
McCarthy Stone

Didsbury, Manchester

Energy Statement

August 2022



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Project:	Didsbury, Manchester
Document Title:	Energy Statement
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1.0 Introduction

1.1 Purpose of the Report

Instructions were received from McCarthy Stone to produce an Energy Statement for the proposed development at Didsbury, Manchester. This report has been produced to support the planning application to be submitted for the development.

This statement provides a response to the relevant planning policy objectives within Manchester City Council Core Strategy 2012-2027 and Guide to Development in Manchester Supplementary Document.

1.2 Site and Building Description

The development will be located at Didsbury, Manchester. The application seeks approval for the construction of a retirement living complex comprising of 26 apartments (mix of 1 and 2-bedrooms), communal areas (including Reception Area, Lounge, Refuse, Scooter Store, Stairs, Lifts, Stores, Plant Room, Corridors and Guest Suite and Ensuite) and associated landscaping. A proposed site layout has been included in Appendix 1.

1.3 Methodology

The proposed drawings, elevations and site plans were reviewed to gain a good understanding of the development; following this the relevant policies were identified. This development is located in Didsbury, therefore the Manchester City Council Core Strategy 2012-2027 (particularly policies EN4 and EN6) and the Supplementary Document Guide to Development in Manchester have been recognised as relevant.

Sample Design Stage SAP & SBEM calculations have been completed to determine the expected performance of the development at Didsbury. The specifications and results for the buildings as proposed are compared to the target building baseline, which is the benchmark for 2013 Part L of Building Regulations compliance.

In reference to local renewable energy, this report determines the feasibility of connection to district heating networks.

2.0 Planning Policy

2.1 Manchester Core Strategy 2012 - 2027

The Manchester Core Strategy 2012-2027, adopted July 2012, outlines the requirements for new developments regarding sustainability. Policies EN4 and EN6 have been identified as relevant.

2.2 EN4: Reducing CO2 Emissions by Enabling Low and Zero Carbon Development

The Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO2 emissions, and rising fossil fuel prices, through the following actions:

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.

2.3 EN6: 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 sqm will be expected as a minimum to meet the target shown in Tables 12.1 or 12.2, 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.

Developments smaller than the above threshold, but involving the erection of a building or substantial improvement to an existing building will also be expected to meet the minimum target, where viable, but will not be expected to submit an energy statement. 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.*

Domestic CO2 emissions reduction targets

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 1: Network development area Target 2: Electricity intense buildings +15% increase on Part L 2010
Target 2: Electricity intense buildings	+15% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Non-domestic CO2 emissions reduction targets

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
Target 2: Electricity intense buildings (Applies to commercial uses with a high proportion of emissions from electricity use (>45 kg CO2/m2))	+10% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Where the CO2 emissions reduction required under any future revision to Part L of the building regulations becomes greater than the '% Minimum requirement', the reduction required under building regulations would apply.

Where the Council identifies an 'allowable solution', for example within an energy proposals plan, that would produce higher carbon reductions at no extra cost than that of achieving the '% Minimum requirement' (or required under building regulations if greater) the higher percentage reduction will be required. The cost comparison is based on the cost of incorporating the 'allowable solution' at design stage.

The energy statement will be required to be submitted at the outset of any proposed development (outline application or before). 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, subject to the energy statement incorporating evidence such as modelling to demonstrate compliance.

Guidance on what the energy statement should contain and how to decide which target applies to a development proposal is given in Appendix A.

2.4 Guide to Development in Manchester Supplementary Planning Document

Chapter 4.5

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 solar energy, whilst avoiding excessive solar gain in summer.*
- *Specify energy and water efficient appliances and systems.*

Chapter 4.6

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 to reduce 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.*

2.5 Policy Response

This statement will respond to policy EN4, EN6 and Chapter 4 of the Guide to Development in Manchester which will be addressed in Section 3.0 - Energy Assessment.

This scheme at Didsbury, Manchester, is a residential development comprising of 26 dwellings, therefore BREEAM is not applicable to this scheme. The Code for Sustainable Homes environmental assessment methodology has been discontinued, therefore this is not applicable.

3.0 Energy Assessment

3.1 Maximising Energy Efficiency and Reducing Carbon Emissions

In efforts to reduce the overall carbon emissions associated with the development and to maximise the energy efficiency, as outlined in Policy EN4, the developer has a robust 'fabric first' approach to the build specification.

This has been achieved through building fabric improvements with an uplift on the minimum requirements of Approved Document Part L, and also specification of efficient mechanical and electrical services, including a number of 'add-on' measures to improve efficiency and performance.

The table below demonstrates how the specification of the development at Didsbury, Manchester compares to the limiting values and minimum efficiencies allowed within Part L 2013:

Building Element	Limiting Part L 2013 Specification	Proposed Specification Apartments
External Walls U-Value	0.30	0.19
Roof U-Value	0.20	0.11
Ground Floor U-Value	0.25	0.11
Window U-Value	2.00	1.40
Party Wall U-Value	0.20	0.00
Half Glazed Door U-Value	2.00	1.40
Heating Efficiency	88%	100%
Pressure Test	10.00	4.00 – 5.00
Low Energy Lighting	75%	100%

The development is proposed to adopt a 'fabric first' approach to the specification and as detailed above, the proposed U-Values are a significant uplift on the minimum requirements under Part L.

The build-up of external wall for the apartments is a fully filled 150mm cavity with Masonry block that achieves a u-value of 0.19 W/m²K. Well insulated cavity walls, roof, floors and openings provide a comfortable environment within the development and reduce the buildings' reliance on the main heating system. The air permeability target in the apartments is between 4.00m³/(h.m²) and 5.00m³/(h.m²), providing a significant improvement over the Notional Building target.

Intelligent construction methods are also utilised in the specification of this development. The use of bespoke calculated thermal bridge details ensure that thermal performance is enhanced by minimising heat and energy losses through thermal bridges and air gaps.

McCarthy Stone utilise panel heating within the apartments in conjunction with thermal mass to regulate internal temperature, which achieves efficiencies up to 100%. This is a further improvement on the minimum efficiency required by individual gas combination boilers in the Notional Building.

Another key element to the specification of the apartments is the utilisation of mechanical ventilation with heat recovery (MVHR). This system allows warm stale air produced by occupancy and internal activities to be extracted from the building; however, the heat within this air is retained and transferred into cool fresh air being brought into the building from outside. The use of MVHR reduces the need to use the main heating system as it provides background heating through occupation (as well as improving comfort levels through the flow of fresh air).

In communal areas, lighting occupancy sensors will be utilised that switch off or dim the lighting when occupants are not present in areas such as circulation spaces, toilets or storage areas. This prevents lighting from being left on when it is not needed, therefore saving energy.

Metering and sub-metering equipment for the heating system will also be used that help identify areas where more energy than expected is being used, such as heaters being left on at times when they are not needed or where there are defective elements present. This helps improve the heating strategy and saves further energy.

To summarise, all of the main building elements outlined in Table 1 have been designed to provide a thermally efficient building envelope that achieves an improvement on the minimum requirements set out within Part L. These elements along with the incorporated heating and ventilation systems ensure enhanced energy efficiency and reduce CO₂ emissions, thus mitigating the impacts of climate change.

3.2 District Heating

To satisfy policy EN4, an exercise has been completed reviewing the potential for the proposed development at Didsbury, Manchester to connect to an existing district heat network. The Association for Decentralised Energy's (ADE) District Heating connection map has been reviewed to confirm the closest possible connection point.

As demonstrated from the map overleaf, the closest connection point is Christie Hospital, approximately 0.73 miles from the proposed site location. Due to the extended distance between these two points, it is considered that this would not be a feasible application.

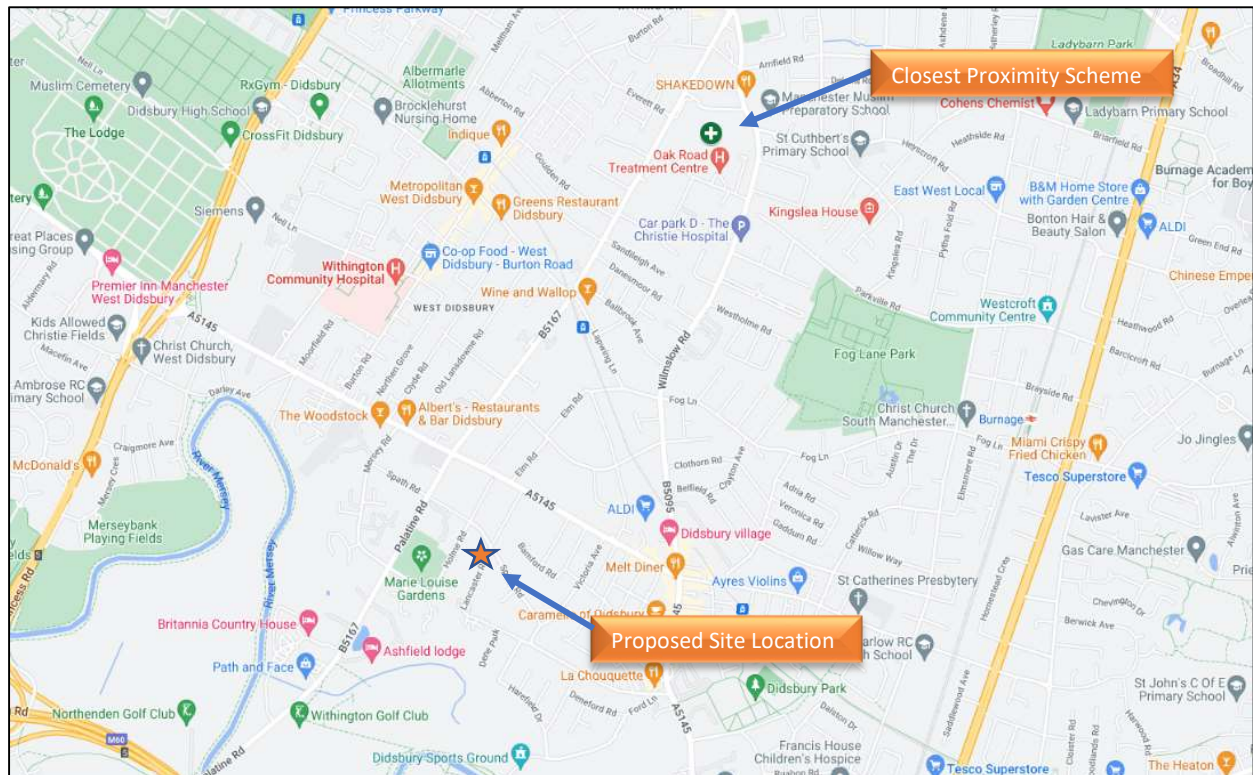


Figure 1 – Association of Decentralised Energy - www.theade.co.uk

3.3 Carbon Emissions

Chapter 4.5 in the Guide to Development in Manchester Supplementary Document refers to a 25% carbon reduction over Building Regulations: Approved Document L (2006). Policy EN6 however, refers to a 15% carbon reduction target under the current version of Part L, which in this case is Part L 2013. Therefore the 15% carbon reduction target under Part L 2013, will exceed the 25% carbon reduction target under Part L 2006, as Part L 2013 is more than a 25% improvement over Part L 2006, as shown in Table 12.3 in the Manchester Core Strategy 2012-2027 document.

Therefore, in order to meet policy EN6 and Chapter 4.5 in the SPD, the development should aim to reduce CO₂ emissions by at least 15% more than the requirements of the current Building Regulations.

To understand the overall proposed energy use of the development, and in line with the 15% carbon reduction target highlighted in policy EN6, sample SAP and SBEM calculations for the proposed development have been undertaken. Software outputs of the calculations completed can be found in Appendix 2.

Table 1 below demonstrates each dwelling's expected breakdown of carbon emissions, based on the dwellings modelled.

Table 1: Carbon Emissions Breakdown	
Target Carbon Emissions (TER)	Units (kg/CO₂/yr)
Domestic	41,600.11
Non-Domestic	20,743.45
Sub-Total	62,343.56
Predicted Carbon Emissions (DER/BER)	Units (kg/CO₂/yr)
Domestic	43,880.00
Non-Domestic	20,680.40
Sub-Total	64,560.40
CO₂ Reduction	-2,216.84

As a result of the sample SAP and SBEM modelling outputs for the development, Table 1 shows the Target CO₂ Emissions (TER) of the development to be 62,343.56 kg/CO₂/yr. The Predicted Carbon Emissions (DER/BER) are demonstrated to be greater than this amount, currently modelled to achieve 64,560.40 kg/CO₂/yr, and therefore shows a shortfall against the TER.

Overall, this is a 2,216.84 kg/CO₂/yr increase in carbon emissions, approximately a 3.56% increase in emissions against the notional amount.

In order to meet policy EN6's 15% carbon reduction policy for the development, a total carbon reduction of 11,568.37 kg/CO₂/yr needs to be achieved through the use of further energy efficiency improvements or low carbon technologies, such as renewable energy. To achieve the 11,568.37 kg/CO₂/yr reduction, a minimum of 22,289.73 kWh/yr would need to be provided if PV was the chosen solution to meet the target.

3.4 Energy Consumption

To understand the overall proposed energy use of the development, and in line with the 20% of energy demand from renewables requirement highlighted in Chapter 4.6 of the SPD, sample SAP and SBEM calculations for the proposed development have been undertaken. Software outputs of the calculations completed can be found in Appendix 2.

Table 2 demonstrates the development's approximate breakdown of regulated energy use, based on the apartment block.

Table 2: Predicted Energy Consumption	
Regulated	Units (kWh/yr)
Space Heating	58,149.75
Hot Water	44,707.97
Lighting	18,556.10
Auxiliary - Pumps, fans and electric keep-hot	3,000.63
Total Predicted Building Energy Consumption	124,414.45

As stated within Chapter 4.6, the development is required to provide 20% of final site energy demand from on-site renewable energy technologies. A 20% total, based on the approximate energy consumption figure of 124,414.45 kWh/yr equates to 24,882.89 kWh/yr to be achieved. In order to achieve this 20% renewables contribution, the client has confirmed that a suitably qualified PV supplier will be engaged to provide a PV array with an approximate output of 24,883.00 kWh/yr, thereby meeting Chapter 4.6's 20% renewable contribution requirement.

The application of PV is the client's current intention; however, designs are subject to change and the tools used are a guide limited by their design as regulation compliance measures against a notional performance, they are not guaranteed of 'As Built' performance nor should they be treated as such.

3.5 Renewable Technology Option Review

To address policy EN6 and Chapter 4.6, a brief overview of relevant renewable technologies has been undertaken.

3.5.1 Small-Scale Wind Turbines

Wind turbines convert the power in the wind into electrical energy using rotating wing-like blades to drive a generator. Similar to Photovoltaic panels (PV), they can either be grid connected or used to charge batteries or for on-site use.

Wind turbines can range from small domestic turbines producing hundreds of watts to large offshore turbines with capacities of 3MW and diameters of 100m. A detailed study for urban deployment should take into account wind speed and turbulence and potential noise pollution issues.

There are two main types of turbine available, horizontal or vertical axis. Horizontal axis turbines, (sometimes referred to a propeller type) range in scale from 0.5m to 100m diameter. Vertical-axis turbines rotate around a vertical axis, resulting in lower rotor tip speed and reduced noise and vibration issues.

In both cases, the output of the turbine will be dependent upon both the start-up speed of the blades and the specific gearing and generator design.

The most common cause of poor performance is poor siting of the turbine. The turbulent wind conditions often found in urban locations undermines the performance of horizontal scale turbines as they have to regularly rotate Yaw to face the oncoming wind.

This process reduces the proportion of energy that the turbine can capture. Vertical axis turbines are designed to avoid this issue by always having blades facing the wind.

These performance issues mean that as a general rule, horizontal turbines are better suited to less turbulent wind regimes, whilst vertical axis turbines offer potential for installation in urban environments. In either case, the turbine must be mounted at a reasonable height to ensure that it can 'see' the wind. For urban deployment, this means that roof mounted turbines still require a mast and the structural design of the building must be developed to incorporate the additional loads and stresses.

It may be possible for the scheme to secure a 20% contribution from Wind Turbines, however, due to the likely issues associated with permissions required for such installation and the potential for nuisance noise in a residential area, the use of wind turbines has not been considered appropriate for the scheme.

3.5.2 Solar Thermal Heating

Solar thermal panels collect solar radiation to heat water that can then be used for either space heating or domestic hot water. There are two types of competing solar thermal technologies; flat-plate and evacuated tube.

Evacuated tube collectors are more efficient and therefore require less active collector array than the equivalent output of a flat plate system. However, in general, capital costs for the two technologies are comparable.

The system consists of solar collectors that are often roof mounted. Liquid is passed through the solar collectors and then to a heat exchanger in a domestic hot water cylinder, which will also have a top-up heat source (gas, biomass, or electricity) to ensure reliability of supply.

Solar thermal collectors can still produce energy from diffuse sunlight and are therefore less susceptible to performance reductions from orientation and angle compared to PV.

A typical 3-4m² collector area system (area dependent on technology) is capable of providing 50% the annual domestic hot water demand for a typical 2-3 bed house. The proportion of hot water provided varies over the course of a year, with the system achieving 100% coverage during the summer months and 5% during the winter.

While the use of Solar Thermal could possibly meet the requirement, it is highly unlikely that it would be the most efficient or cost-effective method to do so. As such, the use of solar thermal has not been considered for this scheme.

3.5.3 Heat Pumps

A ground source heat pump (GSHP) can harness the energy from the ground for use within buildings. This makes it possible to use the heat in the ground during the winter months to meet our heating needs. In the summer months it is also possible to cool buildings using ground temperatures that are lower than ambient air.

A typical ground system consists of a ground to water heat exchanger often called the 'ground loop' or 'ground coil', a heat pump and a distribution system. Water (or other solution) is passed round the system 'absorbing' heat from the ground and upgrading this heat via the heat pump into the building.

The heat exchanger can consist of either a vertical borehole system, where long pipes are driven deep into the ground or a horizontal trench system, which operates at shallower depths. The performance of a HP is measured using a COP (coefficient of performance). This defines the amount of useful energy output from the heat pump compared to the energy input. Typical systems can achieve a COP in the region of 350-400%.

The COP is maximised where the flow temperature of the heating circuit is between 35-40°C and therefore GSHP are ideally suited for connection to under-floor heating.

The potential scale of GSHP is only limited by the availability of land for the ground loop and reasonable levels of energy abstraction. Typical costs for ground source heat pumps range from £800/kW for trench systems to £1,500/kW for vertical borehole systems.

The constraints and nature of the proposed site do not lend well to the use of ground source heat pumps and as a result, this technology has not been considered to be feasible.

Air source heat pumps (ASHP) work in a similar way to ground source and are able to extract heat from the outdoor air, even when the outside temperatures are very low, for use in space heating and hot water systems. ASHP are also available in air – air formats, in which the heat is emitted into the building through ductwork, in which instance can also provide the option for air conditioning or cooling in summer, however they cannot serve hot water systems.

These systems only require space for an external condenser unit, which makes them much simpler to install when compared to GSHP. These systems also offer a significant reduction in carbon emissions from that of a conventional heating system (especially electric heating systems).

Given site constraints (both in terms of space required and potential noise and visual nuisance) as well as financial viability reasons, currently heat pumps are not considered appropriate for the apartment element of the proposed development.

3.5.4 Photovoltaics

Photovoltaic panels convert solar radiation into direct current electricity. In principle, they are an ideal source of renewable energy as they harness the most abundant source of energy on the Earth, the sun, and they produce electricity, which is the most useful form of energy.

PV's are silent in operation, have no moving parts and have a long life with low maintenance levels. PV systems can be connected to the grid or battery arrays in remote locations. Grid connected systems consist of PV arrays connected to the grid through a charge controller and an inverter. PV cells are more efficient at lower temperatures so good ventilation should be allowed around the PV modules where possible.

For McCarthy & Stone, following research and evaluation over several years, PV has been adopted as their preferred renewable technology. McCarthy & Stone put their customers at the heart of product choice, it is the attributes of PV's high performance by delivering real energy generation benefits to running costs, added to the low maintenance costs, which is vital to reduce whole life costs of a scheme for all residents. It is this that makes it their preferred renewable approach for CO2 reduction and Energy reduction targets.

As above, the intended strategy to meet the relevant planning conditions is to apply Solar PV panels into the design. This equates to a required array generating a minimum of 24,883.00 kWh/yr in order to meet both the 15% carbon reduction requirement, and 20% of energy demand from renewables requirement. The client has requested their chosen PV supplier to propose a suitably sized PV array in order to meet the output requirement, which they are committed to applying to the scheme.

4.0 Conclusion

This statement has reviewed the proposed development at Didsbury, which consists of a retirement living complex comprising of 26 apartments, communal areas (including Reception Area, Lounge, Refuse, Scooter Store, Stairs, Lifts, Stores, Plant Room, Corridors and Guest Suite and Ensuite), as well as associated landscaping, and has provided an assessment of the proposed scheme against policies EN4, EN6 and Chapter 4 within the Guide to Development in Manchester Supplementary Document.

The statement has highlighted that the scheme currently proposes to utilise a good thermal envelope to minimise heat loss, as well as efficient heating and lighting systems, which will drive energy efficiency in the building. This is in line with Policy EN4 's objectives of sustainable design and reducing energy use.

The calculations completed on the building fabric show that the predicted energy consumption will be around 124,414.45 kWh/yr. 20% of this total equates to 24,882.89 kWh/yr. They have also shown that a total carbon reduction of 11,568.37 kg/CO₂/yr needs to be achieved to meet EN6's 15% carbon reduction target. Having undertaken a review of renewable technological options to meet policy EN6 and Chapter 4 of the Supplementary Document, the client is proposing to engage a suitably qualified PV supplier to provide a PV array with an approximate minimum output of 24,883.00 kWh/yr, which will provide 20% of the development's predicted energy consumption, and provide over a 15% reduction in carbon emissions, therefore meeting both policy EN6 and Chapter 4's targets.

Whilst the proposed specification and building fabric are the preferred at this present time, the strategy and required contribution may be subject to change as design develops further. Nonetheless, it will be ensured that where any changes are made, the policy requirements listed will be maintained.



Appendix 1

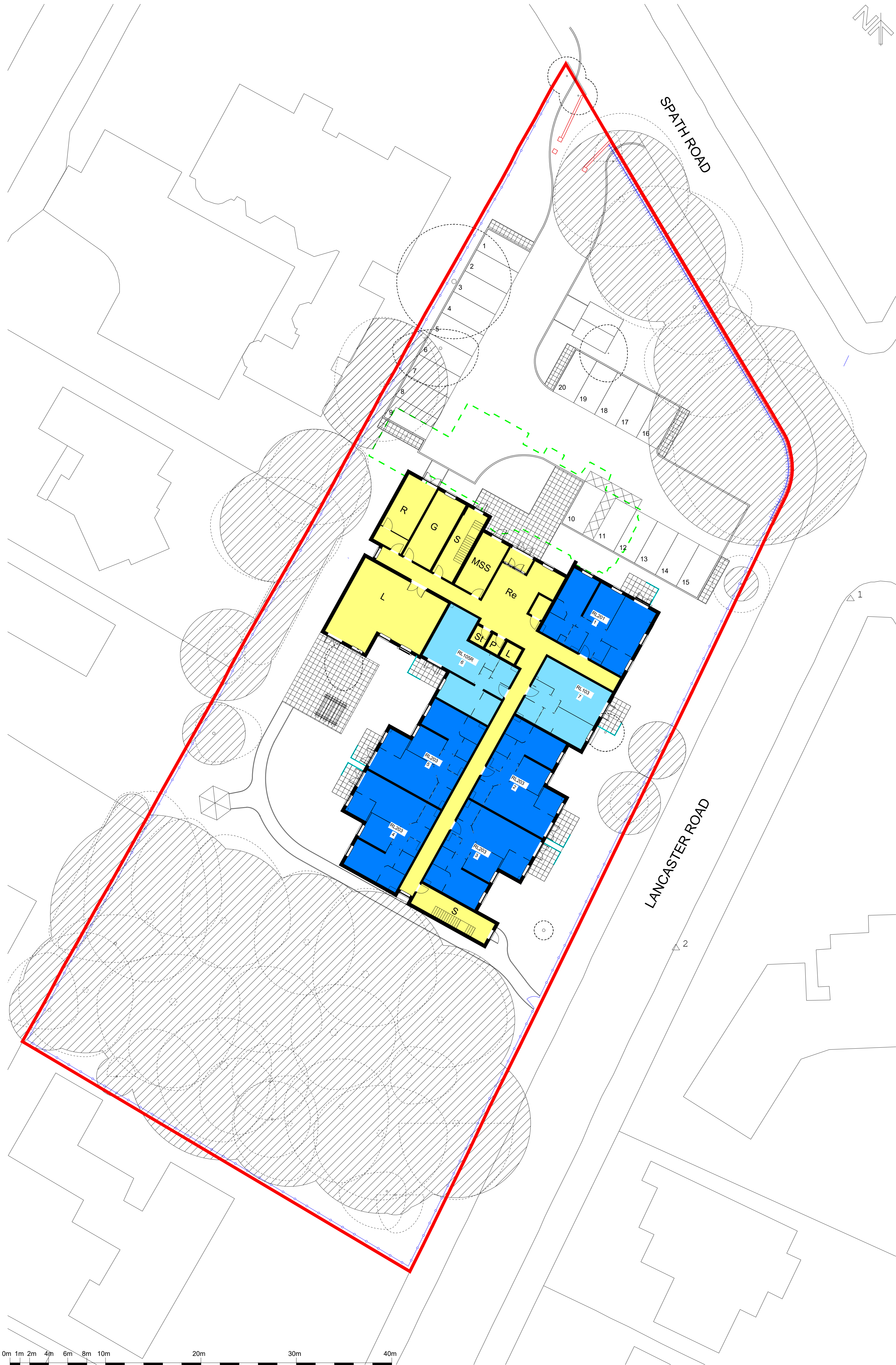
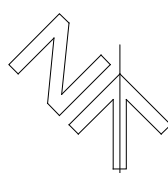
Proposed Site Plan

BOUNDARIES

- Proposed 1.8m high close boarded screen fence approx length 18m
- Proposed 2.1m high close boarded screen fence approx length 223m
- 1.5m high trellis screen fence around patios
- Existing boundary to be retained and enhanced where nessassary

LANDSCAPING

- Trees to be removed inline with arboricultural consultants method statements
- Trees to be retained and protected in line with BS5837:2012. Please refer to Keen Consultants Arboricultural Survey for more information.
- Root protection zone





Appendix 2

Energy Calculations (SAP Worksheets – available on request due to size)