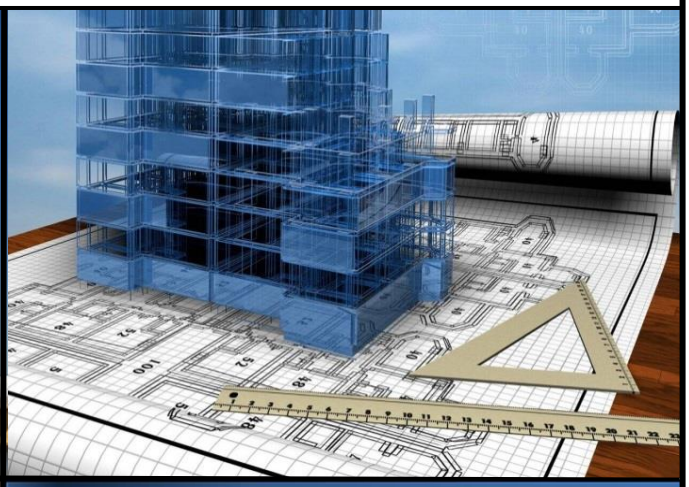
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Elsa Road, Levenshulme, Energy Statement & Sustainability Statement

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Elsa Road
Residential Development
Levenshulme



"Reducing Carbon Emissions
In New-Build
Residential Developments"

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Executive Summary

Elsa Road is a proposed new-build residential development to be constructed within the urban district of Levenshulme, at the former Cricket Club site. The site is located approximately 5no. miles South East of Manchester, and approximately 3no. miles North of Stockport. The A6 provides a primary access routes to and from the site with the M60 providing a nearby motorway link. The proposed development includes the construction of 50no. dwellings, consisting of houses.

Elsa Road "Area in General"



To meet with the challenging demands associated with sustainable development a "fabric first" approach was considered the most cost effective and efficient way of delivering an energy saving development that will connect with local housing needs, and reduce CO_2 emissions during the life cycle of each dwelling. The materials recommended for construction consist of heavyweight structures and lightweight components that offer stability in maintaining internal temperatures at comfortable levels for residents. This choice of materials ensures the fabric is slower to react to changing thermal conditions by acting as a heat sink during warmer periods and resisting high level heat loss during cooler periods.

Introduction

This report has assessed the need for sustainable building-design at the Elsa Road development based on Manchester Council Plan, and current Building Regulation requirements, Part L 2021. It is confirmed, the use of a fabric-first approach will achieve the Council's sustainability targets, with several low carbon energy systems available for enhanced levels of sustainability if required. The fabric-first approach is viable and one that will contribute to the on-going delivery of sustainable dwellings within the local area and wider communities.

Proposed Site Boundary, Elsa Road



1.0 Client's Brief

Acting upon instruction received from Seddon Construction Ltd via email dated 17th December 2025, TWC Consulting Ltd were appointed to conduct a review of the development's sustainability objectives, and assess the potential for low carbon technologies. The study assessed a wide range of building-design options deemed suitable for the development of which a fabric first approach was judged to be the most appropriate strategy to achieve Manchester Council's Local Plan targets.

2.0 UK Sustainable Development & Legislation

The UK Climate Change Act 2008, the Sustainable Buildings Act 2004, progressive changes to the Building Regulations, Planning Laws and other legislative provisions continue to push environmental improvements throughout the UK construction industry. These progressive laws and regulations commit designers and developers to reduce demand for energy within residential dwellings, whilst at the same time lessening the impact of carbon emissions. At the forefront of this evolving process is the tightening of the Building Regulations and various Planning Laws which require high levels of energy efficiency, and encourage renewable energy generation.

3.0 Sustainable Building-Design

An efficient and cost effective way of achieving sustainable building-design is through the prudent selection of building materials that reduce energy demand during occupation. Sustainable building-design provides a whole-house approach that relates to the broader aspects of sustainability, which if implemented prior to the commencement of the construction phase can greatly assist with issues such as fuel poverty, rising energy bills and lowering carbon emissions.

Sustainable building-design is at its most effective when considered at the earliest stages of procurement. Factors such as site orientation, solar shading, solar gain, natural ventilation, increased u-values, high levels of thermal mass, dynamic thermal response, admittance factors, green roofs and low energy lighting all have positive impacts on developments, and each should be considered within the context of long-term sustainability and environmental objectives.

Manchester Council Plan, and current Building Regulations, Part L 2021 direct project teams to obtain the highest levels of sustainability in new-build developments using design and available technologies to reduce the amount of carbon dioxide emissions produced in occupation. The targets set by Building Regulations can be achieved using innovative design specifications and/or a combination of low carbon/renewable technologies where required to achieve the necessary requirements. SAP software is used to confirm targets have been achieved based on the proposed building[s] design[s] and specifications, which are highlighted on compliance printouts as a percentage figure over the target set by the Building Regulations.

The applicant should demonstrate how the proposal will achieve a pass on Part L of the Building Regulations 2021. This could include use of solar technology, future proofing for sustainable heating supply, and provision of electric vehicle charging points within the on-site spaces as appropriate. Where possible, this information should be provided as part of the application.

4.0 Construction "A Fabric-First Approach"

All construction materials have properties which define their thermal dynamics. These properties include thermal conductivity (i.e. the amount of heat energy that can flow through a material at a given temperature range), specific heat capacity (the amount of energy required to raise a material element by 1oC) and emissivity (the rate at which materials radiate/re-radiate energy). Thermal conductivity and specific heat capacity can be combined to form a single calculation known as thermal diffusivity (the rate at which a material can store heat comparative to the rate it can conduct heat, the greater the temperature range the greater the flow of heat).

Heavyweight materials such as concrete, stone, brick and block all have high thermal diffusivity values, in contrast to other materials such as fibreboard, timber, steel which have lower values. With the demand for sustainable construction continuing to intensify, and the significance of thermal dynamics the choice between building materials is a significant factor in building design. Decisions between construction form over aesthetics is challenging designers as the ability of the fabric to react to changing climatic conditions, whilst reducing carbon emissions dominate. Knowing the thermal diffusivity of materials will assist building designers in creating thermally efficient buildings.

Table1: outlines the design specifications and options included as a basis for construction at Elsa Road.

Table1: Elsa Road, Construction Materials

Element	Specification	Construction details
External walls	0.20Wm2/K	100mm Brickwork, 150mm Blown Ecobead, 100mm Blockwork (Med Dense), 12.5mm Plasterboard.
Party walls	0.00Wm2/K	Detail tbc, cavity to be full filled and edge sealed to qualify 0.00W/m2k heat loss in SAP.
Roof	0.09Wm2/K	500mm mineral wool insulation within the roof void
Floor	0.11Wm2/K (varying between plots)	150mm PIR laid above the suspended beam and block floor.
Windows	1.4Wm2/K	BFRC certified DG window units.
Doors	1.0Wm2/K	Standard composite main entrance doors.
Thermal Bridging	0.06Wm2/K or less	All thermal bridges to be individually measured and insulated to minimise heat loss.
Pressure test	Designed q50:	Air tightness of 3.1m^3/m^2@50pa. to reduce the amount of air convection within each dwelling
Ventilation	Intermittent Extract Fans	Controlled ventilation rates to Part F standards
Lighting	At least 75lumens circuit/Watt	100% low energy lighting to be used within all internal areas. External lighting to be fitted with motion sensors
Main heating system	Panel Heaters	Electric Panel Heaters, fitted with appliance thermostats.
Water heating system	EDL200 or similar	Internal Heat Pump for water heating.
Water use	<105litres person, per day	Domestic hot water heated via the main heating system Showers via Heat Pump Cylinder
Renewable energy	Photovoltaics	SAPs show between 1.6kW – 4kWp of PV.

At Appendix A (below) a SAP calculation (Standard Assessment Procedure) has been attached for a typical shared ownership dwelling. The SAP printout confirms the construction strategy listed at Table 1: will meet the carbon reduction target set by Part L of the Building Regulations 2021. This is confirmed at para 1a of

the SAP printout indicated as percentage figure "DER<TER" (i.e. the Dwelling Emission Rate has a betterment over the Target Emission Rate, Building Regulations Part L 2012 by 59.58%). Several additional calculations have also been completed on a range of dwelling types in varying orientations and areas of glazing to ensure each dwelling achieves the carbon reduction target. those of affordable rent/ rent to buy.

5.0 Demand for Energy "Elsa Road"

The demand for energy at the Elsa Road is yet to be confirmed. However, it is anticipated that consumption levels will range between 6,000kWh – 9,000kWh of regulated energy per dwelling, per annum, based on the design proposals and the specifications listed above. This will assist in meeting the carbon emission targets set by Part L of the Building Regulations. Further dwelling specific data can be confirmed as the development progresses using industry recognised software such as SAP, daylight factor measurements, water consumption calculators and pollution mitigation control measures.

6.0 Renewable Energy & Low Carbon Systems

The potential for renewable and low carbon energy systems were considered for Elsa Road including; wind power, combined heat & power, biomass (wood), ground/air source heat pumps and solar energy – with several other renewables energy systems deemed unsuitable at this stage[1]. A summary of each system is outlined in the sections below along with their respective advantages and disadvantages.

6.1 Wind Power

Two types of wind power were considered including large-scale wind turbines and small scale domestic (micro-generation) turbines. Both systems were considered unviable due to surrounding urban areas and the predicted average wind speeds at the site (confirmed at 4.7m/s). It is anticipated the following restrictions would also impact wind power systems[2];

- Planning consent could be problematic given the sites location and likely objections from local residents;
- Noise level assessments would be required;

[1] Tidal power, Hydro, Geothermal, Biogas and Biowaste were not assessed during the study due to site limitations and the unlikelihood of their inclusion.
[2] The BWEA suggests wind speeds of 7m/s or more are required for large scale wind turbines (50kW). The average wind speed at Oldham, Greater Manchester is 4.7m/s at a height of 10m, which has been obtained from the http://www.rensmart.com/Weather/BERR website.

- A life cycle maintenance plan would have to be included within cost projections (i.e. the costs of maintaining the turbine(s) and/or associated moving parts over the life cycle of the system);
- Life cycle costs can be relatively high (depending on the quality of the system);
- Damage to local birds and wildlife have to be considered;
- Visual impact is difficult to define without conducting further feasibility studies;
- The system is less durable than other renewable energy systems;
- Energy is only generated when the wind strength is sufficient;
- Payback (in some cases) cannot be guaranteed.

6.2 Biomass Systems

The market for biomass "wood" has grown significantly during the past 3no. years with Scotland seeing a 300% increase in its use. Biomass boilers are being installed throughout the UK, although in some urban locations there is still a reluctance to use them due to problems associated with pollution[3]. Biomass systems can operate on a variety of fuel sources, which are governed by the specified boiler/plant. Power outputs range from small-scale systems at 4kW to large-scale district heating systems in excess of 1250kW (i.e. de-centralised plant). There are several well-established manufacturers producing biomass boilers including Broag, Hoval and Baxi. Capital costs can vary widely from approximately £1,500 per dwelling for wood stoves to approximately £8,000 per dwelling for district heating network systems.

The following sections outline the advantages and disadvantages of using biomass boilers for Elsa Road;

6.2.1 Advantages, Biomass

- Chips/pellets can be used to power a wide range of biomass boilers including combined heat and power systems (CHP) and individual wood stoves;
- Biomass generates a financial return via the Renewable Heat Incentive;
- Fuel sources can be locally grown and supplied;
- The payback period can be difficult to define, however 5 – 8 years is often used as a benchmark, depending on the type of system and the availability of the Renewable Heat Incentive, see www.energysavingtrust.co.uk for further details.

6.2.2 Disadvantages, Biomass

[3] See http://www.building.co.uk/report-highlights-biomass-pollution-fears/3105974.article for details.

- The supply of fuel can restrict the choice of system (i.e. chips or pellets);
- Pollution needs consideration (at Elsa Road, this would require further on-site clarification);
- Noise levels generated by the system(s) need to be assessed and managed accordingly;
- Maintenance requirements including cleaning, monitoring and running a biomass system can be relatively high;
- Substantial storage space is required to accommodate the plant and fuel supplies;
- The cost of transporting the fuel from source to the site can outweigh the benefits of using the system.

6.3 Heat Pumps

Heat pumps are an essential part of the UK's renewable energy mix. Several variations exist which can deliver heat within a building as and when it is required[4]. With regards the Elsa Road development heat pumps were considered viable either as standalone system(s), and/or as part of a site-wide energy strategy. However, high-end capital costs, design constraints and maintenance requirements during cold snaps would need further studies. Capital costs can vary widely, with quotes ranging as high as £12,000 per dwelling/unit. A summary of each variation is listed as follows;

- Water to Water Heat Pumps

Heat is extracted from a nearby watercourse, which is transferred to a looped pipework system which is then used to generate heat energy for space heating and domestic hot water;

- Air to Water Heat Pumps

Heat is extracted from outside ambient air temperature and transferred to a storage water supply via a heat exchanger where it is used as a source of heat supply when it is required;

- Ground Source Heat Pumps

Heat is taken from below ground level and transferred to a fluid mix (glycol etc.), and thereafter upgraded to provide a viable source of heat.

[4] Heat pumps use a system of compression, expansion, latent heat and exchangers to generate heat energy. The function of heat pumps is similar to that of a domestic fridge. A coefficient of performance is typically used to confirm efficiency standards.

6.3.1 Advantages, Heat Pumps

- Heat pumps can provide a sustainable and renewable source of heat energy supply;
- Heat pumps can generate constant supplies of heat and/or cooling;
- Heat pumps are particularly beneficial when used in conjunction with under-floor heating systems and low surface temperature heat emitters;
- Certain heat pumps are likely to receive income from the Renewable Heat Incentive, see www.energysavingtrust.co.uk for further details;
- Payback periods average between 5 – 7 years depending on the type of system and the availably of the Renewable Heat Incentive.

6.3.2 Disadvantages, Heat Pumps

- Horizontal ground source systems require large areas of land to generate the amounts of heat required inside buildings;
- Vertical ground source heat systems can be expensive to procure and install;
- Efficiency levels are reduced as outside temperatures decrease (i.e. heat pump workloads increase during colder periods to maintain internal temperatures at comfortable levels)[5].

6.4 Combined Heat and Power (CHP)

CHP is the simultaneous generation of heat and power contained within the same energy system. Products range from small-scale domestic engines which run on simple gas turbines, to large-scale tri-generation systems which provide heating, cooling and power. The heat produced during the generation cycle is recovered and then used as a source of heat-energy within the building. CHP systems can deliver efficiency levels up to 90% in contrast to separate systems which can range as low as 30% to 50%. CHP systems are typically specified on large-scale projects where there is a constant and high demand for power (i.e. hospitals and large office buildings).

Although CHP is fast becoming an available option to building designers its inclusion at Elsa Road was deemed unviable due to low demand for heat and power, and periods of occupation which could not be

[5] Although, not a disadvantage, it is possible for some air source heat pumps to ice/frost up when temperatures drop to between 0°C and 3°C. Therefore, the reliability of recognised units should to be considered prior to specification.

confirmed. The advantages and disadvantages of specifying a CHP system remains outside the scope of this report.

6.5 Solar Energy

Solar energy is a popular choice of renewable energy that benefited greatly from previous changes to the Building Regulations [Part L], various funding requirements associated with Code for Sustainable Homes, the availability of Feed in Tariffs, the Renewable Heat Incentive and Planning Conditions[6]. Solar energy is considered to be a common choice of renewable due to its simplicity in installation, its nominal maintenance requirements, it is source of energy during daylight hours and it can return an income/investment from the Feed in Tariff and/or Renewable Heat Incentive.

Solar energy has 2no. primary variations which are usually referred to as; Solar Thermal (hot water), and Solar Photovoltaic (PV).

6.5.1 Solar Thermal

Solar thermal is a renewable heat energy system also known as “solar hot water”. The system can be confused with solar photovoltaic in that it is similar in appearance and it is normally installed on roof areas, however that is where the similarity ends. Solar thermal systems produce heat via the absorption of the Sun’s shortwave radiation and external temperatures, which it then transfers to a heat carrying fluid, where-after it is used to deliver space heating and domestic hot water. The panels/collectors are located within close proximity to a thermal store (i.e. a hot water cylinder) to reduce heat losses within the pipework system. The stored heat is used to increase temperatures of incoming mains water before it reaches the boiler. There are 2no. variations of solar thermal known as “evacuated tubes and flat plate collectors”. Evacuated tubes are more efficient, however they are also more expensive. Capital costs can range between £4000 – £6,000 per dwelling.

6.5.1.1 Advantages, Solar Thermal

- Solar thermal provides a constant source of free heat that can be used to reduce the amount of mains energy required for space heating and domestic hot water;
- The cost of installation is becoming increasingly competitive as the market reaches maturity;

[6] The Code for Sustainable Homes has been wound down, however the standard is still administered by BRE, and is currently being used by several housing organisations as a means of measuring sustainable buildings.

- Solar thermal returns an investment from the Renewable Heat Incentive, although changes to the incentive are currently being reviewed at the time of writing, see www.energysavingtrust.co.uk for further details;
- The payback period can range between 6 – 12 years depending on site variables and the qualifying financial incentive.

6.5.1.2 Disadvantages, Solar Thermal

- Roof mounted systems can increase structural loadings, which in turn can lead to uplifts in costs and expensive strengthening works;
- Energy generation is dependent on diurnal temperatures and weather conditions;
- At Elsa Road there are several design limitations due to internal layouts, associated pipe runs and distances from the panels to the locations where the heat energy is required.

6.5.2 Solar Photovoltaic

- Solar Photovoltaic (PV) panels produce electricity when stimulated by direct and diffuse daylight. The panels absorb light from which an electrical charge is generated. PV panels are usually located on roof areas and have wiring from within the panels fixed to an isolation switch, an inverter and a generation meter for use at source or export to the grid. The price of the panels is declining as the market reaches maturity. Although, a cost of approximately £5,500 per dwelling is considered typical depending on the number of panels required.

6.5.2.1 Advantages, Solar (PV)

- PV arrays provide a source of electricity that can be used at source or export to the grid;
- PV arrays are simplistic to install and wiring is minimal;
- Minimal maintenance requirements associated with the most PV panels;
- Payback periods range between 8 – 10 years depending on site parameters;
- The Feed in Tariff provides a return of approximately 3.70p for each unit of energy generated, although changes to the incentive are currently being reviewed at the time of writing, see www.energysavingtrust.co.uk for further details.

6.5.2.2 Disadvantages, Solar (PV)

- Energy generation can be limited by the site's orientation and efficiencies of the installed panels;
- Energy generation is dependent on diurnal weather conditions and temperatures;
- An increase in structural roof loadings can be expected. This can lead to additional and expensive strengthening works;
- PV panels do not produce energy during hours of darkness.

7.0 Conclusions and Recommendations

It is conclusion and recommendation of this report the design and specifications outlined above will meet the requirements for sustainable development as required by Manchester Council Plan and current Building Regulation requirements, Part L 2021. A mixture of sustainable building-design, a fabric first approach and renewable/low carbon energy systems will deliver thermally efficient dwellings that will reduce demand for energy, resist heat-loss through conduction and maintain internal temperatures at comfortable levels for the occupants.

The use of solar panels on this scheme was deemed viable and fed into the design stage SAPs. Figures at the time of writing show between 1.6kWp and 4kWp installed to the most efficient elevations of the dwelling. This is to be co-ordinated between TWC, Calder Peel Architects and the appointed M&E Designer.

8.0 Appendix A – SAP Calculation

Summary for Input Data

elmhurst energy

Plot Reference	Elsa Road - Type E			Issued on Date	18/12/2025
Assessment Reference	Option 4			Plot Type Ref	Elsa Road - Type E
Plot Address				SAP Version	10.2

SAP Rating	82 B	DER	4.24	TER	10.49
Environmental	96 A	% DER < TER			59.58
CO_2 Emissions (t/year)	0.52	DFEE	39.47	TFEE	41.01
Compliance Check	See BREL	% DFEE < TFEE			3.76
% DPER < TPER	17.69	DPER	45.12	TPER	54.82

Assessor Details	Mr. Steven Johnson	Assessor ID	Z708-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	East	
Property Tenture	2	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Detached	
2.0 Number of Storeys	2	
3.0 Date Built	2025	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	132.99	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	31.60 m	58.60 m²	2.40 m
1st Storey:	31.60 m	58.60 m²	2.70 m