

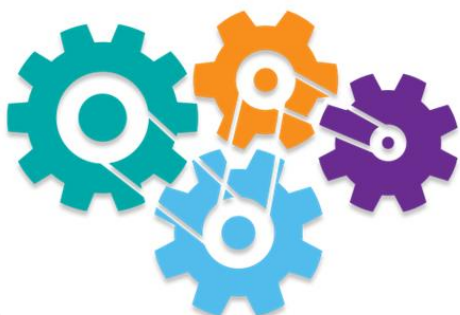


Cabbagefield
Row,
Leigh Park,
Havant

Energy Strategy Report Outlined Statement

July 2021

Ref: 20-7165



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<i>Revision</i>	<i>Initial</i>	<i>Rev A</i>	<i>Rev B</i>	<i>Rev C</i>
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1. Executive Summary

This report demonstrates the initial high level energy strategy of the proposed development at **Cabbagefield Row, Leigh Park, Havant**, based on the information provided by the design team. The development consists of 150 new dwellings within Havant Borough.

1.1. Policy Requirements

The Council requires new developments to incorporate sustainable design and construction measures. The table below summarises the local policy requirements for the proposed development.

Policies	Requirements	Compliance Check
Local Plan E12	A reduction in CO2 emissions of at least 19% of the Dwelling Emission Rate (DER) compared to the Target Emission Rate of Part L of the Building Regulations is achieved.	The proposed development aims to achieve an overall 19% or more carbon reduction through energy efficient measures and renewable technologies (Air Source Heat Pumps and Photovoltaic panels).
	Use district heat or combined heat and power (CHP or CCHP), where appropriate.	Since the proposed renewable technologies (ASHPs and PV panels) will reduce carbon emissions beyond the required 19%, the further reduction via CHP has not been pursued.
	Assessment under the BREEAM Communities scheme, or equivalent, for any development of 100 dwellings or more (gross).	The BREEAM Communities assessment will be produced under a separate cover.

Table 1 Policy Requirements

1.2. Methodology and Strategies

The methodology used to determine the CO₂ emissions is in accordance with the Energy Hierarchy. The below table shows the Energy Hierarchy and suggested strategies for the proposed development.

Stages	Strategies
1st Stage Energy efficient design	- U-values and air permeability better than Building Regulations Part L. - Accredited Construction Details for all thermal bridging junctions - Mechanical Ventilation with Heat Recovery 100% Low energy lights - Low water consumption
2nd Stage District Heat networks or CHP	The ASHP and PV panels will reduce carbon emissions beyond the required 19%, hence the further reduction has not been pursued via the CHP.
3rd Stage On-site renewable technologies	Air Source Heat Pump and Photovoltaic Panels would be proposed to maximize the carbon reduction on site.

Table 2 Energy Hierarchy and suggested strategies

1.3. Assessment Results

After the application of all strategies based on the Energy Hierarchy, the regulated carbon dioxide emissions will be calculated, an example table is shown below.

Energy Hierarchy		Regulated Carbon Emissions (Tonnes CO ₂ /yr)
BASELINE	TER set by Building Regulations 2013 Part L	tbc
1st Stage	After energy demand reduction	tbc
2nd Stage	After CHP/ district Heating	tbc
3rd Stage	After renewable energy	tbc

Table 3 Carbon Emissions after each stage of the proposed strategy

The carbon savings from each stage can be calculated based on the results above. The table below summarises the total cumulative carbon reduction as an example.

Regulated Carbon Savings		Regulated Carbon Reduction	
		Tonnes CO ₂ /yr	%
1 st Stage	After energy demand reduction	tbc	tbc
2 nd Stage	After CHP/ district Heating	0	0%
3 rd Stage	After renewable energy	tbc	tbc
Total Cumulative Savings		tbc	19 % or more

Table 4 Carbon Reduction after each stage of the Energy Hierarchy

Given the total cumulative reduction above, **the proposed development will meet a 19% reduction on the site, and therefore satisfy the planning requirements.**

2. Introduction

This report focuses on the energy strategy for the proposed scheme and how energy consumption and carbon emissions will be minimised and to meet the targeted carbon emissions in accordance with the Local planning policy.

The development is to be located in the Havant Borough and it is in close proximity to Bedhampton Station (approximately 2.1 miles to South). The development consists of 150 new dwellings at Cabbagefield Row, Leigh Park, Havant.

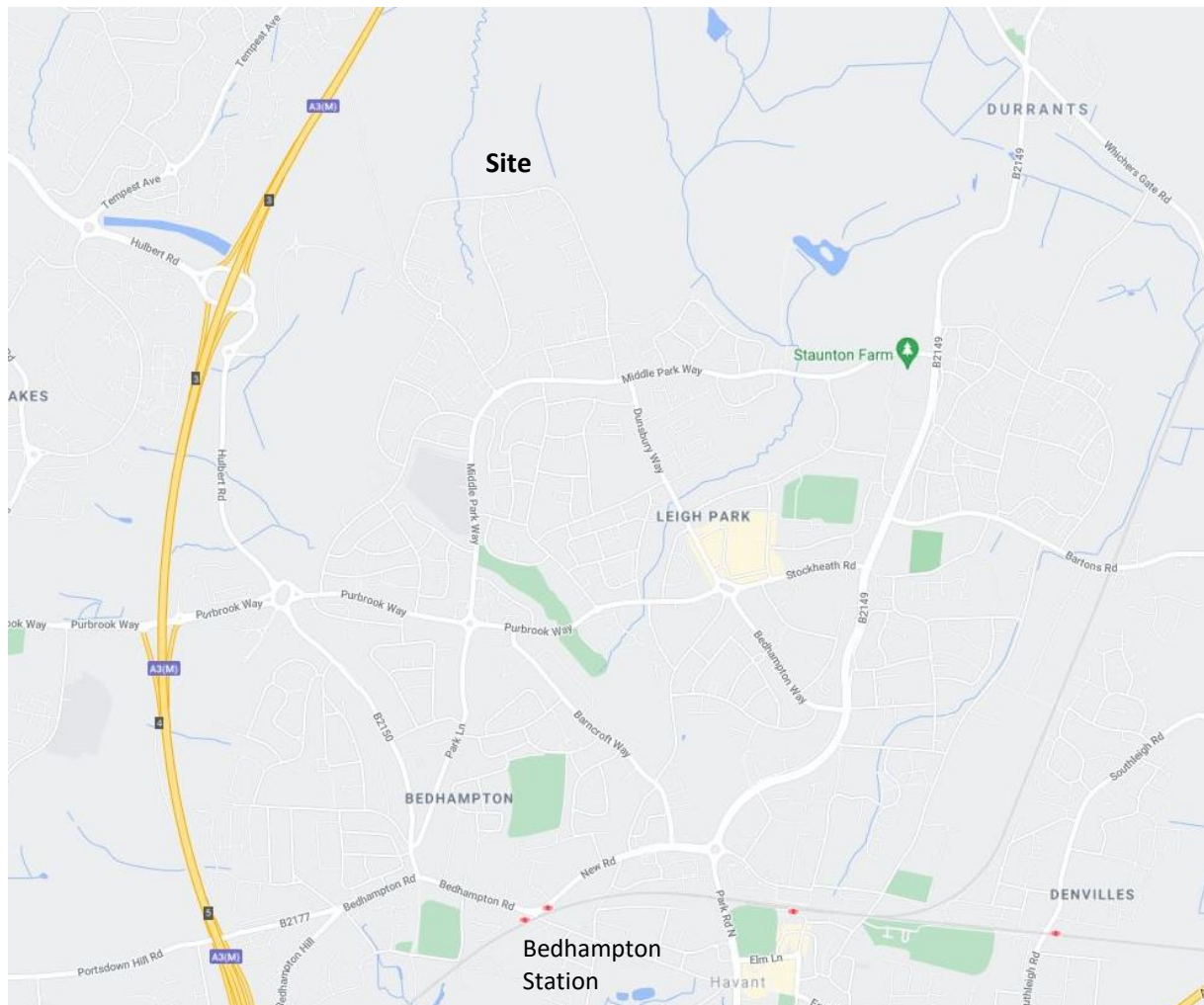


Figure 1 Site Location

3. Planning Policy

3.1. National Planning Policy Framework (February 2019)

The National Planning Policy Framework is a key part of our reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth.

3.2. Havant Borough



Havant Borough Local Plan 2036

Pre-Submission Draft

For public consultation from 4 February 2019 to 18 March 2019

Local Plan (Pre-submission Draft)

E12 Low carbon design

New development is expected to address climate change through low carbon design. Development proposals which are intended to improve the energy efficiency of existing buildings or provide low or zero carbon energy will be supported in principle. Development proposals which involve an increase in non-residential floorspace or the construction of new homes will be expected to:

- Reuse existing buildings' construction materials wherever possible;
- Appropriately integrate solar gain, natural ventilation or ventilation with heat recovery, fabric performance and Passivhaus principles into the layout and design;

- Minimise greenhouse gas emissions and improve energy efficiency of buildings; and
- Use district heat or combined heat and power (CHP or CCHP) (existing or proposed or on-site), where appropriate;

Non-residential development

e. As well as addressing points a) to d) above, proposals for non-residential development are expected to achieve the following standards of the Building Research Establishment's Environmental Assessment Method (BREEAM):

Gross floorspace to be built (sqm)	BREEAM level to be achieved
0-499	Achieving at least Pass under BREEAM is encouraged
500-999	Very Good
1000+	Excellent

Residential development

As well as addressing points a) to d) above, proposals for residential development are expected to achieve the following standards:

- f. A reduction in CO2 emissions of at least 19% of the Dwelling Emission Rate (DER) compared to the Target Emission Rate of Part L of the Building Regulations is achieved; and
- g. The development has demonstrated its long-term sustainability and cumulative impacts using one or both of the following tools as appropriate:
 - i. Assessment under the Home Quality Mark (HQM) ONE, or equivalent, for any development of one dwelling or more (gross)
 - ii. Assessment under the BREEAM Communities scheme, or equivalent, for any development of 100 dwellings or more (gross)

4. Assessment Methodology

4.1. Energy Hierarchy

The energy hierarchy is a classification of different methods to improve energy performance in a parallel sequence. This includes primarily a focus on reducing energy use by avoiding unnecessary use, to then improving the efficiency of energy systems to minimise loss, this is followed by exploiting renewable energy sources and then low carbon energy solutions for energy needs and finally, any remaining demand can be catered for by conventional fuel sources.

The Energy Strategy adopts a set of principles to guide design development and decisions regarding energy, balanced with the need to optimise environmental and economic benefits.

- **1st Stage** – By using less energy and taking into account the further energy efficiency measure in comparison to the baseline building.
- **2nd Stage** – By supplying energy efficiently. The clean building looks at further carbon dioxide emission savings over the lean building by taking into consideration the use of decentralise energy via CHP.
- **3rd Stage** – By integrating renewable energy into the scheme which can further reduce the carbon dioxide emission rate.

4.2. Software and Input data

The Government approved software, i.e. FSAP 2012, will be utilised to carry out the carbon emission calculations, FSAP 2012 will be utilised to carry out Standard Assessment Procedure for energy rating of dwellings.

Syntegra will receive the architectural drawings and relevant documents to undertake the energy assessments.

5. Baseline – Target Emission Rate

The baseline (known as Target Emission Rate), as calculated in line with the Building Regulation 2013, is the maximum amount of carbon dioxide a dwelling or non-residential unit is allowed to emit. The Target Emission Rate (TER) includes carbon dioxide emissions which are covered by Part L of the Building Regulations, known as regulated emissions (space and water heating, ventilation, lighting, pumps, fans & controls). The baseline energy uses and resulting CO₂ emissions rates of the development have been assessed using the Government approved software.

6. 1st Stage – Energy Efficient Design

This section outlines the energy efficient measures taken in order to minimise the building's energy demand and therefore reduce energy use and CO₂ emissions further than the Baseline requirements (Building Regulations 2013 Part L compliance).

6.1. Passive Design Measures

- Enhanced Building Elements

At the 1st stage of the energy hierarchy, energy efficient building elements will be incorporated into the build. The heat loss of different building element is dependent upon their U-value, air tightness, and thermal bridging y-values. Therefore, better U-values and air permeability than the minimum values set in the Part L 2013 will be suggested in this development. And, Accredited Construction Detail for Part L will also be applied for all thermal bridging junctions to reduce the heat loss from the thermal bridging. Please see below more specifically:

		Part L1A 2013 min. required values	Proposed building values
U-value (W/m² K)	Wall	0.30	0.15
	Window	2.00	1.2
	Floor	0.25	0.13
	Roof	0.20	0.13
	Solid Door	1.0 (notional)	1.0
Air Permeability (m³/h.m² at 50 Pa)		10	4
Use of Accredited Construction Details		-	YES

Table 5 Proposed Building Elements

- Orientation & Natural Daylighting

Passive solar gain reduces the amount of energy required for space heating during the winter months. The dwellings would be positioned to have enough external areas, the road and parking spaces, and therefore the passive solar gains could be maximised into the building throughout the day. Moreover, the internal layout of the development has been designed to improve daylighting in all habitable spaces, as a way of improving the health and wellbeing of occupants.

- **Efficient Use of Water**

The development will have specifications of water efficient fittings including low volume dual flush WCs, and low flow taps/ showers/ bath. These measures will result in the internal water consumption rate of **105 litres/person/day** or less, excluding an allowance 5 litres per person per day for external water consumption. The design stage calculations are below.

Installation Type	Unit of Measure	Capacity/ flow rate (1)	Use factor (2)	Fixed use (litres/head/ day) (3)	Total Consumption Litres/head/day [(1)x(2)]+(3) =(4)
WC (dual flush)	Full Flush Volume (litres)	6	1.46	0	8.76
	Part flush Volume (litres)	4	2.96	0	11.85
Taps (excluding kitchen/ utility room taps)	Flow rate (litres/minute)	6.5	1.58	1.58	11.85
Bath (where shower also present)	Capacity to overflow (litres)	120	0.11	0	13.20
Shower (where bath also present)	Flow rate (litres/minute)	7.5	4.37	0	32.78
Kitchen / utility room sink taps	Flow rate (litres/minute)	6.5	0.44	10.36	13.22
Washing machine	Litres/kg dry load	9	2.1	0	18.90
Dishwasher	Litres/place setting	1.2	3.6	0	4.32
Waste disposal unit	Litres/use	If present = 1 If absent = 0	3.08	0.00	0
Water Softener	Litres/person/day	-	1.00	0.00	-
(5)	Total calculated use (litres/person/day) = Sum column 4				114.9
(6)	Contribution from greywater (litres/person/day)				0
(7)	Contribution from rainwater (litres/person/day)				0
(8)	Normalisation Factor				0.91
Total water consumption (litres/person/day)					104.5
	External water use				5

Table 6 Design Stage Water Use Calculations

- **Solar Shading**

Where required, appropriate mitigation will be explored including internal blinds, to provide solar shading and reduce overheating risks during hot summer time.

- **Mechanical Ventilation with Heat Recovery**

Mechanical ventilation with heat recovery (MVHR) will be used for all residential units. The MVHR is proposed to ensure adequate air quality and noise insulation. The mechanical ventilation will also include heat recovery to improve its efficiency and reduce any heat loss from the building.

- **Heating and Hot Water System**

The space heating and hot water are provided by energy efficient systems as summarised in the table below. At the 1st stage gas boilers (89.5% efficiency) will be examined for space heating and hot water demand. The detailed inputs for this assessment will follow the table below.

Systems	General Specification	Controls/ Other inputs
Heating	Gas combi boilers with radiators (efficiency of 89.5%)	• Control – Programmer, TRVs and flow switch • Pump in heated space • Boiler interlocked • Fan-flued
Hot water	From gas boilers	-

Table 7 Heating and Hot water systems

Please note that the heating/hot water system above has been used only for carbon emissions calculation at 1st stage. The suggested system will be mentioned at 3rd stage as Air Source Heat Pump (ASHP) will be proposed.

7. 2nd Stage – District Heating or CHP

The Local Plan E12 encourages the district heating or CHP systems to reduce CO₂ emissions further. Since the development consists of 150 dwellings that would require high heating loads, the CHP system could be considered for space heating and hot water.

However the Air Source Heat Pump has been proposed as a low carbon technology at 3rd stage and significant carbon reduction has been achieved more than the required 19% reduction. Hence the CHP has not been considered for further carbon reduction.

8. 3rd Stage – Renewable Energy

In this section the viable renewable energy technologies that could reduce the development's CO₂ emissions are examined. In determining the appropriate renewable technology for the site, the following factors were considered;

- Renewable energy resource or fuel availability of the LZC technology on the site.
- Space limitations due to building design and urban location of the site.
- Capital, operating and maintenance cost.
- Planning Permission.
- Implementation with regards the overall M&E design strategy for building type.
- Available Grants.

The table below summarises the various low zero carbon technologies considered for the projects, and we have identified that **Air Source Heat Pumps (ASHP)**, **Photovoltaic (PV)**, and **Ground Source Heat Pumps (GSHP)** would be the most appropriate option in this development.

Technology	Local Planning Requirements	Carbon Payback	Grants/ Funding	Feasibility
Air Source Heat Pumps (ASHP)	Noise Issues from external units	High	Renewable Heat Incentive (RHI)	HIGH
Photovoltaic (PV)	Spatial and shadowing	High	-	HIGH
Ground Source Heat Pumps (GSHP)	Spatial issues for bore holes and noise	Medium	Renewable Heat Incentive (RHI)	MEDIUM
Solar Thermal	Spatial and shadowing	Low	Renewable Heat Incentive (RHI)	MEDIUM
Biomass	Spatial requirement for fuel storage and biomass odour	High	Renewable Heat Incentive (RHI)	LOW
Wind Power	Extensive planning requirements for noise and local biodiversity	Low	-	LOW
Hydro Power	Extensive planning requirements for noise and water quality	None	-	ZERO

Table 8 Feasibility Study of LZC Technologies

8.1. Non-feasible Technology

• Solar Thermal

The use of solar thermal for this development would be limited to domestic hot water only. The use of solar thermal for space heating would not be practical as it is not required when solar thermal is at its most effective during the summer months. Therefore, this system would require additional plumbing and space for hot water storage, incurring additional financial cost. Moreover, the amount of carbon offset from the system is generally lower than other technologies. Therefore, this technology is deemed to be unsuitable for this development.

• Hydro power

There is no river or lake within the development site boundaries. Therefore, small scale hydro-electric will not be studied any further because of the location and the spatial limitations of the development.

• Wind Power

Wind turbines need extensive planning requirements and they are only feasible at consistent wind speed. Moreover, since the development is located in an urban area, the site does not have sufficient wind speed to operate wind turbine at the height of 10meters as shown below (<http://www.renew-reuse-recycle.com/noabl.pl?n=503>). Hence this option has been discounted.

Estimated average windspeeds around PO9 4..

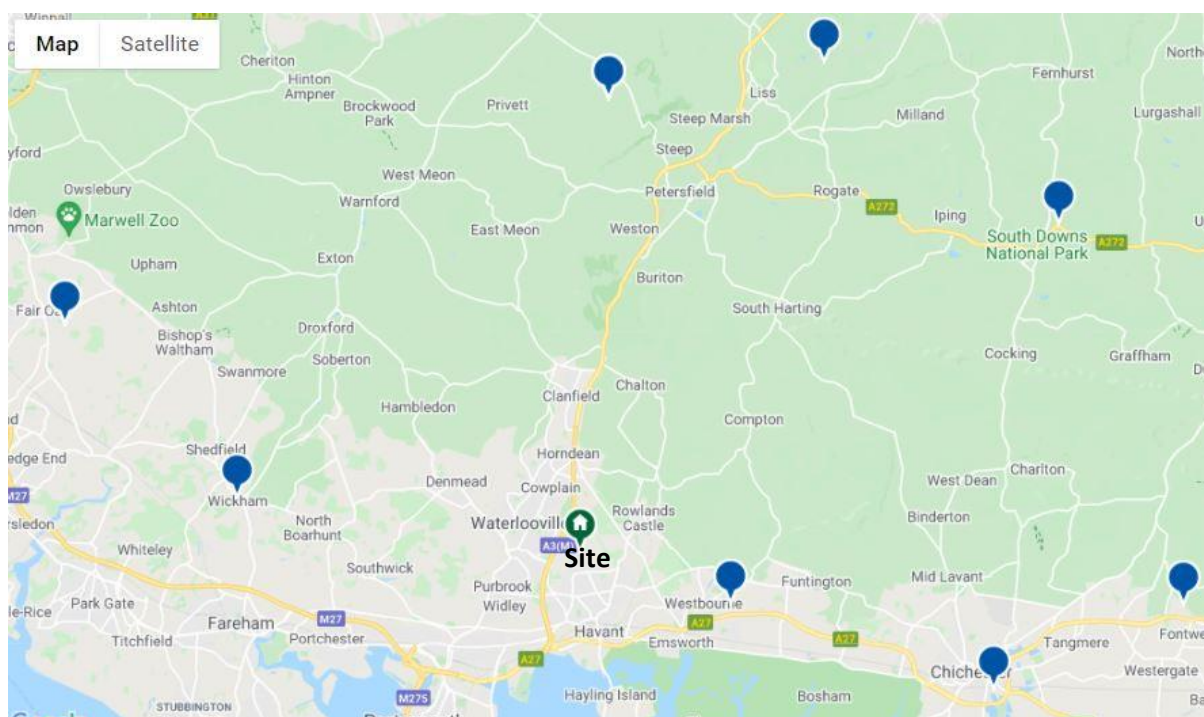
Wind speed at 10m above ground level (m/s)			Wind speed at 25m above ground level (m/s)			Wind speed at 45m above ground level (m/s)		
4.8	4.7	4.7	5.6	5.5	5.5	6.1	6	6
4.8	4.6	4.6	5.6	5.4	5.4	6.1	6	6
5	4.7	4.7	5.8	5.5	5.5	6.3	6	6

• Biomass

A biomass system designed for this development would be fueled by wood pellets which have a high energy content. However, a biomass system would not be an appropriate technology for the site for the following reasons:

- The burning of wood pellets releases substantially more NOx emissions when compared to similar gas boilers. As the development is situated within an urban area, the installation of a biomass boiler would further impact on the air quality in this area.
- The lack of spaces for pellet boiler and storage on the site.
- Pellets would need to be transported from local pellet suppliers, which causes carbon emissions to the air.

However, if the biomass system is considered at detailed design stage, local suppliers can be found near the site as shown in the map below (<http://biomass-suppliers-list.service.gov.uk>).



Company name	Postcode	Contact	Fuel Supplied	Telephone
Woodmancote Agricultural Contractors	PO10 8QA	www.woodmancote-contractors.co.uk nick@woodmancote-contractors.co.uk	Chip	07860 562570
Mole Valley Farmers Ltd	PO17 5DE	www.molecountrystores.co.uk wickham@molecountrystores.com	Pellets	01329 835010
David Cover & Son Ltd	PO19 8PE	www.covers.biz graeme.clements@covers.biz	Pellets	01243 791478
South East Wood Fuels Ltd	GU32 1ED	www.sewf.co.uk info@sewf.co.uk	Chip	01323 340041
REGENERATION SERVICES LIMITED	GU32 1ED	www.regenerationservices.co.uk bensgreenfarm@btinternet.com	Chip, Firewood	01730 827263
Steve Marston	GU33 7HU	marstonforestry@btinternet.com	Firewood	01730 892754
LC Energy Ltd	SO50 7DZ	https://www.lcenergy.co.uk/ info@LCEnergy.co.uk	Pellets	01483209360
LC Energy Ltd	SO50 7DZ	www.LCEnergy.co.uk info@lcenergy.co.uk	Pellets	08448751320
Viscount Cowdray (Cowdray Estate)	GU29 0AQ	www.cowdrayestate.co.uk enquiries@cowdray.co.uk	Chip	01730812423
Peter Pitman Ltd	BN18 0SP	peterpitmanltd@btinternet.com	Firewood	07850 498607

8.2. Proposed Technology

- **Air Source Heat Pumps (ASHP)**

ASHP can meet the space heating and hot water demands on site efficiently in comparison with gas boilers. Although this low carbon technology consumes electricity to operate, due to higher efficiency the heat output is much greater. Therefore, ASHPs will be suggested for the space heating and hot water, the specifications will be proposed at detailed design stage.

- **Photovoltaic (PV)**

Based on the feasibility study above, PV would also be a suitable renewable technology for the following reasons:

- i. The installation of PV is much simpler when compared to other renewable technologies
- ii. There is sufficient roof space available to install enough PV modules to have a significant impact on carbon emissions of the development
- iii. PV panels sited on the roof within an urban area are less visually intrusive when compared to wind turbines

The PV system capacity for the whole development depends upon the heating system selected and the roof area. Therefore, the amount of PV will be maximised within the available roof areas.

- **Ground Source Heat Pumps (GSHP)**

GSHP could be a feasible option to meet the space heating requirements, however, it requires ground space for bore holes to extract the ground heat to be utilised for space heating requirements. It requires available ground space for a borehole or trench system, the ground source loop would have to be incorporated within the foundation piles of the structure.

Given the proposed LZC technologies at the 3rd stage (**PVs, ASHPs, GSHPs**), the overall CO₂ reduction via on-site renewables will be maximised.

9. Conclusion

At this early design stage, this report explores the initial energy strategy of the proposed development at Cabbagefield Row, Leigh Part, Havant. To satisfy the Local Plan requirements, the development will pursue the 19% CO₂ reduction against Part L baseline through energy efficient measures and low carbon technologies.