energycouncil
engineering sustainable buildings

Environmental Standards Statement

Ref: Z30844

Proposed 15No. Dwellings at Pomona Hotel

on

Reddish Lane,
Gorton,
Manchester,
M18 7JN

for

One Manchester

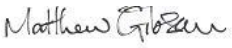




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Executive Summary

This document evaluates the technical and economic feasibility of using both passive and low and zero carbon technologies and assesses the practical levels of CO_2 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
- Principles of The Guide to Development in Manchester SPD (2007)
- National Planning Policy Framework (2018)

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 Pomona Hotel 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 highly efficient electric panel system
4) Hot water will be provided by an electric immersion heater
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 20kWp for the development

An assessment of CO_2 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.

The principles of a 'Be Lean, Be Clean, Be Green' design philosophy have been applied, which results in a 10.93% improvement over Building Regulations Part L1A (2013), as indicated in Table 1.

Table 1 - Proposed development CO_2 emissions against Building Regulations Part L1A (2013)

	Total CO_2 Emissions ($KgCO_2/Yr$)	
Baseline Emissions of Development (pre-improvement)	**22,430**	
Proposed Strategy	**19,978**	
Total Reduction in Carbon ($KgCO_2/yr$)		**2,452**
Percentage Improvement in Carbon Emissions (over Building Regulations ADL1A 2013)		**10.93%**

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

1. Introduction

This Environmental Standards Statement has been developed in support of the planning application for the proposed development of an apartment block in Gorton, Manchester on the site of the old Pomona Hotel.

The proposed development consists of a three-storey, 15-apartment block. 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
- Principles of The Guide to Development in Manchester SPD (2007)
- National Planning Policy Framework (2018)

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 CO_2 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 on the site of the old Pomona Hotel, Reddish Lane, M18 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 – Site plan for the proposed Pomona Hotel residential development

The site is located off Reddish Lane, with Hyde Lane to the north. The proposed site is in a predominantly residential area, with the development covering the now demolished Pomona Hotel site.

1.2. Floor Plans



Figure 2 – Proposed floor plans for the residential Pomona Hotel (Top left: Ground; Top right: First; Bottom left: Second; Bottom right: Roof)

The proposed development consists of a three-storey residential block on Reddish Lane. The residential block will consist of fifteen self-contained apartments, with a central courtyard, parking and external stores. Each 2-bedroom unit will each have an external terrace or balcony area. The following apartment types are provided:

- 10No. 2-bedroom apartments
- 5No. 1-bedroom apartments

2. Policy Drivers for Sustainable Development

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

2.1. National Policy

The National Planning Policy Framework, published in July 2018, 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
10. 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)		
Section	**Policy Requirements**	**Design Response**
EN 4 - Reducing CO_2 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 Pomona Hotel residential 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 Code for

		Sustainable Homes, 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 residential Pomona Hotel development 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.

<table>
<tr>
<td>Policy EN 6 - Target Framework for CO2 reductions from low or zero carbon energy supplies</td>
<td>Applications for residential development of 10 or more units and all other development over 1,000m^2 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 CO_2 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>
</td>
<td>The proposed development consists of a 15No. dwelling apartment block 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 electric panel heaters and an LED lighting scheme ensure energy consumption is minimised, prior to the application of a photovoltaic array.</td>
</tr>
<tr>
<td>Policy EN 7 – Energy Infrastructure opportunities</td>
<td>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.</td>
<td>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</td>
</tr>
</table>

	• 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. Due to the relatively small scale of the development, the development of a new energy centre and decentralised energy network would not be a feasible design solution.
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: • Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rain water	Sustainable design and construction measures for the proposed Pomona Hotel residential development are provided within Section **Error! Reference source not found.**. The proposed development

	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.	will be designed and constructed in line with the principles of Code for Sustainable Homes. 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) • Site layout and building design principles should maximise the capture and use of daylight and passive	In line with the principles of the Be Lean, Be Clean, Be Green design philosophy, the proposed Pomona Hotel 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.

	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 photovoltaic array will be installed, with energy generation confirmed below in Section 6.1. 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 CO_2 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 *A reduction in energy use as a result of passive design and energy efficiency*
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 *A focus on supplying energy to the development through efficient means*
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 *The installation of renewable technologies to meet energy demand where possible*
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 CO_2 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 Pomona Hotel site.

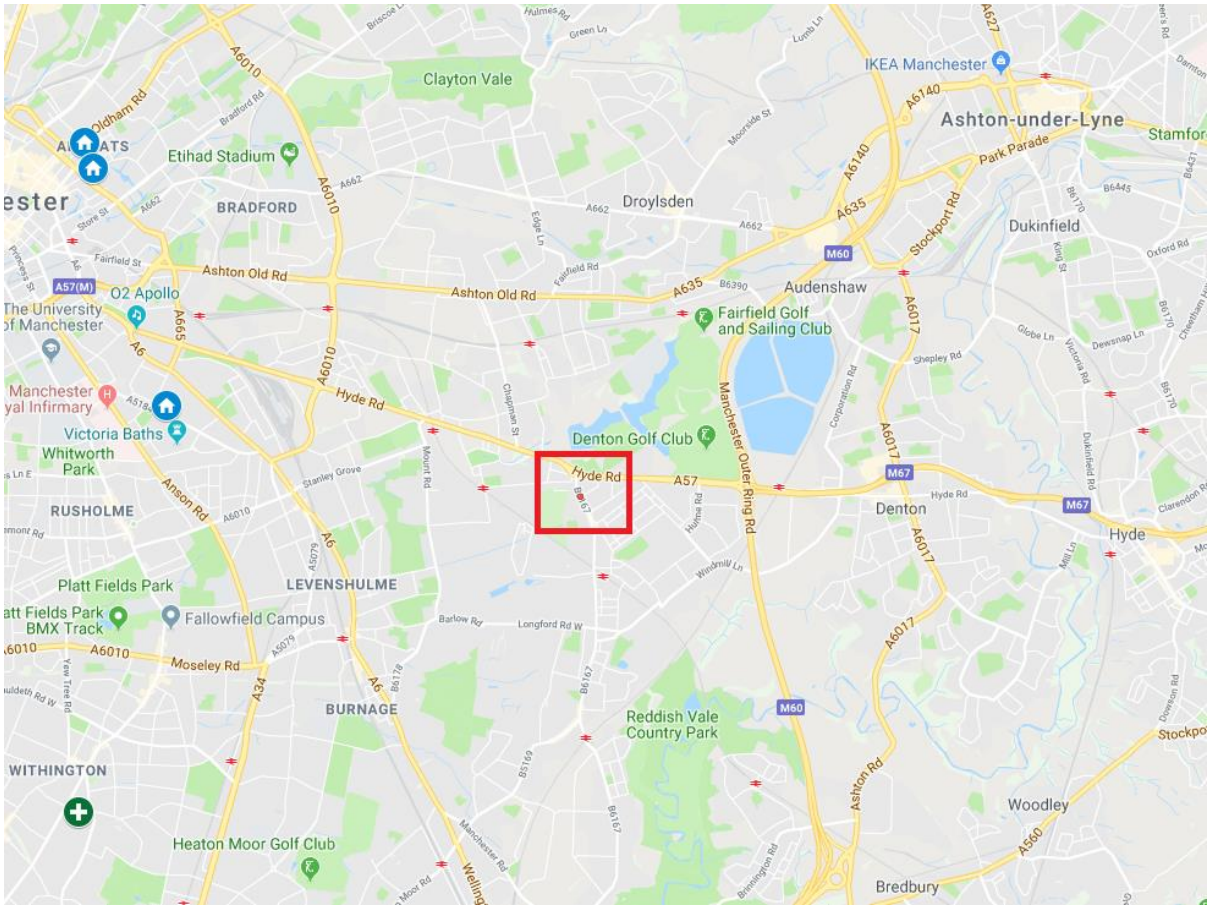


Figure 3 – Location of site in relation to current local heat networks

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.

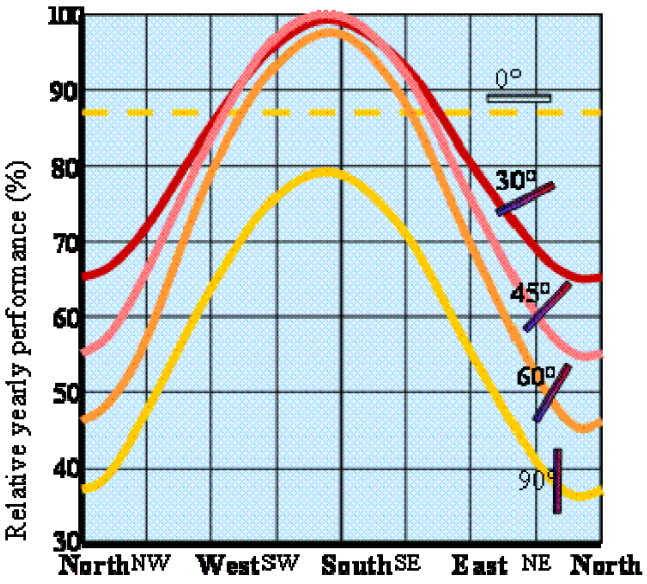


Figure 4 - Performance of photovoltaic panel orientation

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.

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 20kWp total array provides a significant reduction on carbon emissions and has been applied equally between apartments within preliminary SAP calculations.

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.

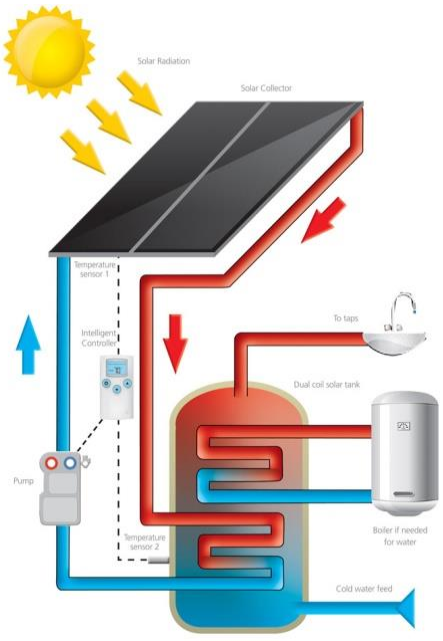


Figure 6 - The principles of a solar thermal system

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 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 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.

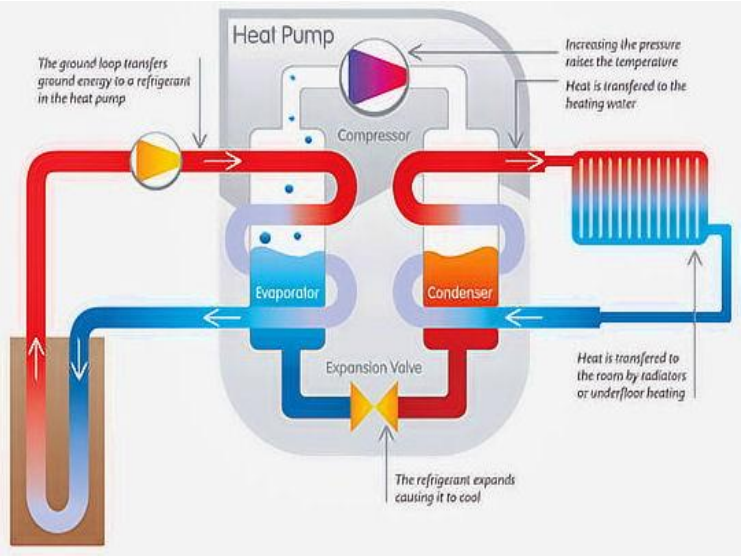


Figure 7 - Principles of a GSHP system

Due to the relatively small scale of this development, GSHPs are not considered an appropriate design solution.

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.

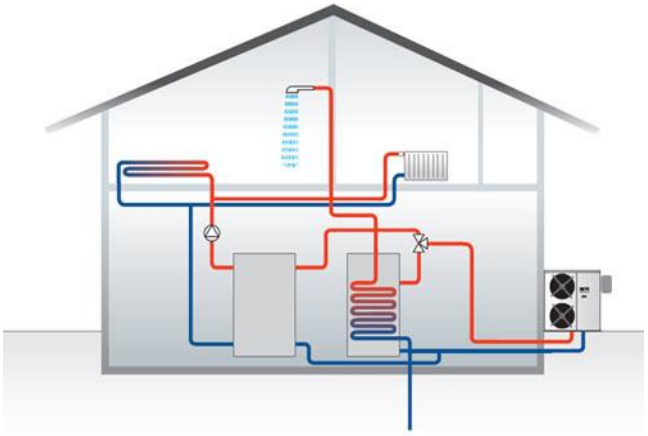


Figure 8 - Principles of an ASHP system

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 Pomona Hotel residential 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.

Table 4 - Fabric efficiency for the preliminary ADL1A Pomona Hotel residential development

	U-value (W/m^2K)	G-Value
Flat Roof	0.14	n/a
Pitched Roof	0.15	n/a
Ground Floor	0.14	n/a
External Wall	0.20	n/a
External Glazing	1.40	0.63
Rooflights	1.40	0.76
Door	2.20	n/a

Energy Council have carried out preliminary 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.

Three of the development's fifteen plots have been selected as a benchmark to establish a worst-case performance.

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 10.93% 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 2,452 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)	No. of Type	TER	DER	Improv. Factor (%)	Target Carbon Emissions (Kg CO_2/yr)	Designed Carbon Emissions (Kg CO_2/yr)
Z30844	2 Bed Corner	66.55	4	26.61	26.87	-0.98	7,084	7,153
Z30849	2 Bed	61.94	6	22.69	19.23	15.25	8,433	7,147
Z30854	1 Bed	50.23	5	27.53	22.61	17.87	6,914	5,679
Total			**15**			**10.93**	**22,430**	**19,978**

6.1. Local Energy Policy

As per Manchester City Council's Guide to Development in Manchester Supplementary Planning Document and Planning Guidance (2007), a portion of the proposed development's energy demand should be met through renewable energy means:

> "…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 to reduce the total energy demand of the building."

The table below confirms compliance for the proposed development against these targets. Data has been extracted from the preliminary SAP datasheets and are available upon request.

Table 6 - Impact of renewable energy generation of energy and carbon emissions

	Energy Consumption (kWh/yr)	Carbon Emissions (kg CO_2/yr)
Site Energy Demand	4,433.93	2,301.05
PV Generation	988.64	513.10
Contribution of PV Array	**22.3%**	

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 2013 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 will be developed at the preliminary stages of the project, with a range of transport improvement measures to be included within the development. These measures aim to promote the use of sustainable modes of transport.

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 7.
- 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 7 - 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/100m^2 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 will be 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.
- Reduction of night-time light pollution using ILE compliant light fittings will be installed, where practicable.

8. Conclusions

The approach for the proposed Pomona Hotel residential 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 2,452 Kg/CO_2/yr from the baseline emissions of 22,430 kg/CO_2/yr. This equates to a 10.93% 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 electric panel system
4) Hot water will be provided by an electric immersion heater
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 20kWp for the development

8.1. Low/ Zero Carbon Technologies Review

- Photovoltaic panels are specified for this development to be utilised with all-electric building systems, ensuring energy efficiency and carbon savings can be maximised. A rooftop array totalling 20kWp is proposed.
- Solar Thermal Hot Water is not considered a viable option as 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.
- GSHPs are not viable for site because of spatial and financial costs. There is no room to accommodate a GSHP vertical bore and associated communal plant room, ground conditions are unknown, and systems are very costly.
- 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 10.93% improvement in CO_2 emissions above the Building Regulations Part L1A (2013) baseline is proposed to support our application and to meet policy requirements.

Table 8 - Summary of Carbon Emissions

	Total CO_2 Emissions ($KgCO_2/yr$)	
Baseline Emissions of Development (pre-improvement)	**22,430**	
Proposed Strategy	**19,978**	
Total Reduction in Carbon ($KgCO_2/yr$)		**2,452**
Percentage Improvement in Carbon Emissions (over Building Regulations ADL1A 2013)		**10.93%**

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 6.1.
- 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 Pomona Hotel residential development is viewed favourably.

9. Appendices

9.1. Energy Model Inputs for Part L1A (2013) Compliance

Item	Brief description	Notes	Confirm
	The following information is required for the design submission (as per 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 (2013) apply.		
1.2	Electricity is supplied by standard tariff rather than economy 7, 10 or 24.	*Assumed standard tariff*	
1.3	Dwellings have a medium thermal mass parameter.	*Cavity wall construction*	
1.4	Full address is:	Pomona Hotel Reddish Lane, Gorton Manchester	
2. Floor Construction Details			
2.1	Ground floor construction is insulated to achieve the U-value stated opposite.	U-Value = 0.14 W/m²K λ of insulation = 0.02 W/mK	
3. Wall Construction Details			
3.1	Main external wall is an insulated cavity wall to achieve the U-value indicated opposite.	U-Value = 0.20 W/m²K	
3.2	Party walls and walls to heated corridors are a fully filled cavity sealed top and bottom to achieve the U-value opposite.	U-Value = 0.0 W/m²K when applied to adjacent heated space	
4. Roof Construction Details			
4.1	Flat roofs are insulated to achieve the U-value opposite.	U-Value = 0.14 W/m²K	
4.2	Pitched roof is insulated to achieve the U-value stated opposite.	U-Value = 0.15 W/m²K	
5. Openings			
5.1	All double-glazed windows and patio type doors/windows are u-PVC with argon fill to achieve the U-value opposite.	U-Value = 1.4 W/m²K G-value = 0.63	
5.2	Rooflights are double-glazed to achieve the U-value stated opposite.	U-Value = 1.4 W/m²K G-value = 0.76	
6. Ventilation			
6.1	Design stage SAP calculation assumes an air permeability of 5m3/m2/hr at 50pa.		
6.2	A System 3 MEV is installed in all wet areas.	Greenwood Unity CV3 or equivalent	
6.3	No open flues/chimneys are present in the dwellings.		
7. Space Heating			
7.1	Heating to the dwellings is provided by electric panel heaters.		
7.2	The heating system has a programmer and thermostat.		
7.3	A weather or load compensator is not installed.		
8. Water Heating			
8.1	Water usage per person per day is ≤125 Litres.		
8.2	DHW for the apartments, communal areas and commercial areas is an electric immersion heater type.	Storage for apartments = 150 litres Declared loss factor = 1.60kWh/day	
9. Renewables			
9.1	A photovoltaic panel array will be installed on the south-facing roof of the development.	Array size = 20 kWp (1.33 kWp/apt)	
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 will be installed to meet Energy Saving Trust Enhanced Construction Detail MV03.	Psi value of 0.01W/mK.	
10.3	100% low energy (LE) lights are installed throughout apartments.		
10.4	Windows can be half opened in summer to prevent overheating.		
10.5	No cooling is installed to dwellings.		