



Environmental Standards Statement

PALGRAVE AVENUE, MANCHESTER

DECEMBER 2022

GreenBuild Consult Head Office |
Suite 3, Churchgate Court, 3 Church
Road, Whitchurch, Cardiff, CF14 2DX

London Office | Kemp
House, 152 City Road, London
EC1V 2NX

W: www.greenbuildconsult.co.uk | T: 0333355 3610

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Document Checking:

Prepared By:

Gideon Griffiths

Signed:



Checked By:

Owain Morgan

Signed:



Verified By:

Daryl Fisher

Signed:



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2		

1. INTRODUCTION

- 1..1 Green Build Consult have been appointed by Wardell Armstrong to assist with an Environmental Standards Statement for the proposed development at Palgrave Avenue, Manchester.
- 1..2 The study follows a fabric first approach, providing commentary on key features such as energy efficiency measures.
- 1..3 A detailed assessment of the development is also included, this has allowed for the dwellings to be assessed using the SAP methodology against the updated Part L 2022 building regulations.
- 1..4 It is the intention of the design team for this report to represent the aims and objectives of the proposed development with an emphasis of the feasibility of a selection of renewable technologies. These building service strategies will be explored further as the design progresses through to technical design.

2. SITE CONTEXT

Wider Site

- 2..1 An outline on the proposed development is provided by Wardell Armstrong.

Figure 1 - Development Site Plan



- 2..2 The development will comprise of 7 residential dwellings.
- 2..3 As context, the development site is currently an unused area of land within a residential area.

Residential Provision

- 2..4 As a brief summary, the development comprises of 6 semidetached houses and 1 mid-terrace, located on Palgrave Avenue with Queens Road to the rear of the properties.

Figure 2 – Floor Plans



2..5 Figure 3 depicts typical street scene and elevation drawings for the development.

Figure 3 - Typical Elevation Image from Palgrave Avenue, Manchester



3. ENERGY & CARBON ASSESSMENT

- 3..1 The following section reviews potential energy efficiency measures to be adopted within the scheme as a measure to ensure the high sustainability ambitions of the scheme are implemented and requirements of the Manchester's Core Strategy are followed.

Local Policy Context

- 3..2 The Manchester Core Strategy Development Plan Document (adopted July 2012) sets out the vision for the local authority and puts in place a policy framework to deliver that vision. Taken as a whole, it is the local expression of sustainable development. It balances competing requirements and demands to deliver against economic, social and environmental objectives.
- 3..3 *As outlined within the City Council's Guide to Development in Manchester SPD/SPG, (chapter 4) and Core Strategy policies EN4 and EN6 an Environmental Standards Statement should be submitted with your application, which addresses sustainability ratings and the provision of renewable energy within the development (Please refer to Appendix A of the Core Strategy for guidance on preparing this statement). This should include a BREEAM pre-assessment rating through the submission of a pre-estimator report which should demonstrate that a rating level of at least Very Good would be achieved. Where this standard is not achievable clear reasons why need to be set out within the submission. This statement must address the guidance within Chapter 4 of the 'Guide to Development in Manchester and policies EN4 and EN6 of the Core Strategy for the City of Manchester, confirm the proposals for the provision of onsite renewable energy to provide 25% of final site energy demand and CO2 reduction.*

Energy Efficiency

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:

- 3..4 **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 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.

- 3..5 The contribution of renewable or low carbon technology to the energy demands of the development should be maximised where possible, in line with Policy EN1.5.

3..6 Following building fabric and passive design efficiency measures a review of the building services has been made with the aim of supplying efficient and low carbon solutions for the building services to further reduce the environmental impact of the development.

‘Fabric First’ & Passive Design Efficiency Measures

Energy Efficient Fabric

- 3..7 The heat loss of different building fabric elements is dependent upon their U-value. A building with low U-values provides better levels of insulation and reduced heating demand during the cooler months. The proposed development will incorporate high levels of insulation for all solid elements and high-performance glazing beyond Part L 2022 targets and notional building specifications, to reduce the demand for space conditioning as far as possible.
- 3..8 There are several changes to the regulations which are primarily focussed on delivering enhanced fabric performance values beyond those currently incorporated within Part L 2014 regulations and encouraging the installation of low and zero carbon technologies.
- 3..9 Enhanced thermal performance will be enforced through stringent ‘backstop’ u-values for the construction elements. A comparison of these figures is given within the table below.

Table 1: Minimum Standards for Building Fabric

Minimum Fabric Performance Standards		
Element	Part L 2014	Part L 2022 Edition
External Walls	0.30 W/m²K	0.26 W/m²K (for houses) 0.26 W/m²K (for flats)
Roof	0.20 W/m²K	0.16 W/m²K
Floors	0.25 W/m²K	0.18 W/m²K
Windows	1.8 W/m²K	1.6 W/m²K
Solid Doors	1.8 W/m²K	1.6 W/m²K
Air Permeability	10m³/hm²	8 m³/hm²

- 3..10 Introducing enhanced backstop u-values ensures that even if low carbon heating solutions are introduced to offset emissions, good thermal performance will also be required to future-proof the property.
- 3..11 We recommend adopting enhanced thermal performance for the new development at Palgrave Avenue with improved performance beyond the new regulatory ‘backstop u-values reported above.
- 3..12 A summary of the recommended thermal performance u-values and comparison with Part L 2022 fabric performance figures used is summarised within Table 2 below.

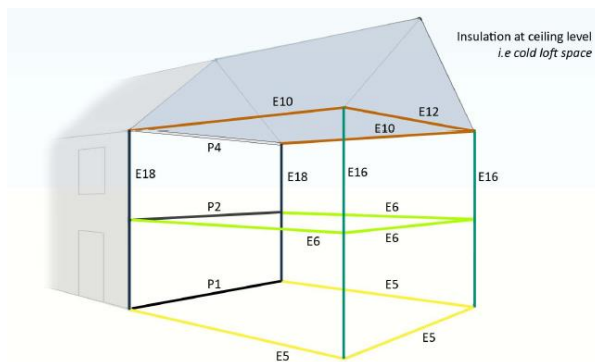
Table 2: Proposed building fabric U-values

Proposed – Building Fabric U-value Comparison			
Element	Sub-Element	Part L 2022 Edition	Proposed Scheme
Walls	External Walls	0.26	0.16
Floor	Ground Floor	0.18	0.12
Roof	All Roof Structures	0.16	0.10
Windows	All Windows	1.6	1.20 (G value of 0.63)
Doors	Patio Doors	1.6	1.20 (G value of 0.63)
Doors	Front Door	1.6 (Pedestrian doors)	1.20 (solid entrance door)

Thermal Bridging

- 3..13 As the heat within the building escapes through a 'path of least resistance', any place where there is a break in the building's insulation provides a weak spot in thermal performance known as a thermal bridge. 'Geometrical Thermal Bridges' are of particular concern as these are common throughout the whole building and can occur more frequently with complicated building designs.

Figure 4: Thermal Bridging Junctions (ref: Stroma)



- 3..14 A further change proposed within Part L 2022 is the removal of Accredited Construction Details (ACD's) from the SAP calculation methodology. As a result, there are now three routes available when including thermal bridging within the SAP calculation.
- Use thermal bridging details calculated by a suitably competent person following the guidance in BRE Report BR 497 and the temperature factors set out in BRE Information Paper IP 1/06
 - Use the values in the Standard Assessment Procedure, Table K1, in the 'default' column
 - Use a default ψ -value of $0.20 \text{ W/(m}^2\text{K)}$
- 3..15 As building fabric u -values improve, a greater portion of heat loss within the building is through poor thermal bridge design, therefore ensuring appropriate detailing is adopted will be important to further reduce the heating energy demand of the scheme.
- 3..16 It is envisaged that the construction details for the proposed building will be designed to be more efficient than that of the accredited construction details, so we have allowed for a mixture of default and well performing Timber Frame values which achieve ψ Values of around $0.03 \text{ W/(m}^2\text{K)}$.

Commented [DF1]: Should this state 'thermal bridging'?

Air Tightness

- 3..17 Achieving an airtight building is important for the energy efficiency of the dwelling and, more importantly the comfort of the building occupants. A lower value indicates a more airtight building that is more energy efficient, thus performing better in SAP calculations.
- 3..18 Air permeability refers to the air tightness or leakage rate of a building. Air leakage occurs through gaps in the fabric of the thermal envelope, notably at junctions in the building fabric.
- 3..19 The requirement to test all dwellings is an important new change to Part L and as such careful consideration of air tightness and the workmanship that will be involved in achieving this should be made by both the design team and the contractor.
- 3..20 The proposed development will aim to improve upon the Part L1 (2022) worst allowable standard for air tightness of 8m³/m².h at 50Pa, by targeting a low air permeability and assessing each property individually in line with the requirements of Part L (2022).

Minimum Fabric Performance Standards		
Element	Part L 2022 Edition (Wales)	Proposed Performance Standard
Air Permeability	8 m³/hm²	5 m³/hm²

Solar Gain & Overheating Risk

- 3..21 Solar heat gains are important to any building design seeking to minimise energy consumption however the benefits from solar heat gains, principally through passively introducing heat to the building thus reducing the load on the heating systems however these need to be critically evaluated to ensure excessive heat gains are minimised.
- 3..22 The proposed introduction of Building Regulations Part O it places the emphasis of designing homes with passive features to limit the risk of overheating for building occupants. It is recommended that an assessment of overheating risk using Dynamic Simulation Modelling (DSM) be pursued following further design review of the homes to recommend design features to limit solar gain exposure and maximise the opportunity for natural ventilation to purge excess heat from the dwellings.

Active Efficiency Measures & Renewable Energy Appraisal

- 3..23 Active design measures include features of the building services strategy which are aimed at reducing the energy demand of the scheme through efficient systems and control strategy.

Energy Efficient Lighting

- 3..24 Low energy light fittings will be incorporated throughout the development. Light fittings will be specified as LED luminaires, this will enable the proposal to reduce energy use and internal heat gains as much as possible and reduce the homes lighting energy demand.
- 3..25 Where outdoor or security lighting is to be provided, this will also be supplied by energy efficient LED fittings.

Efficient Building Services & Low & Zero Carbon Heating Solutions

- 3..26 As part of the assessment, we have reviewed potential renewable and Low & Zero Carbon (LZC) technologies that are applicable to this development.
- 3..27 A brief summary of a selection of these technologies is provided within the following table.

Table 3 - Renewable and Low & Zero Carbon Feasibility Summary

Technology Considered	Comments
GSHP	Technology unlikely to be feasible Deemed unfeasible by the design team due to spatial constraints of the site and prohibitive costs.
ASHP	Technology feasible Deemed feasible due to size and location of properties.
Biomass	Technology not feasible Burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within an urban location. Furthermore, potential adverse air quality from pollutants, especially in urban environments is an important large factor in disregarding this technology.
Wind	Technology not feasible Windspeeds and frequencies are not expected to yield any significant carbon reductions. Furthermore, noise and visual issues associated with wind turbines have also been considered as the site is located in a predominantly residential area.
Solar Thermal	Technology potentially feasible but disregarded due to other viable solutions Solar PV electricity generation contributes a wider range of end energy demand uses therefore would be better use of available roof space.
Solar PV	Technology feasible and should be reviewed further Solar PV achieves a good carbon offset and is a viable means of generating renewable energy onsite.

Building Services

- 3..28 The building service strategy has identified heating and hot water as the predominant regulated energy demands within the home. As such measures will be introduced to ensure that energy efficient services are selected and operate as efficiently as possible.
- 3..29 Any additional improvements additional measures would be required such as the introduction of WWHRS would be recommended to improve the energy performance.

Affordable Dwellings - Recommended Building Services Strategy	
Ventilation Strategy	Natural, use of intermittent extract fans
Heating	ASHP – aroTHERM Plus 10kW + uniTOWER
Hot Water System	200L hot water cylinder
Lighting	100% energy efficient lighting
Renewable Technology	0.5 kWp Roof mounted PV system oriented to South/Southwest facing to each dwelling

- 3.30 Where a hot water cylinder is to be provided, these will be highly insulated to minimise heat loss from the cylinder. Furthermore, primary pipework will be insulated to minimise loss of heat during distribution.

Energy Efficient Controls Strategy

- 3.31 As a minimum, Time and temperature zone control will be provided to control the space conditioning within the homes and offer a quick response to special heating requirements.

Renewable Energy Systems

- 3.32 As reported above, roof mounted solar PV systems are thought to be a viable renewable energy solution for the dwellings on site as there is a good opportunity for installing these systems on southerly facing roofs of the buildings.
- 3.33 As part of our assessment, we have allowed for system sizes of 0.5 kW south facing PV system to each dwelling which would offer a considerable CO₂ and primary energy consumption saving for each property and effectively help to offset the regulated energy demands of each of the properties.

Energy Assessment Results

- 3..34 Following a review of passive and active design features, along with the potential provision of renewable and Low & Zero Carbon systems, SAP calculations have been carried out on a sample of dwelling types within the development for review of predicted energy and CO2 emissions performance.
- 3..35 These calculations utilise the building fabric and services specification described within this report and are intended to represent a potential route to implementing good levels of thermal performance an implementing feasible renewable and low carbon heating systems.

Table 4 - Recommended Building Fabric and Services Summary Palgrave Avenue, Manchester

Building Fabric & Services Specification for Energy Modelling		
Element	Sub-Element	Proposed Scheme
Walls	External Walls	0.16
Floor	Ground Floor	0.12
Roof	All Roof Structures	0.10
Windows	All Windows	1.20 (G value of 0.63)
Doors	Patio Doors	1.20 (G value of 0.63)
Doors	Front Door	1.20 (solid entrance door)
Mechanical & Electrical Specification		
Ventilation Strategy		Natural, use of intermittent extract fans
Heating System		ASHP – aroTHERM Plus 10kW + uniTOWER
Hot Water System		200L hot water cylinder
Lighting		100% energy efficient lighting
Renewable Technology		0.5 kWp Roof mounted PV system oriented to South/Southwest facing to each dwelling

- 3..36 The calculations have been undertaken using Elmhurst SAP 10 compliance software.
- 3..37 The results represent the expected energy performance achieved through incorporating the energy efficiency and renewable energy measures reported within the assessment.

Table 5 - Sample Energy Modelling results for Palgrave Avenue, Manchester

Sample House Types - Energy Modelling Results at Palgrave Avenue, Manchester			
House Type	Target Emission Rate (kgCO ₂ /m ² /yr)	Dwelling Emission Rate (kgCO ₂ /m ² /yr)	Percentage Improvement (%)
Plot 1	9.34	3.25	65.20
Plot 2	9.34	3.25	65.20
Plot 3	9.34	3.25	65.20
Plot 4	9.34	3.25	65.20
Plot 5	10.40	4.36	58.08
Plot 6	9.71	4.24	56.33
Plot 7	10.40	4.36	58.08

- 3..38 As can be seen within the results a substantial CO₂ emissions reduction beyond Part L building regulations standards can be met for the development through following the design principals and building services strategy reported within this assessment.
- 3..39 This would represent a significant improvement beyond 'business as usual' practice and a substantial uplift in performance beyond current Part L 2022 Building Regulations.

4. CONCLUSION

- 4..1 Further to the site overview, a detailed assessment has been undertaken using the SAP calculation methodology for all dwelling types across the development. This utilises compliance calculation against the proposed changes introduced within Part L 2022 England.
- 4..2 Furthermore, several LZC technologies were considered for the scheme, and it was determined that the most suitable options would be roof mounted solar PV combined with ASHP's.
- 4..3 A CO₂ emissions reduction was noted following these measures with an average reduction of around 62.06% beyond the new Part L 2022 baseline values via the implementation of air source heat pumps and proposed roof mounted PV proposals.
- 4..4 Each dwelling will be supplied with on-site renewable energy generation via roof mounted PV systems which will help feed the all-electric heating and hot-water demand.