



ENERGY AND SUSTAINABILITY REPORT

FOR THE OUTLINE APPLICATION

AT

**LAND WEST OF SCHOOL LANE
HIGHAM, GRAVESHAM**

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1.0 EXECUTIVE SUMMARY

This report sets out the proposed energy strategy for the development and demonstrates how the scheme could comply with the National Planning Policy Framework (NPPF) and Approved Document Part L of the Building Regulations. The strategy has been developed using a fabric-first approach, prioritising enhanced building envelope performance to minimise energy demand before incorporating low-carbon technologies.

In addition to carbon reduction measures, the development incorporates water efficiency standards achieving 110 litres per person per day in accordance with Approved Document G recommendations.

2.0 SITE LOCATION

The proposed development is located in Higham on the land West of School Lane. This falls under the jurisdiction of Gravesham Borough Council.



Figure 1 – Development Layout

2.1 SITE OVERVIEW

The proposed development comprises of 50 residential units, consisting of 25 private dwellings arranged as a mix of two, three, and four-bedroom houses, together with 25 affordable dwellings comprising one and two-bedroom apartments and two and three-bedroom affordable dwellings.

The proposed development encompasses a total area of 2.8 Hectares

3.0 INTRODUCTION

BSE3D Consulting Engineers have been appointed by M Scott Properties Ltd to prepare an Energy Statement in support of the outline planning application for the proposed residential development at land to the West of School Lane, Higham. The proposed development comprises 50 dwellings, together with landscaping and associated infrastructure works.

This Energy Statement sets out the proposed energy strategy for the development, including the approach to minimising energy demand and reducing carbon dioxide emissions in accordance with relevant national and local planning policy requirements. The strategy has been developed to achieve improvements in energy performance beyond the Part L benchmark targets through a combination of fabric efficiency measures and low-carbon and renewable energy technologies.

Predicted annual emissions for the proposed development have been calculated and are presented later in this report. The Energy Statement also demonstrates how the development could meet the required energy efficiency standards and identifies the measures adopted to improve the overall environmental performance of the development.

4.0 ENERGY REDUCTION APPROACH

The following design measures to reduce energy demand could be applied to the development:

- Energy efficient building fabric and insulation to all floors, walls and roofs
- High efficiency glazing throughout
- High quality build which will be confirmed by achieving good air tightness results throughout
- Efficient building services including heating systems
- Mechanical ventilation systems with heat recovery
- High efficiency lighting throughout the properties

This Statement outlines how the development could comply with the National Planning Policy Framework and Approved Document Part L of the Building Regulations. Approved Document Part L sets minimum fabric efficiency standards and, in conjunction with SAP calculations, establishes the maximum permissible emission rates for new-build residential properties, forming the Government's sustainable design benchmark in England.

For this development, a fabric first approach could be implemented to minimise energy demand by prioritising high levels of insulation and improved air tightness. By enhancing the thermal performance of the building's envelope, the energy required to heat the dwellings is significantly reduced. In addition to this, low-carbon and renewable energy technologies will be assessed in terms of their suitability and viability for the development, with appropriate solutions proposed.

The systems recommended in this report are also aligned with the UK government's Net Zero Strategy, which targets net-zero greenhouse gas emissions by 2050. As outlined at COP29 in 2024, the strategy also sets an interim goal of reducing UK emissions by at least 81% by 2035.

5.0 ENERGY ASSESSMENT METHODOLOGY

This Statement sets out how the proposed development could meet the required energy performance standards. The assessment process begins with the calculation of the baseline energy demand using the Standard Assessment Procedure (SAP), with results reported in the form of the Target Emission Rate (TER), as required under Approved Document Part L of the Building Regulations.

Once the design stage is underway, full calculations will be carried out in order to further assess the entire development.

SAP is the Government-approved methodology for assessing and comparing the energy and environmental performance of residential dwellings in the UK and forms the basis for demonstrating compliance with national energy efficiency requirements.

5.1 DEVELOPMENT BASELINE

The baseline SAP specification for the dwellings is detailed below; this data is derived from Table 1.1 of Approved Document L.

Table 1.1 Summary of notional dwelling specification for new dwelling⁽¹⁾

Element or system	Reference value for target setting
Opening areas (windows, roof windows, rooflights and doors)	Same as for actual dwelling not exceeding a total area of openings of 25% of total floor area ⁽²⁾
External walls including semi-exposed walls	U = 0.18 W/(m ² ·K)
Party walls	U = 0
Floors	U = 0.13 W/(m ² ·K)
Roofs	U = 0.11 W/(m ² ·K)
Opaque door (less than 30% glazed area)	U = 1.0 W/(m ² ·K)
Semi-glazed door (30–60% glazed area)	U = 1.0 W/(m ² ·K)
Windows and glazed doors with greater than 60% glazed area	U = 1.2 W/(m ² ·K) Frame factor = 0.7
Roof windows	U = 1.2 W/(m ² ·K), when in vertical position (for correction due to angle, see specification in SAP 10 Appendix R)
Rooflights	U = 1.7 W/(m ² ·K), when in horizontal position (for correction due to angle, see specification in SAP 10 Appendix R)
Ventilation system	Natural ventilation with intermittent extract fans
Air permeability	5 m ³ /(h·m ²) at 50 Pa
Main heating fuel (space and water)	Mains gas
Heating system	Boiler and radiators Central heating pump 2013 or later, in heated space Design flow temperature = 55 °C
Boiler	Efficiency, SEDBUK 2009 = 89.5%
Heating system controls	Boiler interlock, ErP Class V Either: – single storey dwelling in which the living area is greater than 70% of the total floor area: programmer and room thermostat – any other dwelling: time and temperature zone control, thermostatic radiator valves
Hot water system	Heated by boiler (regular or combi as above) Separate time control for space and water heating
Wastewater heat recovery (WWHR)	All showers connected to WWHR, including showers over baths Instantaneous WWHR with 36% recovery efficiency utilisation of 0.98
Hot water cylinder	If cylinder, declared loss factor = 0.85 × (0.2 + 0.051 V ^{2/3}) kWh/day where V is the volume of the cylinder in litres
Lighting	Fixed lighting capacity (lm) = 185 × total floor area Efficacy of all fixed lighting = 80 lm/W
Air conditioning	None
Photovoltaic (PV) system	For houses: kWp = 40% of ground floor area, including unheated spaces / 6.5 For flats: kWp = 40% of dwelling floor area / (6.5 × number of storeys in block) System facing south-east or south-west

5.2 DEVELOPMENT ENHANCEMENTS

5.2.1 FABRIC FIRST APPROACH

Many Local Planning Authorities now recognise the long-term benefits of adopting a fabric-first approach, where reducing the lifetime energy demand of a building takes priority over the addition of renewable or low-carbon technologies. This strategy focuses on enhancing the performance of the building envelope to minimise heat loss and reduce overall energy consumption from the outset.

A well-designed fabric-first building can provide a consistently comfortable internal environment, maintaining stable indoor temperatures while keeping fuel bills to a minimum. A key advantage of this approach is that it does not rely on changes to occupant behaviour in order to achieve its intended performance. As such, developments designed with a fabric-first philosophy often perform more reliably in practice than schemes that depend on renewable technologies requiring user interaction or behavioural adjustment (for example, solar thermal systems). This consideration is increasingly important in the context of rising energy costs and growing concerns around fuel poverty.

A fabric-first strategy for this Development has therefore been prioritised. In line with this methodology, the proposed dwellings could be designed to exceed the limiting U-values for new residential buildings as set out within Approved Document Part L. These enhanced fabric performance standards improve upon the target baseline construction requirements and are summarised in Table 4.1 (Approved Document Part L) below.

Table 4.1 Limiting U-values for new fabric elements and air permeability in new dwellings

Element type	Maximum U-value ⁽¹⁾ W/(m ² ·K)
All roof types ⁽²⁾	0.16
Wall ⁽²⁾	0.26
Floor	0.18
Party wall	0.20
Swimming pool basin ⁽³⁾	0.25
Window ⁽⁴⁾⁽⁵⁾	1.6
Rooflight ⁽⁶⁾⁽⁷⁾	2.2
Doors (including glazed doors)	1.6
Air permeability	8.0m ³ /(h·m ²) @ 50Pa
	1.57m ³ /(h·m ²) @ 4Pa

The construction summary below provides an overview of the fabric performance parameters used to undertake the SAP calculations. These specifications have been carefully chosen to enhance thermal performance and reduce energy demand, forming a key component of the overall fabric-first strategy.

U-values:

Ground Floor:	0.13 W/m ² k
External Walls:	0.18 W/m ² k
Roof:	0.11 W/m ² k

Doors- To achieve a U-value of 1.0W/m²k, Double glazed air filled (LowE, EN = Soft Coat) and default Transmittance Factor 'g' of 0.63.

Glazing - To achieve a U-value of 1.2W/m²k, Double glazed air filled (LowE, EN = Soft Coat) and default Transmittance Factor 'g' of 0.63.

5.2.2 EFFICIENT BUILDING SERVICES

The latest IPCC climate change report warns that average global temperatures should not exceed a 1.5°C increase. According to the report, if global temperatures surpass this limit, catastrophic environmental breakdown is likely. The report also highlights that UK carbon emissions have dropped to their lowest levels since the dawn of the post-industrial age. Since 1990, emissions have decreased by 38%, reaching levels comparable to those in 1890. However, there is still a long way to go to limit the impact of climate change. The publication "Next Steps for UK Heat Policy" indicates that residential space heating and Domestic Hot Water (DHW) production in the UK accounts for 20% of all carbon emissions.

Several renewable and low carbon technologies have been considered for this development. These are considered sustainable technologies because they offer reductions in carbon emissions (environmental benefit) compared to conventional finite sources of power.

The following low carbon technology has been considered for this development:

- Air Source Heat Pumps
- Photovoltaic panels

A general overview of these options is provided below as background information.

5.2.3 AIR SOURCE HEAT PUMPS

Air source heat pumps operate on the same principles as ground and water source heat pumps. The basic principle of ASHP systems is to extract heat from the external air to provide heating, hot water, or both.

The ASHP consists of an external heat pump condenser which removes low-grade energy from the surrounding air by means of a fan pulling the outside air over a heat exchanger which is then upgraded to higher temperature using the refrigeration cycle. The ASHP then supplies low-temperature hot water to the building, either for heating through radiators or an underfloor system, or for domestic hot water via a storage cylinder.

As the heat pump transfers energy that is already in the environment, they are very efficient and have a high ratio of heat output to energy input. This heating energy efficiency is expressed as a coefficient of performance (COP), while cooling energy efficiency is expressed as an energy efficiency ratio (EER). In modern ASHP's the COP can range from 2.5 - 4.0. Due to this COP the carbon emissions associated with ASHP installations are much lower than traditional fossil fuel-based systems.

The air source heat pump is one of the most popular low-carbon technologies available on the market due to its accessibility and ease of installation compared to other low-carbon alternatives. This popularity has spurred technological advancements, leading manufacturers to produce increasingly more efficient and affordable units.

There are some disadvantages to ASHPs, the main one being their higher capital cost compared to equivalent fossil fuel boiler installations. Additionally, they produce lower temperature hot water than boilers which tends to work better with underfloor heating. Also, proper consideration must be given to the location of the heat pump, considering its visual impact as well as the potential for noise generation.

It should be noted that air source heat pumps are not entirely renewable systems. While they harness renewable low-grade heat from the air to heat buildings, they also rely on electricity, which historically has been carbon intensive. However, with the ongoing decarbonisation of the national grid, electricity is gradually becoming a more environmentally favourable fuel choice.

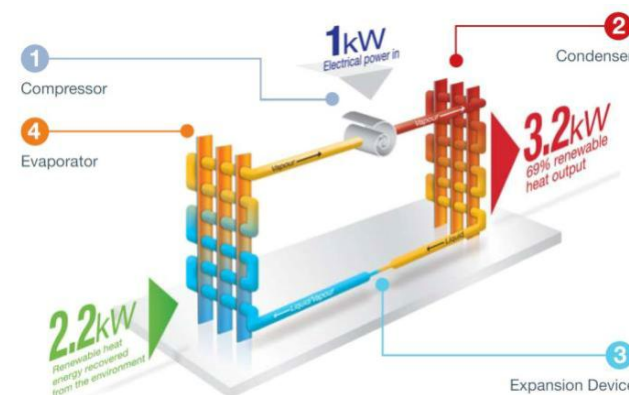


Figure 2 - ASHP Diagram

5.2.4 PHOTOVOLTAIC PANELS

The potential incorporation of (PV) panels could be considered as part of the development's renewable energy strategy. PV systems can provide on-site renewable electricity generation and reduce regulated carbon emissions associated with grid electricity consumption.

However, the assessment demonstrates that the proposed development already achieves a significant improvement over the Target Emission Rate (TER) through the adoption of a fabric-first approach and the installation of high-efficiency air source heat pumps (ASHPs). The overall development achieves a significant reduction in regulated carbon emissions compared to the Part L baseline.

This level of performance substantially exceeds current Building Regulations requirements and delivers meaningful carbon savings without reliance on additional bolt-on renewable technologies. Given the strong carbon performance already achieved, the inclusion of PV panels is not required in order to demonstrate compliance with national or local policy targets at this stage.

The proposed all-electric heating strategy ensures the dwellings are future-ready, and the ongoing decarbonisation of the national electricity grid will continue to reduce operational emissions over time. Should future regulatory requirements tighten, the buildings are considered suitable for the later integration of PV systems if required.

On this basis, photovoltaic panels have not been incorporated into the current energy strategy.

5.3 INCORPORATED SERVICES

For this scheme it is proposed to carry out a fabric first approach and a secondary approach of high efficiency building services. As part of this strategy, high-efficiency air source heat pumps (ASHPs) could be installed and paired with hot water cylinders predominantly supplied by the ASHPs, ensuring an efficient and low-carbon heating and hot water solution.

Main Heating:

2 Bed properties: 5.0kW heat pump - Mitsubishi Ecodan
3 Bed properties: 6.0kW heat pump - Mitsubishi Ecodan
4 Bed properties: 8.5kW heat pump - Mitsubishi Ecodan

Hot water:

1 Bed properties: 150L Cylinder – Mitsubishi EHPT15X
2 Bed properties: 150L Cylinder – Mitsubishi EHPT15X
3 Bed properties: 170L Cylinder – Mitsubishi EHPT17X
4 Bed properties: 210L Cylinder – Mitsubishi EHPT21X

Solar Panels:

- N/A

WWHR:

- N/A

Ventilation:

- MVHR

Design Air Permeability:

- To achieve an Air test of 5m³/hm²

Lighting:

- 100% Low energy.
- Fittings will need to be 6W and achieve 80lm/w.

Showers:

- Showers to achieve a flow rate of no more than 8 litres per minute
- Fed via the unvented hot water system

The integration of the above efficient building services will lead to an enhancement over Part L of the building regulations.

As above, it is proposed to install an MVHR system within the dwellings, this will not only enhance the building's energy efficiency but also significantly improve indoor air quality by delivering a continuous supply of fresh air to occupied rooms.

6.0 DISTRICT HEAT NETWORKS

For this development, the potential to connect to an existing district heating network has been considered. While district heating can offer notable energy, carbon and cost benefits compared to individual systems, the proposed scheme of 50 new residential dwellings would incur significant additional capital costs associated with network connection and infrastructure.

There are currently no existing or planned district heating networks in close proximity to the development site, as illustrated by the heat network map below. As a result, substantial pipework lengths would be required to connect the proposed dwellings, leading to increased capital costs and significant distribution heat losses in comparison to more densely built development such as blocks of flats. On this basis, a district heating network has not been proposed for this scheme.

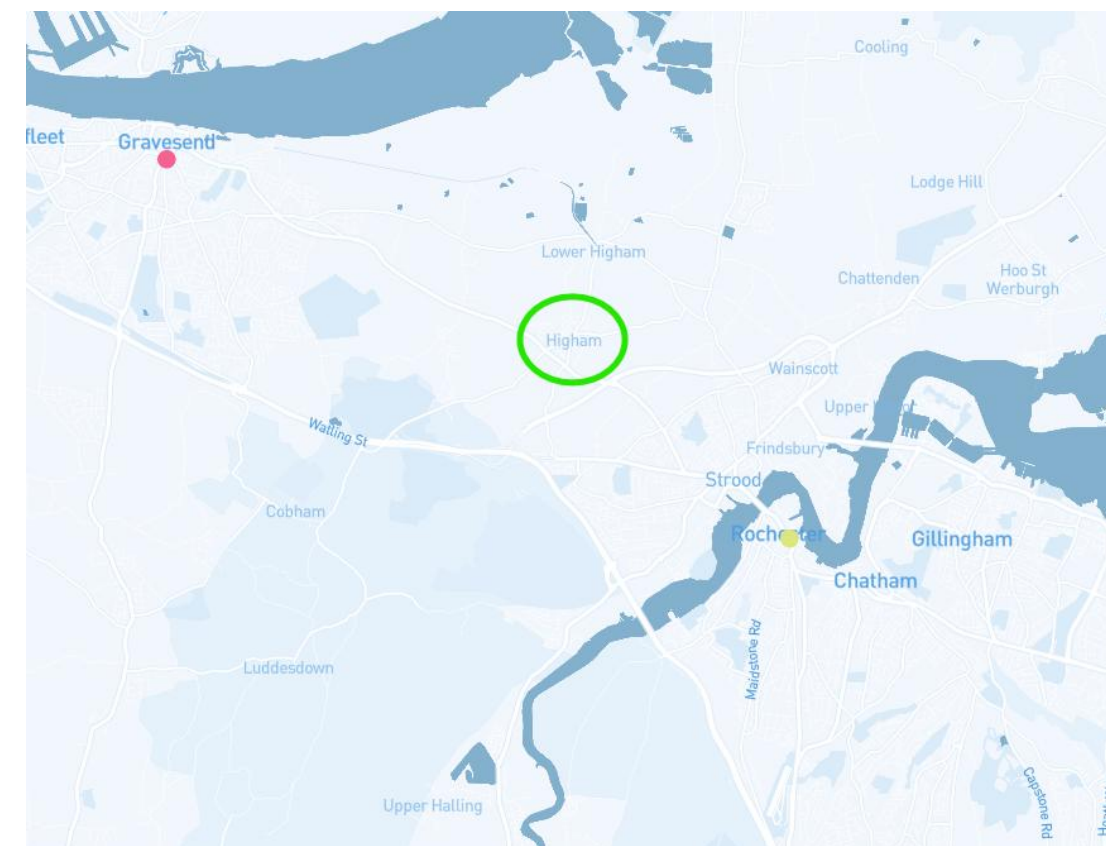


Figure 3 - Heat Network Map

7.0 WATER EFFICIENCY

It is acknowledged that the water consumption of houses has a significant impact on not only direct operational running costs (i.e., water consumption charges), but also indirectly through additional energy usage and the heating of water for domestic use.

For the development, water demand could be reduced by incorporating water-efficient fixtures and fittings as a standard specification within each new dwelling. A standard of 110 litres per person per day would be achieved.

To demonstrate the requirement of consuming less than 110 litres per person per day, the fittings approach will be used as outlined in the table below from approved document G.

Table 2.2 Maximum fittings consumption optional requirement level	
Water fitting	Maximum consumption
WC	4/2.6 litres dual flush
Shower	8 l/min
Bath	170 litres
Basin taps	5 l/min
Sink taps	6 l/min
Dishwasher	1.25 l/place setting
Washing machine	8.17 l/kilogram

Table 3 - Maximum Fittings Consumption

To ensure compliance of the water consumption table above, flow restrictors are to be fitted.

8.0 OVERHEATING

The risk of summertime overheating has been considered in accordance with the principles of Approved Document Part O of the Building Regulations.

Mechanical Ventilation with Heat Recovery (MVHR) systems are proposed within the dwellings. These systems provide continuous background ventilation and assist in maintaining good indoor air quality. During warmer periods an MVHR system helps mitigate summertime overheating by supplying fresh, cooler external air to the building.

The development layout also comprises predominantly low-rise residential dwellings, which reduces overheating risk compared to high-density apartment blocks with limited façade exposure.

A detailed overheating assessment will be undertaken at detailed design stage, if required, to demonstrate full compliance with Approved Document Part O. However, based on the current design proposals and ventilation strategy, the risk of overheating is considered low and manageable.

9.0 CONCLUSION

The proposed Development could be designed prioritising energy demand reduction through a fabric-first approach, followed by the integration of efficient, low-carbon building services.

The scheme could achieve a significant improvement beyond minimum Building Regulations compliance and demonstrate the effectiveness of the adopted strategy.

The potential for connection to a district heating network has also been considered for the development and discounted due to the absence of a nearby heat network and the technical difficulty of this. However, water efficiency measures have been adopted for the scheme to limit the water usage to 110 litres per person per day which reduces water consumption and associated energy use for hot water generation.

In conclusion, the proposed development could:

- Exceed the requirements of Approved Document Part L
- Comply with the National Planning Policy Framework
- Align with the UK Net Zero Strategy
- Deliver substantial and measurable carbon reductions
- Provide a sustainable, comfortable, and future-resilient residential environment

10.0 APPENDIX 1: POLICY COMPLIANCE TABLE

Policy Compliance Table			
Policy / Regulation	Policy Requirement	Development Response	Compliance
National Planning Policy Framework (NPPF)	Support the transition to a low-carbon future; shape developments to reduce greenhouse gas emissions; support renewable and low-carbon energy.	A fabric-first approach has been adopted to minimise energy demand. High-efficiency air source heat pumps are proposed as a low-carbon heating solution.	Compliant
Approved Document Part L (2021)	New dwellings must not exceed the Target Emission Rate (TER) and must meet minimum fabric efficiency standards.	SAP 10.2 calculations demonstrate that all assessed dwellings achieve Dwelling Emission Rates (DER) significantly below the TER. Enhanced U-values exceed limiting fabric standards.	Compliant
Approved Document Part O (Overheating)	Limit unwanted solar gains and provide adequate means of removing excess heat.	MVHR systems and openable windows provide background and purge ventilation. Overheating risk considered low; detailed assessment to be undertaken at design stage if required.	Compliant
Approved Document Part G (Water Efficiency)	Maximum internal water consumption of 125 litres/person/day or better	Water-efficient fixtures specified to achieve 110 litres per person per day.	Compliant
UK Net Zero Strategy (2050 Target)	Achieve net-zero greenhouse gas emissions by 2050, with interim reductions by 2035.	All-electric heating strategy using ASHPs avoids fossil fuel systems. Development significantly reduces regulated emissions and benefits from ongoing grid decarbonisation.	Aligned
Energy Hierarchy (Be Lean, Be Clean, Be Green)	Reduce demand, supply efficiently, incorporate renewables where feasible.	Be Lean: Enhanced fabric performance and air tightness. Be Clean: Efficient ASHP heating and MVHR. Be Green: Renewable technology considered; PV not required due to substantial carbon reductions already achieved.	Compliant

11.0 LIST OF ABBREVIATIONS

- ASHP Air Source Heat Pump
- DER Dwelling Emission Rate
- DHW Domestic Hot Water
- LPA Local Planning Authority
- PV Photovoltaics
- SAP Standard Assessment Procedure
- TER Target Emission Rate