Energy Statement
Ref: Z59603.3 RevA

29 No. Dwellings

at

Winston, Lordship and Hodge,
Moston,
Manchester

for

One Manchester





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Contents

1. Introduction 7
1.1. Location 8
1.2. Floor Plans 10
2. Policy Drivers for Energy Efficiency and Renewable Energy 12
2.1. National Policy 12
2.2. Local Policy 13
3. Methodology 19
4. Baseline Energy Assessment 21
4.1. Predicted Baseline Energy Requirements 22
5. Passive Design and Energy Efficiency 23
5.1. Passive Design Measures 23
5.2. Energy Efficient Systems 23
6. District & Communal Heating Networks 24
6.1. Decentralised Heating Networks 24
7. Renewable Energy Technologies 25
7.1. Photovoltaics (PV) 25
7.2. Solar Thermal HW Panels 26
7.3. Ground Source Heat Pump (GSHP) 27
7.4. Air Source Heat Pump/Exhaust Air Heat Pump/ Hot Water Heat Pump 28
7.5. Micro Wind Power 29
7.6. Biomass 30
8. Energy Assessment of Proposed Scheme 32
9. Conclusion 33
9.1. Low/ Zero Carbon Technologies (LZT) Review 33
9.2. Summary Headlines 34
10. Appendices 35
10.1. LZT Feasibility Table 35
10.2. Specification for New Build Dwelling Assessments (ADL1A 2021 - SAP) 36

Executive Summary

This Energy Statement has been prepared in support of planning application Section 73 application and the proposed variation of the relevant planning condition for the development of 29 No. new-build dwellings at Winston, Lordship and Hodge. The original Energy Statements were submitted and conditioned under planning application 141682/FO/2024. Following the approval of the original scheme, minor changes have been made to the proposed development, and this updated Energy Statement has therefore been prepared to assess the revised scheme against the applicable energy and sustainability requirements in support of the Section 73 application. The statement is provided to demonstrate that the revised development continues to satisfy the relevant energy and sustainability requirements.

Planning application section 73:

This report is prepared in support of the s73 application and the proposed variation of the relevant planning condition(s) and assesses the revised scheme against the applicable energy and sustainability requirements.

This Energy Statement will evaluate the technical and economic feasibility of using both passive and low and zero carbon technologies and will assess the practical levels of CO_2 reduction possible for this development to comply with the following Manchester City Council's planning requirements:

- National Planning Policy Framework (2025)
- Manchester City Council's Core Strategy Development plan (2012-2027)
- Places for Everyone Joint Development Plan (2024)

The following low and zero carbon technologies have been evaluated:

- Biomass
- Wind
- Biogas
- Air Source Heat Pumps & Exhaust Air Heat Pumps
- Geothermal
- Combined Heat & Power (CHP)
- Solar Hot Water
- Solar Photovoltaic

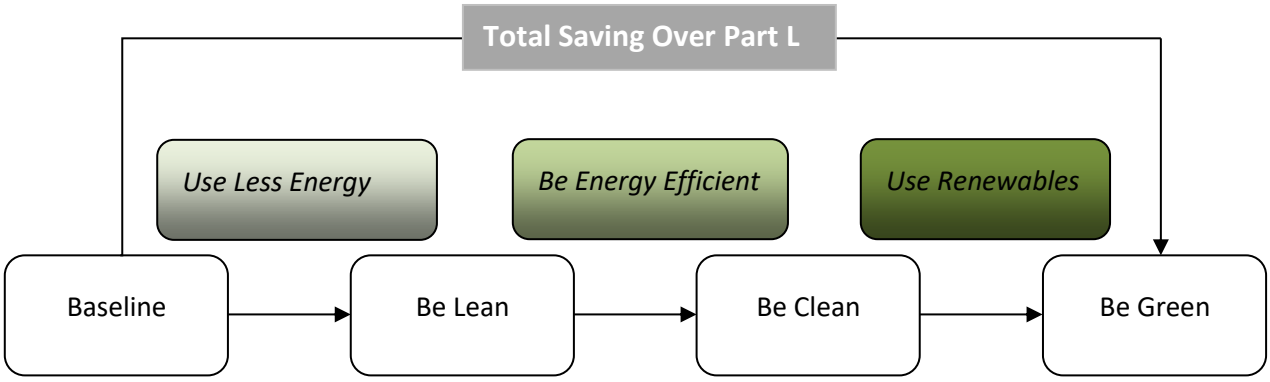
The approach for the development is to embed sustainability into the heart of the development through a range of design measures based on the 'Be Lean, Be Clean, Be Green' design hierarchy. Measures will include:

1. Enhanced building fabric to meet Building Regulation ADL1A 2021.
2. Enhanced air tightness and thermal bridging
3. Highly efficient mechanical ventilation with heat recovery system to all cottage flats.
4. Highly efficient mechanical extract ventilation to all houses.
5. Heating to Cottage Flats will be provided by highly efficient electric panel heaters
6. Hot water to Cottage Flats will be provided by highly efficient hot water heat pumps
7. Heating and Hot Water to Houses provided by highly efficient air source heat pumps
8. Efficient lighting strategy primarily using LED type fittings.

For the purpose of the assessment, we have evaluated the dwelling types in ADL1A 2021 (Standard Assessment Procedure SAP 10) to provide an accurate estimate of predicted energy consumption/CO_2 emissions.

Summary

This Energy Statement has been prepared to support the approved planning condition 29 and the associated s73 application. The report demonstrates that the approved scheme complies with the energy and sustainability requirements of the planning condition 29. It outlines the finalised building fabric performance, energy efficiency measures and low-carbon heating strategy adopted for the development, evidencing compliance with the approved planning requirements and relevant national and local planning policies. The development achieves energy savings through a fabric-first approach, incorporating passive energy efficiency improvements to minimise energy demand and carbon emissions. These measures complement the overall sustainable energy strategy for the development and support the objectives of both national and local planning policy.



The principles of a Be Lean, Be Clean, Be Green design philosophy have been applied, which results in a 60.45% improvement and a 21.50% primary energy improvement over Building Regulations Part L1A 2021, as indicated in Table 1. A full design specification that confirms inputs used within the SAP calculations is provided within the Appendices of this report.

Table 1 - Proposed development emissions against Building Regulations Part L1A 2021

	Total CO_2 Emissions ($kgCO_2/yr$)	**Total Primary Energy (kWh/yr)**
Target Dwelling Performance	**23,180**	**121,505**
Proposed Dwelling Performance	**9,169**	**95,630**
Total Reduction	**14,012**	**25,875**
Percentage Improvement (above ADL1 2021)	**60.45%**	**21.50%**

1. Introduction

The proposed development is for 29No. dwellings which comprises 18No. cottage flats and 11No. houses spread across Hodge Street, Lordship Close, and Winston Road in Moston, Manchester. The dwellings have been assessed under Building Regulations Approved Document Part L1A (2021).

Supporting information is provided within this report for the proposed energy strategy to be considered on site in accordance with the following planning policies:

- National Planning Policy Framework (2025)
- Manchester City Council's Core Strategy Development plan (2012-2027)
- Places for Everyone Joint Development Plan (2024)

Throughout this report, passive design techniques, energy efficient equipment and appropriate low carbon technologies will 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 will be made based on the calculation methodology dictated by the Standard Assessment Procedure (SAP) and in line with the requirements of Places for Everyone Joint Development Plan (2024).

1.1. Location

The area of land for the proposed development at Winston, Lordship and Hodge is highlighted by the red line boundary shown in the image below.



Figure 1 - Location and surrounding area of proposed residential development

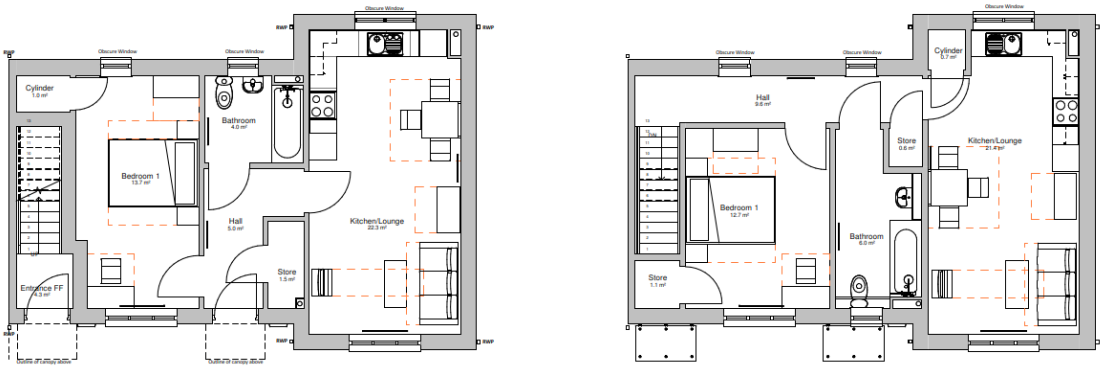
The sites will be accessed from Winston Road, Hodge Street and Lordship Close. The surrounding area is suburban, with Boggart Hole Clough located to the North of the proposed site.



Figure 2 - Site Plan for Proposed development

The proposed development is as shown within the red line boundary defined in figure 2 above.

1.2. Floor Plans



Ground Floor Plan (50.0m²)
1 : 50

01 First Floor Plan (60m²)(To include staircase)
1 : 50

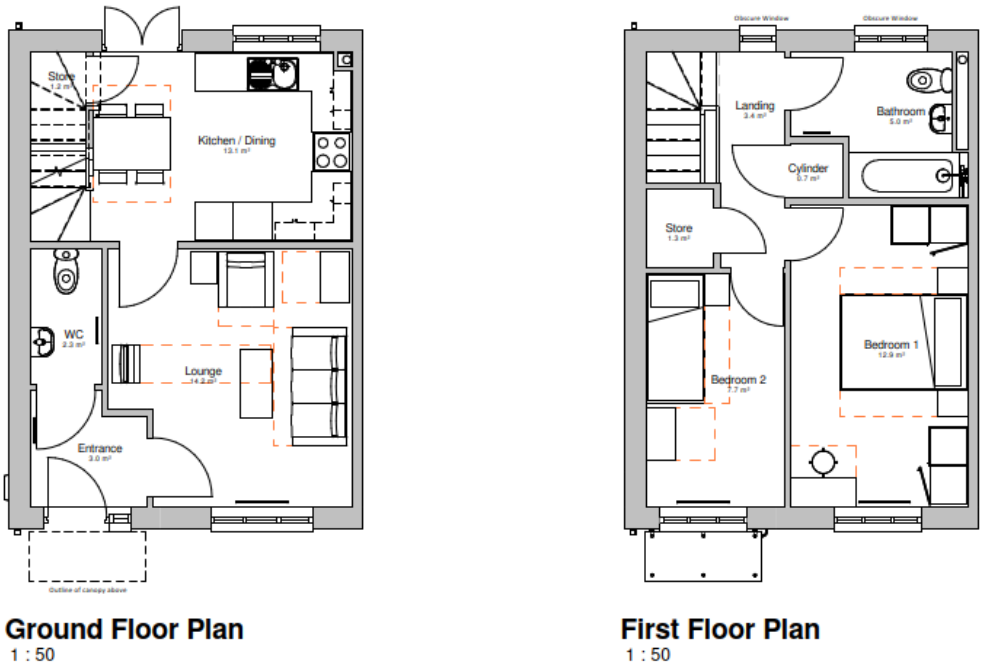
Figure 3 – 1B2P Cottage Flats Floor plan



Ground Floor Plans
1 : 50

01 First Floor Plan
1 : 50

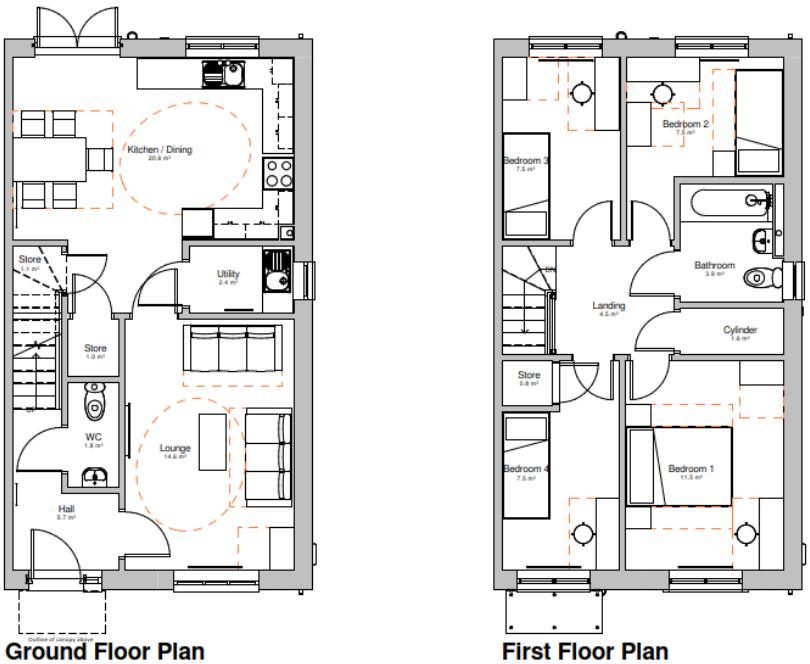
Figure 4 – 1B2P/2B3P Cottage Flats Floor Plan



Ground Floor Plan
1 : 50

First Floor Plan
1 : 50

Figure 5 – 2B3P House Floor Plan



Ground Floor Plan
1 : 50

First Floor Plan
1 : 50

Figure 6 – 4B5P House Floor Plan

2. Policy Drivers for Energy Efficiency and Renewable Energy

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

2.1. National Policy

The National Planning Policy Framework was published in February 2025 and sets out the governments' planning policies for England and they should be applied. Table 2 sets out the relevant energy 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
14. 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 Places for Everyone Joint Development Plan (2024), using a 'Be Lean, Be Clean, Be Green' approach in reducing operational carbon emissions. An overview of current decentralised energy schemes in Manchester and an assessment on the potential for future schemes in relation to this development is provided in Section 7 of this report. This energy statement appraises site specific information to determine the most appropriate approach to minimise energy consumption.

2.2. Local Policy

The adopted Places for Everyone Joint Development Plan 2022 to 2039 (March 2024) provides a set of guidelines for new development. All relevant energy policy within these documents is provided within this section together with a design response.

Table 3 – Key Local Planning Policy Requirements and Design Responses

Places for Everyone Joint Development Plan 2022 to 2039 (March 2024)		
Section	**Policy Requirements**	**Design Response**
Policy JP-S1: Sustainable Development	To help tackle climate change, development should aim to maximise its economic, social and environmental benefits simultaneously, minimise its adverse impacts, utilise sustainable construction techniques and actively seek opportunities to secure net gains across each of the different objectives. Carbon and Energy Within this, new development will have a critical role to play and all new homes and commercial/industrial buildings will need to achieve net zero carbon by 2028.The definition of net zero carbon development has been established by the UK Green Building Council. It is expected that development in the Plan area will apply a net zero carbon approach to operational emissions up until 2028, thereafter emissions in construction should be considered. Minimum carbon reduction targets will be set in line with the Future Homes Standard of 80% or until such a time this is superseded. To provide further confidence in decision making, supporting research23 was commissioned to outline how the pathway to 2028 can be achieved for 'net zero in operation'24 by setting out critical milestones and measures that would be expected when following the energy 'hierarchy' and adopting a fabric first approach. 5.17 Based on the evidence which has informed the 5-Year Environment Plan and achieving net zero carbon in new development, this has shown that there will need to be a significant increase in photovoltaic technology. Therefore, where planning applications for residential development are accompanied by an energy statement, the following	The proposed development will follow the principles of the Energy Hierarchy by adopting a passive fabric-first approach to design rather than adopting the use of renewable technologies. A full energy strategy is provided in Section 7 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 fabric first approach to the development is a much-preferred

best practice thresholds should be seen as the starting point in relation to reducing energy demand and onsite renewable energy generation. The thresholds set out in Table 5.1, for post 2025, are consistent with the GM Five Year Environment Plan.

Table 5.1 Best Practice Thresholds for Reducing Energy Demand and Onsite Renewable Energy Generation within residential developments

-	Space Heat Demand[25]	Hot Water Energy Demand[26]	Renewable Energy Generation Targets
2021 - 2025	Houses (30kWh/m2) Flats (25kWh/m2)	20% energy demand reduction in the total heat required for water heating	*Photovoltaic installation: 20% ground floorspace
2025 - onwards	Houses (20kWh/m2) Flats (15kWh/m2)	^20% energy demand reduction in the total heat required for water heating	*Photovoltaic installation: 40% ground floorspace
*Ground floorspace used as a proxy for available roof area.	-	-	-
^Will need to be reviewed with Future Homes Standard 2025 to determine if savings already embedded.	-	-	-

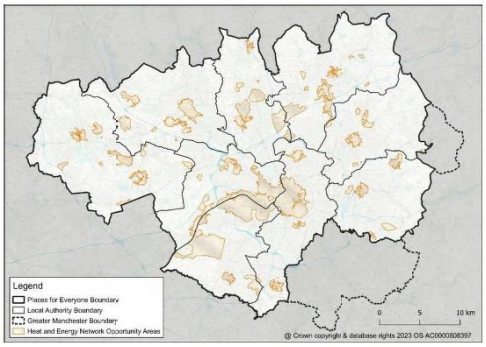
5.19 By following the energy hierarchy, new development will need to achieve net zero carbon through the maximisation of on-site measures first. However, in circumstances where a development has demonstrated that the hierarchy
has been followed and there are no reasonable alternatives to meet the minimum carbon reductions, then payment to offset remaining emissions will
also be required. Such payments should be expected to fund other carbon
saving programmes within Greater Manchester to help meet the 5 Year Environment Plan targets (such as energy efficiency retrofit and renewable
energy installations).

method with the use of Air Source Heat Pumps (ASHP) to provide heating and hot water to the houses & Hot Water Heat Pumps (HWHP) to provide hot water only to the cottage flats.

Further information can be found within section 8.

Policy JP-S2: Carbon and Energy	The aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures including: 1. Promoting the retrofitting of existing buildings with measures to improve energy efficiency and generate renewable and low carbon energy, heating and cooling; 2. Promoting the use of life cycle cost and carbon assessment tools to ensure the long-term impacts from development can be captured; 3. Taking a positive approach to renewable and low carbon energy schemes, particularly schemes that are led by, or meet the needs of local communities; 4. Increasing the range of nature-based solutions including carbon sequestration through the restoration of peat-based habitats, woodland management, tree-planting and natural flood management techniques; 5. An expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable; a. Be net zero carbon which applies: • from adoption– to regulated operational carbon emissions; • from 2028 -to all emissions 'in construction'. From 2025 development should also calculate and minimise carbon emissions from unregulated emissions alongside regulated emissions. Development proposals should set out how this has been achieved in an energy statement in accordance with the energy hierarchy, which in order of importance seeks to: i. Minimise energy demand; ii. Maximise energy efficiency; iii. Use renewable energy; iv. Use low carbon energy; and v. Utilise other energy sources. From 2025 any residual carbon emissions that cannot be fully mitigated on-site should be offset, in agreement with the relevant local planning authority through a financial contribution to a carbon offset fund. As an interim measure, development should be consistent with the 2022 Part L Building Regulations unless superseded by changes to building regulations and/or national or local planning policies. b. Incorporate adequate electric vehicle charging points, in line with Part S of the Building Regulations, unless superseded by relevant Local Plan	The scheme utilises low carbon technology with the use of Air Source Heat Pumps for houses & Hot Water heat pumps for cottage flats, and includes for low energy lighting, and improved thermal elements to minimise energy demand and enhance energy performance in line with current Building Regulations

	policies, to future proof for the likely long-term demand, taking account of the potential maximum energy demand for the site; c. Where practicable, prioritise connection to a renewable energy/heating/cooling network in the first instance or a low carbon energy/heating/cooling network that is adaptable to non-fossil fuels at a later date; d. In residential developments, achieve energy demand reductions in terms of space heat demand; hot water energy demand and the delivery of on-site renewable energy generation, in accordance with Table 5.1. For renewable energy generation priority should be given to PV installation where technically feasible, alternative technologies will be appropriate where the equivalent generation is evidenced. Include a detailed energy statement to demonstrate via site relevant evidence how the development has sought to maximize reductions in carbon emissions in line with relevant policy targets, including the minimisation of overheating risks and appropriate measures for post occupancy evaluation.	
Policy JP-S3: Heat and Energy Networks	The provision of decentralised energy infrastructure is critical to the delivery of our objectives for low carbon growth, carbon reductions and an increase in local energy generation. The following measures will help to achieve this: 1. Delivery of renewable and low carbon energy schemes will be supported with particular emphasis on the use of decentralised energy networks in areas identified as "Heat and Energy Network Opportunity Areas". These have been identified where: • Existing heat/energy networks are operational or have been commissioned; • Proposals for new heat networks/energy networks are being progressed, or future opportunities have been identified in city-region master planning; • Sufficient density of existing heat demand occurs; and • Significant future development is proposed at the strategic development locations. 2. Within the identified "Heat and Energy Network Opportunity Areas", unless it can be demonstrated that there are more effective alternatives	Based on a review of available data, the site is not currently located within a designated Heat and Energy Network Opportunity Area, nor within 500m of an operational or planned district heat network. Due to the constrained, mixed-use nature of the existing building, and the relatively low and dispersed heat demand across

	for minimising carbon emissions or such connection is not practicable or financially viable, it is expected that: • New residential developments that are '10 dwellings or more' or other developments over 1,000 m2 floorspace shall: a. Connect to an existing or planned heat/energy network or be designed to enable future connection (where within 500m of such a network); and/or b. Install a site-wide or communal heat/energy network solution. • An expectation that new industrial development will demonstrate that opportunities for using waste heat locally have been fully examined, and included in proposals; • An expectation that where publicly-owned buildings and assets adjoin new major development sites, opportunities for these buildings and assets to connect to site-wide proposals will be considered; and • An expectation that any site-wide networks will be designed so as to enable future expansion to adjoining buildings or assets as appropriate. Figure 5.1 Heat and Energy Network Opportunity Areas  Flood Risk and the Water Environment 5.39 Climate change and population and economic growth can put increasing pressure on the available potable water supply for homes and businesses. It is important that water is conserved and efficiently used as much as possible to help build resilience to periods of drought; avoid over abstraction; reduce carbon emissions from water treatment and disposal; and protect river and wetland habitats from degradation. All new homes have to meet mandatory national standard set out in Building Regulations (of 125 litres/person/day). Where there is a clear	individual units, the use of decentralised energy or site-wide heat networks has not been considered practicable or financially viable in this instance. Instead, the scheme will utilise Air Source and Hot Water heat pumps, supported by improved insulation and building fabric upgrades, in full compliance with Part L1A of the Building Regulations (2021).

	local need, the government's Housing Optional Technical Standards paragraph 013 and 014 set out that local authorities may also consider tighter water efficiency requirements for new homes (110 litres a day) to help manage water demand. This will be determined through the preparation of district local plans.	

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 2021 (SAP) applies to the proposed dwelling 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 the new build envelope (U-values) Glazing design Airtight construction Efficient mechanical ventilation using system 3 extract 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 incl. potential 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 of the Places for Everyone Joint Development Plan (2024).

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, maintenance and operation, etc...

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. Baseline Energy Assessment

Energy Counsel have based the analysis on current Building regulations ADL1A 2021 (SAP 10), taking into account solutions that must not only be energy efficient but also practical, reliable and user friendly.

Energy Counsel have carried out preliminary SAP 10 calculations for the dwellings. Under Building Regulations Part L1 2021, dwellings must comply with all three metrics set by the notional building shown below.

- Dwelling Emissions Rate (DER) must be lower than or equal to the Target Emissions Rate (TER)
- Dwelling Primary Energy Rate (DPER) must be lower than or equal to the Target Primary Energy Rate (TPER)
- Dwelling Fabric Energy Efficiency Rate (DFEE) must be lower or equal to the Target Fabric Energy Efficiency Rate (TFEE)

SAP 10 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, ventilation and lighting for a dwelling. SAP 10 can also be used to ascertain the energy requirements of a development.

To assess the baseline carbon emissions, we must make an estimation of the energy demands through Building Regulations in order to set a target upon which the actual development can be compared.

4.1. Predicted Baseline Energy Requirements

The predicted baseline CO_2 emission demands for the development:

Table 4 - Baseline dwelling emissions

Our Ref	Dwelling Type	No. Of Type	Floor Area m^2	TER (kg $CO2/yr/m^2$)	TPER (kWh/ yr/m^2)	Total Target Carbon Emissions (kg CO2/yr)	Total Target Primary Energy (kWh/yr)
Z59603	1B2P FF Cottage Flat - Blue	6	60.34	12.41	65.06	4,493	23,554
Z59604	1B2P GF Cottage Flat - Blue	6	49.93	14.49	76.36	4,341	22,876
Z59605	1B2P GF Cottage Flat - Pink	3	50.41	12.32	64.68	1,863	9,782
Z59606	2B3P FF Cottage Flat - Pink	3	63.23	11.86	62.10	2,250	11,780
Z59607	2B3P House - Yellow	9	70.66	12.71	66.51	8,083	42,296
Z59608	4B5P House - Orange	2	99.76	10.78	56.22	2,151	11,217
Total		**29**				**23,180**	**121,505**

The baseline carbon emissions rate for the development is **23,180 $KgCO_2$/yr** and the baseline primary energy rate is **121,505 kWh/yr.**

5. Passive Design and Energy Efficiency

The approach of the development is to embed sustainability into the heart of the design from the outset of the project design process. The design will be developed with sustainable solutions, taking into account the relevant policies and strategies of the Places for Everyone Joint Development Plan (2024).

The development will seek to consider all aspects and principles of sustainable development, taking into account environmental, social and economic impacts.

5.1. Passive Design Measures

The philosophy for the site is to achieve as much of the necessary reduction in carbon emissions through the use of passive design techniques and energy efficient measures as possible, before resorting to the use of LZCs. This ensures that the highest standards of building fabric and energy efficiency are achieved, rather than offsetting a poorer performance with LZC contributions.

This will be undertaken through a fabric first energy efficient design approach with high levels of thermal efficiency and a reduction in energy demand through efficient lighting design

5.2. Energy Efficient Systems

Options have been reviewed for improving the energy efficiency of the development by installing an efficient heating system. The scheme will utilise high efficiency Air Source Heat Pumps to provide heating and hot water to the houses and Hot Water Heat Pump serving hot water to the cottage flats.

A low energy high efficiency mechanical ventilation system with heat recovery will serve cottage flats, and highly efficient mechanical extract ventilation to serve the houses in line with the requirements of Building Regulations Part F (2021).

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6. District & Communal Heating Networks

This section outlines how consideration of energy supplied efficiently from a district heating network can be provided to the dwellings in line with the Energy Hierarchy.

6.1. 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 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

There are currently no existing district heating networks within proximity to the site, and the development of a decentralised system would not be feasible for a project of this scale. With the closest being Sheltered Housing at Victoria Square, Manchester just over 2 mile southwest.

7. Renewable Energy Technologies

Energy Counsel have reviewed options for the use of on-site renewable energy/Low or Zero Carbon Technology (LZT) in line with the policy aspirations of the Places for Everyone Joint Development Plan (2024).

This renewable energy statement/strategy reviews the technical and economic feasibility of the following technologies

- Solar Photo-voltaic
- Solar Hot Water
- Ground Source Heat Pumps
- Air Source Heat Pumps / Exhaust Air Heat Pumps
- Micro Wind Power
- Biomass

7.1. 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.

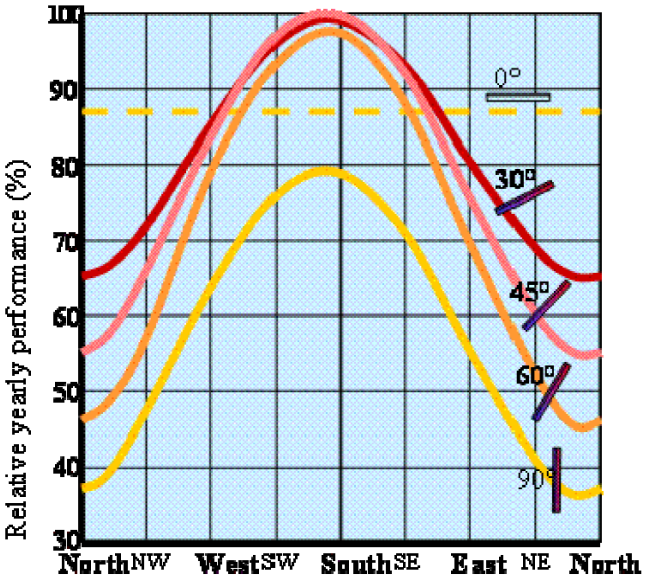


Figure 7 - Performance of photovoltaic panel orientation

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 to the right:



Figure 8 - Photovoltaic array on a pitched roof

The cost to install PV is typically £1,000 - £1,500 per kWp for 'on-roof' panel systems.

The development does not incorporate photovoltaic (PV) panels. Instead, carbon emission reductions are achieved through the use of air source heat pumps (ASHPs) for space heating and hot water to the houses and hot water heat pumps (HWHPs), which provide low-carbon hot water to the cottage flats in line with the objectives of the Places for Everyone Joint Development Plan (2024).

7.2. Solar Thermal HW Panels

Solar panel heating uses the radiant energy from the sun to heat hot 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.

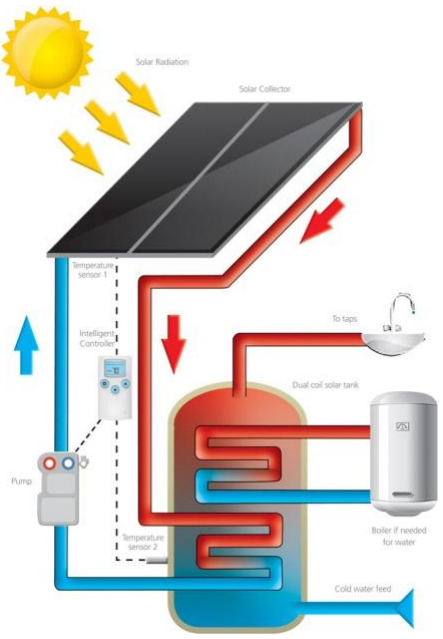


Figure 9 - The principles of a solar thermal system

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 hot water storage, the less pipe work is required. Annual

maintenance checks are recommended. The solar collectors are connected to a condensing boiler via a HW cylinder with twin coil.

A typical installation in the UK has a panel size of 3-5m^2 which is used in conjunction with a HW storage tank of 180-300litres, of which a minimum of 90-150 litres must be dedicated to solar hot water storage.

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 and dwelling type.

The use of solar thermal panels is generally most effective when integrated with individual heating systems serving each dwelling. Whilst the orientation of the development would be suitable for the utilisation of solar thermal technology to provide domestic hot water, the preferred low-carbon strategy for this development is the use of air source heat pumps (ASHPs) for space heating together with hot water heat pumps (HWHPs) for domestic hot water production.

The adoption of ASHPs and HWHPs provides a more efficient and practical means of reducing operational energy demand and carbon emissions, enabling the development to achieve compliance with the Building Regulations and the Places for Everyone Joint Development Plan (2024) without the need for solar thermal technology. As the required carbon reductions are achieved through these technologies, the installation of solar thermal panels is not considered an appropriate or necessary solution for this development.

7.3. 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.

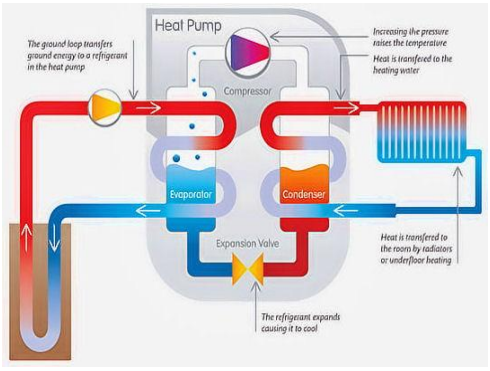


Figure 10 - Principles of a GSHP system

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.

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

7.4. Air Source Heat Pump/Exhaust Air Heat Pump/ Hot Water Heat Pump

Air source heat pumps (ASHPs) work by extracting heat from the external air to provide space heating and domestic hot water. They can be installed externally adjacent to a dwelling or mounted on an external façade, depending on the design requirements. ASHPs use a relatively small amount of electricity to extract and upgrade renewable heat energy from the air. Their efficiency is measured by the Coefficient of Performance (CoP), which is the ratio of heat output to electricity consumed. Typical systems achieve a CoP of between 2-4, although higher efficiencies can be achieved under favourable operating conditions. Due to their high efficiency and ability to provide both space heating and domestic hot water, ASHPs are considered the most appropriate low and zero carbon (LZC) technology for the proposed dwellings on this development.

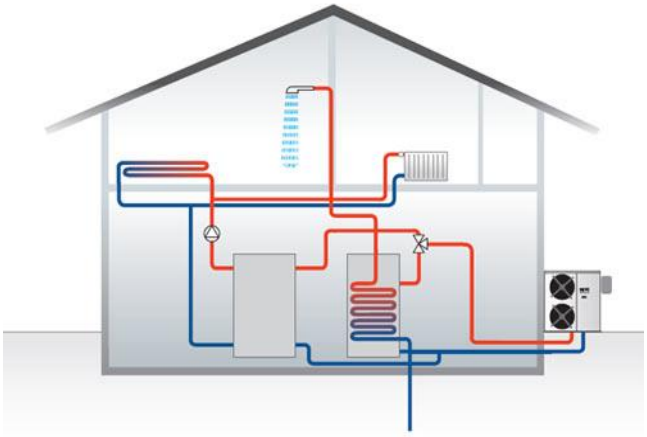


Figure 11 - Principles of an ASHP system

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.

Hot water heat pumps (HWHPs) are considered the most appropriate low and zero carbon (LZC) technology for the proposed cottage flats and are used to provide domestic hot water throughout the dwellings. Unlike conventional air source heat pumps, HWHPs comprise only an internal unit and do not require an external condenser, making them particularly well suited to higher-density residential developments where the installation of multiple external units would be impractical and could impact the appearance of the site. As the proposed dwellings have a relatively low space heating demand due to their high fabric performance, domestic hot water represents the largest proportion of their energy demand. Consequently, the use of HWHPs provides an efficient and practical solution, delivering significant carbon emission reductions in accordance with the objectives of the Places for Everyone Joint Development Plan (2024).

7.5. 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:



Figure 12 - Mounted wind turbine

- Roof mounted – These are mounted on the roof of dwellings
- 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.
- Generally speaking 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

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.

7.6. 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.



Figure 13 - Biomass boiler and hopper

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.

Biomass CHP 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 these reasons biomass is discounted.

8. Energy Assessment of Proposed Scheme

The proposed development has adopted the principles of the 'Be Lean, Be Clean, Be Green' approach.

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 air source and hot water heat pumps, supported by efficient ventilation systems.

Table 5 - Proposed emissions from the development

Ref	Dwelling Type	No.	TER	DER	TPER	DPER	Total Carbon Emissions (Kg CO2/yr)	Total Primary Energy (kWh/yr)
Z69235	1B2P FF Cottage Flat - Blue	6	12.41	5.42	65.06	56.29	1,962	20,379
			56.33%		13.48%			
Z69235	1B2P GF Cottage Flat – Blue	6	14.49	5.98	76.36	61.97	1,791	18,565
			58.73%		18.84%			
Z69235	1B2P GF Cottage Flat – Pink	3	12.32	4.62	64.68	48.21	699	7,291
			62.50%		25.46%			
Z69235	2B3P FF Cottage Flat – Pink	3	11.86	5.23	62.10	54.30	992	10,300
			55.90%		12.56%			
Z69235	HT 2B3P	9	12.71	4.35	66.51	45.66	2,766	29,037
			65.77%		31.35%			
Z69235	HT 4B5P	2	10.78	4.80	56.22	50.41	958	10,058
			55.47%		10.33%			
Total		**29**	**60.45%**		**21.30%**		**9,169**	**95,630**

The carbon emissions for the new build dwellings are predicted to emit **9,169** $KgCO_2$/yr. This is a total carbon reduction of **14,012** $KgCO_2$/yr from the baseline emissions of **23,180** $KgCO_2$/yr this equates to a **60.45**% carbon reduction.

The primary energy rate is **95,630** kWh/yr. This is a primary energy reduction of **25,875** kWh/yr from the baseline primary energy rate of **121,505** kWh/yr. This equates to a **21.30**% primary energy reduction.

The development proposal meets local policy including energy efficient lighting, efficient ventilation, improved thermal bridging, low air leakage and highly efficient water heating delivered via a heat pump.

9. Conclusion

In conclusion, the proposed development has been designed through the adoption of a fabric-first approach, enhanced energy efficiency measures, and an appropriate low-carbon heating strategy. The final building specification demonstrates compliance with the relevant national and local planning policies and satisfies the energy and sustainability requirements of the approved planning condition. It is therefore considered that the development has achieved an appropriate standard of energy performance and carbon reduction, and this Energy Statement should be accepted in support of the discharge of planning application section 73.

1) Reduce the total carbon emissions by 60.45% compared to Building Regulations ADL 2021.
2) The heat pumps are the renewables/ low carbon technology. Their contribution to the overall energy reduction under the 'be green' energy hierarchy is over. 50+%.
3) Reduces the total primary energy by 21.30% compared to Building Regulations ADL 2021.

The approach for the development at Winston, Lordship and Hodge, 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 2021.
2. Enhanced air tightness and thermal bridging
3. Highly efficient mechanical ventilation with heat recovery system to all cottage flats.
4. Highly efficient mechanical extract ventilation to all houses.
5. Heating to Cottage Flats will be provided by highly efficient electric panel heaters
6. Hot water to Cottage Flats will be provided by highly efficient hot water heat pumps
7. Heating and Hot Water to Houses provided by highly efficient air source heat pumps
8. Efficient lighting strategy primarily using LED type fittings.

9.1. Low/ Zero Carbon Technologies (LZT) Review

- Solar Thermal Hot Water is not a viable option as hot water will be provided by efficient heat pumps.
- 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 on this constrained site is not viable.
- 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, noise and air traffic.

- 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.
- Photovoltaic panels have been considered and are viable for this development. However they are not currently proposed due to financial constraints and the fact the scheme is meeting appropriate planning standards.
- HWHP units have been proposed for the hot water delivery on this development to the cottage flats due to their high COPs providing carbon savings in addition to the future proofing of the dwellings when considering the future of mains gas boilers.
- Air source heat pumps (ASHPs) have been proposed to provide space heating and domestic hot water throughout the houses on this development due to their high Coefficients of Performance (CoPs), offering an efficient and low-carbon heating solution. ASHPs are considered the most appropriate low and zero carbon (LZC) technology for the proposed dwellings, delivering significant reductions in operational carbon emissions while providing a reliable and efficient heating system. A more detailed overview of LZT technologies is provided in the appendices of this report.

9.2. Summary Headlines

- A passive fabric-first approach has been taken to reduce the energy demand of the proposed development. By focusing on passive design measures and energy efficiency through the energy hierarchy, the project offers an efficient and sustainable solution for the life of the building.

Table 6 - Proposed development emissions against Building Regulations Part L1A 2021

	Total CO_2 Emissions ($kgCO_2/yr$)	**Total Primary Energy (kWh/yr)**
Target Dwelling Performance	**23,180**	**121,505**
Proposed Dwelling Performance	**9,169**	**95,630**
Total Reduction	**14,012**	**25,875**
Percentage Improvement (above ADL1 2021)	**60.45%**	**21.30%**

10. Appendices

10.1. LZT Feasibility Table

Technology	Technical Feasibility	Carbon Savings	Estimated Costs	Financial Viability
Solar photovoltaics	South facing aspects of the roof could support a rooftop array to ensure energy consumption is reduced sufficiently if sought.	An 8kWp system could save around 2,480 kg of CO2 per year per dwelling, although	Average cost for such a system is around £1.5K per dwelling.	Current potential income generation is around £230 per annum per dwelling, with a fuel cost saving of around £60 per year per dwelling.
Wind	Average wind speeds on the site according to the NOABL Wind Speed Database are 4.7m/s. To be technically feasible a minimum of 6m/s is required, therefore this site is not considered feasible.	N/A	N/A	N/A
Micro Hydro	There is no capacity for micro hydro on this site since there are no local water courses available.	N/A	N/A	N/A
District Heating	There are currently no existing or planned district heating networks to facilitate connection at this stage.	N/A	N/A	N/A
Solar Hot Water	This technology has been discounted as the level of hot water usage in each dwelling does not merit a storage system, which poses space issues.	Around 270 kg of CO2 per year per dwelling.	£3-5K per dwelling	Income generation from RHI in a 4 person household would be in the region of £340 / year (per dwelling) with a fuel saving of around £65 per year per dwelling
Heat Pumps	GSHP: Ground conditions on site are unknown, and installation of coils are likely not economically viable for this project. ASHP & HWHP: A HWHP for hot water is the preferred option due to the high efficiency and energy savings	GSHP: 2,100 to 3,300 kg CO2 per year per dwelling ASHP: 1,700 to 2,700 kg CO2 per year per dwelling.	GSHP @ £13-20K per dwelling ASHP: £7-11K per dwelling	GSHP: £2,590 minimum annual RHI income generation per dwelling with fuel saving of £440 per year minimum per dwelling ASHP: £920 minimum annual RHI income generation per dwelling with fuel saving of £335 per year minimum per dwelling
Biomass	The small scale of this development would not facilitate the installation of biomass boilers due to the space required for pellet storage.	N/A	N/A	N/A

10.2. Specification for New Build Dwelling Assessments (ADL1A 2021 - SAP)

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 2021 apply.		
1.2	Post code of site is Unknown.	Winston, Lordship and Hodge	
1.3	Electricity is supplied by standard tariff rather than economy 7, 10 or 24.	*Assumed Standard tariff*	
1.4	It is assumed that the dwellings have a Medium thermal mass parameter.	*Masonry construction assumed.*	
2. Floor Construction Details			
2.1	Ground floor is to achieve the U-value stated opposite.	U-Value = 0.12 W/m²K	
3. Wall Construction Details			
3.1	Main external walls are to achieve the U-value stated opposite.	U-Value = 0.18 W/m²K	
3.2	Party walls are fully filled and sealed to achieve the U-value opposite.	U-Value = 0.00 W/m²K	
4. Roof Construction Details			
4.1	Cold Roofs are to achieve the U-value indicated opposite.	U-Value = 0.09 W/m²K	
5. Openings			
5.1	All double-glazed windows to achieve the U-Value stated	U-value = 1.2 W/m²K. double glazed window g-value = 0.4	
5.2	Doors to achieve the U-Value stated	U-value = 1.0 W/m²K.	
6. Ventilation			
6.1	Design stage SAP calculation assumes an air permeability of 4m³/m²/hr at 50pa will be achieved.		
6.2	Mechanical ventilation with heat recovery system installed in all cottage flats.	EnviroVent EnergiSava 260	
6.3	Mechanical extract ventilation installed in all wet rooms of houses	Vent Axia Low Carbon NBR or equivalent	
6.4	No open flues or fireplaces or flue-less gas fires are present anywhere.		
7. Space Heating			
7.1	There is one main heating system installed.	No secondary heating.	
7.2	Heating is provided to the cottage flats by individual electric panel heaters		
7.3	The heating system has programmer and appliance stat		
7.4	Houses to be provided heat by Air source heat pump	*Vaillant aroTHERM plus 5kW*	
8. Water Heating			
8.1	Hot water to cottage flats is provided from hot water heat pumps with cylinder storage	Vaillant aroSTOR 200ltr Size of Hot water to be confirmed by specialist.	

8.2	Hot water to houses is provided from Air source heat pumps with cylinder storage	Size of Hot water cylinder to be confirmed by specialist.	
8.3	Water usage per person per day is ≤125 Litres.	To meet Part G	
9. Renewables			
9.1	No photovoltaic technologies have been proposed.		
10. Other			
10.1	Use standardized thermal bridging details wherever possible to enhance thermal performance of the building.	Y=0.05 W/mK	
10.2	Low energy (LE) lights are installed throughout.	All lighting must be specified with efficacy of 80 lumens/circuit watt or more.	

Index of Tables and Figures

Figure 1 - Location and surrounding area of proposed residential development 8
Figure 2 - Site Plan for Proposed development 9
Figure 3 – 1B2P Cottage Flats Floor plan 10
Figure 4 – 1B2P/2B3P Cottage Flats Floor Plan 10
Figure 5 – 2B3P House Floor Plan 11
Figure 6 – 4B5P House Floor Plan 11
Figure 7 - Performance of photovoltaic panel orientation 25
Figure 8 - Photovoltaic array on a pitched roof 26
Figure 9 - The principles of a solar thermal system 26
Figure 10 - Principles of a GSHP system 27
Figure 11 - Principles of an ASHP system 28
Figure 12 - Mounted wind turbine 29
Figure 13 - Biomass boiler and hopper 30

Table 1 - Proposed development emissions against Building Regulations Part L1A 2021 6
Table 2 – Key National Planning Policy Requirements and Design Responses 12
Table 3 – Key Local Planning Policy Requirements and Design Responses 13
Table 4 - Baseline dwelling emissions 22
Table 5 - Proposed emissions from the development 32
Table 6 - Proposed development emissions against Building Regulations Part L1A 2021 34