

St. Michaels, Manchester Commercial Development

Project Title: St. Michaels, Manchester

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INTRODUCTION

The application site is bounded by Jacksons Row, Bootle Street and Southmill Street.

The proposals include the demolition of the existing buildings on the site, with the exception of part of the old police station building (with the entrance off Southmill Street), which will be converted into office accommodation. The Sir Ralph Abercromby Public house will remain largely unaltered. The development of the site is to deliver a mixed used development which will be divided into two blocks as follows:

Phase 2

- Offices
- Retail/Restaurant/bar

Phase 3

- 5 * Hotel
- Residential
- Retail/Restaurant/bar
- Synagogue

ENERGY STRATEGY & SUSTAINABLE DESIGN APPROACH

The energy strategy is formulated around a collective approach to implement a sustainable development strategy which incorporates environmentally sound methods of construction, a passive design approach to reduce energy demand, and highly efficient energy supply and distribution. It is intended to highlight within this review the systems which provide a reduced energy use strategy in order to serve the relevant elements of the Building Services for the development.

As such, the following passive design techniques and technologies are proposed for the development;

- Building fabric performance (u-values) beyond minimum standards and best practice, reducing heat loss and gain
- Daylight linked lighting and controls to minimise lighting energy usage
- Reducing embodied carbon impact through material selection and construction techniques
- Demand controlled ventilation; reducing energy usage associated with ventilation, heating and cooling systems.
- Air Source Heat Pumps providing heating and cooling with heat recovery between the two systems. Variable volume systems with advanced control will minimise operational energy use.
- Heat Recovery Ventilation to all areas, with variable volume control based on necessity.

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The energy strategy for the redevelopment of the existing building on Southmill street aims to improve energy efficiency as far is reasonably practical without prejudicing the character of the building or increasing the risk of long-term deterioration of the building fabric or fittings.

To underline the approach to energy and carbon, the office development is seeking a NABERS 5 star rating. NABERS is based on real life energy consumption and encourages the landlord and tenant to operate efficiently, monitor and report energy consumption.

The commercial office development is targeting a BREEAM assessment result of 'Outstanding' and the sustainable approach to the design and arrangement of the systems will aspire to meet these requirements. The development will utilise heat recovery air source heat pumps for heating and cooling and be constructed to maximise passive methods to condition the buildings thermal and visual environment. The location of the proposed development is highly sustainable in terms of its links with public transport, and the use of the land incorporating a hotel and bar/dining facility reinforces the desire to create a sustainable development in the wider context, reducing transport emissions which provides benefits to the local culture and economy. The reuse of the existing site will also ensure embodied carbon will be minimised during the construction.

In addition to this, the office development will be developed with principles of WELL. This combined approach aims to address energy, carbon and wellbeing.

KEY OBJECTIVES

Manchester Core Strategy Document

The Manchester Core Strategy document 2012 is a key document in Manchester Local Development Framework and sets planning policies. With respect to energy and CO2 emissions, the notable subjects that are expected to be covered by a large multiuse development are;

Policy EC 1 - Employment and Economic Growth in Manchester

Development proposals should have regard to Climate change resilience demonstrating how CO2 emissions will be minimised with an aim of zero carbon emissions, through;

- Energy efficiency
- Renewable energy
- Decentralised energy infrastructure;

Policy EN 5 - Strategic Areas for low and zero carbon decentralised energy infrastructure

Within Manchester it is expected that new developments are 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, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward such plans.

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Where investment or development is being undertaken into or adjacent to a public building/asset or district heating network, full consideration will 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

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 1,000 m² will be expected as a minimum to meet the target shown below unless this can be shown not to be viable. 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.

- 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.

Target area 1 applies to this scheme, as the development has at least three of the following - commercial offices, hotel, residential, apartments, public building, supermarket, or it is adjacent to an existing district heat network. If connection to an existing heat network, or installation of a new heat network is not considered feasible or viable then a development would be expected to follow Target Area 3."

For the Domestic aspect of the proposed scheme, the requirements of Code Level 4 are more onerous than the targets stated above.

For Non Domestic buildings, the requirement of a 15% reduction in carbon set out above is the most onerous target, unless, a specific BREEAM rating is stipulated by the planners of desired by the developers.

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. That any energy centre, including generating plant, standby/boiler plant and substations, will be located and designed to a high quality so as to integrate with and contribute to the townscape.

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Summary

Non Domestic Target

15% reduction in emissions from Part L 2010
BREEAM target not stipulated.

Domestic Target

Code Level 4, but has been removed. Instead, it is expected that the target of 25% reduction over Part L 2010 or 19% reduction over Part L 2013 will be required.

Technologies and Systems

Of the renewable energy and low carbon technologies available, the following have been considered for inclusion on this development;

1. CHP (combined heat and power)
2. Air source heat pumps
3. Photovoltaic Cells
4. Connection to the Manchester district heating network
5. Passive measures for thermal performance in the construction of the building.

When reviewing these systems against the lengthy payback periods, the prohibitive installation and maintenance costs, and the possible limited renewable energy usage provided, Air Source Heat Pump technology and passive design measures proved the most suitable for this project.

Sustainable Design

Sustainable design is the practice of designing physical objects, particularly in the built environment, to encompass with the principles of economic, social, and environmental sustainability. Defined as meeting the needs of the present without compromising those of the future, it ranges from the design of small objects for everyday use, through to the designing of buildings, landscapes and cities. It is an essential tool within the fields of architecture, urban design and planning engineering, graphic design, industrial design, interior design and fashion design.

- The aim of sustainable design within Building services is to construct buildings and services in a way that reduces the use of non-renewable resources and minimises the impact on the environment fossil fuel emissions can have.
- Targeting the passive design features of a building can reduce the reliance on energy resources for building heating and cooling initially as greater air tightness results in less temperature fluctuations within a development.
- Alternatively, where energy for building services must be consumed, renewable energy can be used. Described as the energy flows derived from natural sources, these sources are continuously at work in within the environment and are theoretically not depleted when used.
- A New Thermal Envelope for the development would be sought to be designed and constructed to go beyond the minimum requirements laid down in the current L2A Building

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Regulations 2013, both in terms of Fabric U-Values and Air Permeability.

- Natural Daylighting and artificial light dimming would be maximised to reduce artificial lighting load. The use of low energy electric lighting would also be sought to be implemented in excess of that currently required to comply with Building Regulations.

The design approach, in respect to minimising carbon emissions from the development, aligns with the best practise guidelines adopted by the Local Planning Authority in their Core Strategy policies. This policy states that Lean, Clean and Green energy savings should be considered sequentially.

The lean savings are measures to improve the baseline energy performance and would typically mean improvements to the thermal conductivity of the fabric and glazing, high efficiency pumps, lighting, alongside lighting control systems.

The clean savings are measures that reduce carbon dioxide emissions when compared to the standard design approach, but rely on an element of non-renewable energy consumption. The technologies that could be considered here would be;

- VRF (variable refrigerant flow) systems;
- WR2 (water source variable refrigerant flow) systems; and
- Combined Heat and Power;

Both the VRF and WR2 systems are refrigerant based comfort cooling systems which use different mediums, ie; VRF uses air and WR2 uses water as the means of heat absorption and rejection.

Sustainable Design	Applied to Development
Improved Fabric U-values over and above 2013 Part L2a regulations	Yes – passive measure
Improved air tightness over and above the 2013 Part L2a regulations	Yes – passive measure
VRF heat recovery comfort cooling systems	Yes – low carbon technology
Heat recovery ventilation systems	Yes – passive measures
LED lighting throughout	Yes – low carbon technology

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PHASE 2

Offices MEP Strategy

- Air source heat pumps with heat recovery provide simultaneous heating and cooling via LTHW and CHW systems, serving both ventilation plant and office fan coil units.
- LED low energy lighting installed throughout
- Heat recovery ventilation systems installed to all internal office areas
- Variable air volume office ventilation systems, modulating based on CO2 level control.
- Daylight linking to all office lighting installation to locally switch off perimeter lighting rows during daylight hours.
- Lighting control systems installed to local zones to turn off groups of fittings via presence or absence detection systems.
- Local electric hot water supplies to toilets, showers and kitchenettes.
- Inverter driven pumps and fans installed throughout.

Manchester Core Strategy Policy EN6 states that applications for developments over 1000m² will be expected as a minimum to meet the following target for Energy Intense Buildings: + 15% increase on Part L 2010.

Between the Part L 2010 and Part L 2013 Building Regulations, the target emission rates were improved by 9% for non-domestic buildings.

With this, these technologies will provide the requirement to achieve the 9% improvement in carbon emissions.

The reduction in regulated carbon will be demonstrated using approved compliance simulation software – using a dynamic simulation modelling approach. A BRUKL report (Building Regulation UK Part L) which calculates Part L (fuel and energy conservation) of the Building Regulations 2013 measured against maximum target carbon dioxide emissions for buildings will be included.

Note that alongside this assessment, an operational energy assessment is being undertaken – using the NABERS approach will realise whole building operational carbon.

Retail/Restaurants/Bar MEP Strategy

Whilst not included in the base build, the following is anticipated from the fitout of the retail units.

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- VRF (variable refrigerant flow) Heat recovery comfort cooling system providing simultaneous heating and cooling to retail /restaurant and bar areas.
- Low energy lighting installed throughout
- Heat recovery ventilation systems installed
- Inverter driven pumps and fans installed throughout.

PHASE 3

5 * Hotel/Function Spaces MEP Strategy

- 4 pipe FCUs connecting to chillers and District Heating/Gas boilers, MVHR units in the guest rooms, Central vent plant to the FoH/BoH areas, supplemented with FCUs for heating/cooling
- LED low energy lighting installed throughout
- Heat recovery ventilation systems installed to all hotel rooms
- Central air handling plant systems serving function spaces, gym, back of house office areas. All central air handling plant shall be completed with heat recovery devices via thermal wheels or plate heat exchangers and inverter driven fans.
- Lighting control systems installed to local zones to turn off groups of fittings via presence or absence detection systems.
- Local cylinders to guestrooms, central hot water to hotel podium.
- Inverter driven pumps and fans installed throughout.
- An Energy saving card reader system installed to each bedroom to provide energy savings within unoccupied areas. The action of inserting the card into the "energy saving" card reader shall energise a contactor and switch the lighting and partial power on in the bedroom. Removal of the energy saving card reader will turn off lighting and partial power.

These technologies will provide the requirement to achieve the 15% reduction in carbon emissions.

Residential MEP Strategy

- LED low energy lighting installed throughout
- Localised whole house supply and extract with heat recovery ventilation systems installed to all apartments rooms
- Local electric hot water cylinders.

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- Inverter driven pumps installed throughout.

These technologies will provide the requirement to achieve the 15% reduction in carbon emissions.

The reduction in carbon will be demonstrated by using the SAP - The Standard Assessment Procedure (SAP). This is the UK Government's system for measuring the energy rating of residential dwellings to comply with Part L1A 2013 of the Building Regulations.

Synagogue MEP Strategy

- LED low energy lighting installed throughout
- Central air handling plant systems serving the spaces. All central air handling plant shall be completed with heat recovery devices via thermal wheels or plate heat exchangers and inverter driven fans.
- Plate heat exchanger served from the central building low temperature hot water network to provide space heating and domestic hot water.
- Inverter driven pumps installed throughout.

Restaurant/Bar MEP Strategy

Whilst not included in the base build, the following is anticipated from the fitout of the restaurant/bar.

- VRF (variable refrigerant flow) Heat recovery comfort cooling system providing simultaneous heating and cooling to units.
- low energy lighting installed throughout
- Heat recovery ventilation systems installed
- Inverter driven pumps and fans installed throughout