) Heating will be provided by highly efficient communal ground source heat pump system
- 4) Hot water will be provided by ground source heat pump system
- 5) Ventilation will be provided through a System 3 type MEV extract system
- 6) Lighting will be provided to all areas by LED-type fittings
- 7) A photovoltaic panel array is provided totalling 3.25kWp for the development mounted on the roof facing **South West**. 3.25kWp will be supplied to the communal areas of the development

8.1. Low/ Zero Carbon Technologies Review

- Photovoltaic panels are specified for this development to be utilised on the apartment block equally distributed, ensuring energy efficiency and carbon savings can be maximised. A rooftop array totalling 3.25kWp is proposed.
- Solar Thermal Hot Water is not considered a viable option as there is no storage space for water tanks and an accurate estimate of hot water demand is not known; however, it is not expected to be a major energy contributor.
- Biomass has been discounted as it poses problems in terms of air quality, delivery of fuel, storage and transportation for deliveries, etc. It would require a centralised larger plant space for storing fuel, which is not suitable.
- Micro-wind turbines do not work on this type of development due to problems with wind turbulence and mounting of the units. The wind speeds in the area are not conducive to wind power electricity generation and there would be issues with turbulence, wind shading and noise.
- Ground Source Heat Pumps are chosen for the project to provide heating and hot water to each of the apartments.

- ASHP units have not been specified for this development due to the development having a minimal cooling demand, as well as the increased maintenance and financial impact on the development that utilising ASHPs would have.

An overall 44.29% improvement in CO₂ emissions above the Building Regulations Part L1A (2013) baseline is proposed to support our application and to meet policy requirements.

Table 7 - Summary of Carbon Emissions

	Total CO ₂ Emissions (KgCO ₂ /yr)
Baseline Emissions of Development (pre-improvement)	144,387
Proposed Strategy	80,436
Total Reduction in Carbon (KgCO₂/yr)	63,951
Percentage Improvement in Carbon Emissions (over Building Regulations ADL1A 2013)	44.29%

Several sustainable initiatives will be implemented by the project team and commitments have been identified to further improve the environmental and sustainability profile of the proposed development in the future stages of the design and construction processes. This will offer building occupiers, and the surrounding area added benefits in terms of quality of living standards, lower energy and water bills and enhanced/improved surroundings and facilities.

- A preliminary assessment has been undertaken to review how the orientation, layout, design and materials used in the construction of the development will impact on the sustainability. A range of improvements have been listed in Section 7.
- Water efficiency will be promoted throughout the development through the incorporation of water efficient fittings and water metering. Reduction in water usage indirectly impacts on energy usage embodied carbon reductions through water treatment.
- Procurement and construction processes will be carried out to minimise the environmental impacts of materials, with sustainable locally sourced and/or recycled materials being selected wherever practicable. This also impacts on embodied carbon and energy usage.
- The development provides compliance with the sustainability measures in Manchester City Council local policy through a holistic range of sustainability and energy efficiency measures to ensure impact is minimised.

Based on the range of energy, carbon and sustainability measures proposed within this Environmental Standards Statement it is hoped the proposal for the Bellamy Court Extra Care development is viewed favourably.

9. Appendices

9.1. Energy Model Inputs for Part L1A (2016) Compliance

Item	Brief description	Notes	Confirm
	The following information is required for the design submission (as requirements of approved doc L1A)	Please note submission is now in two stages. A) Design , B) As installed	
1. Dwelling Type			
1.1	Building Regulations Part L1A (2016) apply.		
1.2	Electricity is supplied by standard tariff rather than economy 7, 10 or 24.	<i>Assumed standard tariff</i>	
1.3	Dwellings have a medium thermal mass parameter.	<i>Cavity wall construction</i>	
1.4	Full address is:	Bellamy Court Extra Care, Abbey Hey Lane, Openshaw, Manchester	
2. Floor Construction Details			
2.1	Ground floor achieving the U-value stated opposite. Typically, 150mm EPS 100 (Jablite) insulation	U-value = 0.16-0.18W/m ² K (P/A ratio) λ of insulation = 0.036 W/mK	
2.2	Upper Heat Loss floors (where present). 200mm MWQ.	U-value = 0.18 W/m ² K	
2.3	Party Floors	E-FC-14,16 or 17 or similar approved RSD to enhance performance	
3. Wall Construction Details			
3.1	Main external wall is an insulated cavity wall to achieve the U-value indicated opposite.	U-Value = 0.25 W/m ² K	
3.2	Semi-exposed wall to unheated spaces are same construction as 3.1 (where present) and are insulated to achieve the U-value stated opposite.	U-value = 0.22 W/m ² K	
3.3	Party walls and walls to corridors and other circulation and communal spaces are fully filled (insulated) and cavity sealed to achieve the U-value indicated opposite. (all corridors/ stairwells etc. are to be heated)	U-value = 0.00 W/m ² K E-WM-17 or equivalent	
3.4	All corridors/ stairwells, circulation spaces and communal areas, meeting rooms and offices etc. are to be heated E-WM-17.	Heated communal and corridor/ stairwell	
4. Roof Construction Details			
4.1	Conventional lofts are insulated with 500mm mineral wool to achieve the U-value opposite.	U-Value = 0.09 W/m ² K	
4.2	Flat roof areas are insulated with 150mm PIR to achieve the U-value opposite.	U-value = 0.15 W/m ² K	
4.3	Sloping roof areas are insulated with 100mm PIR between rafters and overdrawn with 50mm PIR to achieve U value opposite	U-value = 0.15 W/m ² K	
5. Openings			
5.1	Main external doors to the extra care are installed to achieve the U-value opposite. Doors to apartments and bedrooms open onto heated corridors/ circulation space and are not classed as external	U-value = 1.4 W/m ² K average glass and frame U-value	
5.2	All double-glazed windows, roof lights and patio doors with Low-e glass to achieve the U-value opposite.	U-value = 1.5 W/m ² K average glass and frame U-value. G=0.63 as standard G-value 0.48 for all windows on South, West and East elevations G-value 0.35 for any rooflights	
6. Ventilation			
6.1	This Design Stage SAPs & SBEM calculation assumes an air permeability as opposite	5m ³ /m ² /hr at 50pa on the dwellings and non-dwellings	

		All apartments to be tested, or an air leakage rate of 3m ³ /m ² /hr @ 50Pa required	
6.2	Dwelling: Mechanical ventilation to the Apartments is to be centralised system 3 MEV	As Vent Axia Sentinel Multivent or equal and approved	
6.3	Non-dwelling: Mechanical ventilation to the following communal areas is to be continuously running System 3: Activity room, Communal WCs, Staff shower room, Communal kitchen, Buggy Stores, Cleaner's stores, Laundry, Refuse room and other areas as identified on M&E spec	SFP = 0.4 W/l/s	
6.4	Non-dwelling: Mechanical ventilation to Care Suites etc is to be continuously running System 3 and as identified on M&E spec	SFP = 0.4 W/l/s with boost facility to extract at 4ac/h for overheating	
6.5	Kitchen, lounges and dining areas as M&E spec		
6.6	Ensure all corridors/stairs with glazing have openable windows/thermostatic controlled AOVs	To reduce overheating risk, subject to full DSM thermal comfort calcs	
6.7	Ensure corner plot Apartments have openable window area to provide cross ventilation		
6.8	All other areas of the building are naturally ventilated.	<i>Assumed at least 25% of windows are openable (typically 1:4 windows openable).</i>	
6.9	Allow for louvred panels or other way of naturally ventilating the ground floor apartments and other habitable rooms whilst maintaining security to mitigate overheating	i.e. cannot fully open windows without compromising security	
6.2	Dwelling: Mechanical ventilation to the Apartments is to be centralised system 3 MEV	As Vent Axia Sentinel Multivent or equal and approved	
7. Space Heating and Hot Water			
7.1	Dwellings: Heating and hot water to dwellings and communal areas to be provided by a communal Ground source heat pump system which preheats the brine and then supplies a GSHP interface unit within each flat with integral 120l HW cylinders	GSHP Efficiency = 301% taken from MCS certificate. (SCOP @ 45°C) Hot Water Cylinder = 120 litres with 80mm foam insulation and fully insulated pipework <i>(Modelled as per BRE Technical Note – No: 1 – V1.0 – 13.05.2019 and email from Elmhurst Energy Ltd)</i>	
7.2	Dwellings: The GSHP unit supplies radiators with TRVs within each apartment		
7.3	Non-dwelling: Heating system is provided with central time control and local temperature controls.		
7.4	Non-dwelling: Pumps serving the heating and hot water system are inverter driven with differential pressure sensors across the pumps.		
7.5	Non-dwelling: Heating to non-domestic areas is metered however it is not provided with automatic monitoring and targeting with alarms for out-of-range values warn of out of range values.		
8. Lighting and Lighting Controls			
8.1	Dwelling: All apartment light fittings will achieve a luminous efficacy of >45 lumens per circuit watt.		
8.2	Non-dwelling: All light fittings achieve a luminous efficacy of 80+ lumens per circuit watt.		
8.3	Non-dwelling: Display light fittings within the Reception area will achieve a luminous efficacy of 60 lumens per circuit watt.		

8.4	Non-dwelling: PIR presence detection lighting controls will be provided to the Storage and WC areas. All over light fittings are controlled manually.		
8.5	Non-dwelling: Light fitting energy use is metered but the system does not warn of out of range values.		
9. Renewables			
9.1	PV included to comply with M&E Spec clause 3.31. The minimum of 20m ² PV shall be installed to South Facing roof.	An allowance for 13No. PV modules (250W each) will be installed which equates to circa 3.25kW _{peak}	
10. Other			
10.1	Accredited Construction Details (ACD) for limiting thermal bridging are installed at every junction in the main fabric.	Refer to ACD details.	
10.2	Split lintels to be used (Psi value = 0.01)	Improves thermal bridging and the DFEE	
10.3	All Balcony's (single, corner etc) must all be thermally broken in accordance with ACD/ ECD	Construction details must show thermal separation. Thermal break provided for all balconies	
10.4	Non-dwelling: All fans are in accordance with the minimum requirements of 'Non-Domestic Building Services Compliance Guide, 2013' in terms of Specific Fan Power.		
10.5	Non-dwelling: A Building Log Book will be provided following the guidance in CIBSE TM31, Building Log Book Toolkit.		
10.6	Non-dwelling: Building Regulations Part L2A 2016 apply. Please confirm that all fixed building services are in accordance with the minimum standards set out in paragraphs 2.45-2.48 of Building Regulations Part L2A 2013.		