LAND EAST OF HIGH ROAD, HIGH CROSS, HERTFORDSHIRE

Sustainable Construction, Energy & Water Statement

M Scott Properties Ltd

SCOTT PROPERTIES

CONTENTS

1. INTRODUCTION

DEVELOPMENT DESCRIPTION

1.1. The development site (the Site) is located east of High Road, in High Cross, within the boundary of East Hertfordshire District Council in the County of Hertfordshire.

1.2. This report supports an Outline Planning Application (with all matters reserved except for access) for a predominantly residential development.

Map of Site Outline

INTRODUCTION AND AIMS OF THE STATEMENT

1.3. This Statement addresses the relevant local and national policy on the sustainable design and construction of dwellings. National policies on energy standards have changed significantly in recent years, and regulations are expected to evolve further in the next few years. As this development is in outline form only, no specifics can be given at this stage, only consideration of the available methods and techniques to be explored at the Reserved Matters stage.

1.4. This Statement will examine changes and future standards and describe an approach that can adapt to regulation changes. The report will show how, by following a fabric first approach to reduce demand, the proposed development can achieve a level of energy performance that meets or exceeds the current Building Regulations standards while considering various other sustainable design aspects.

1.5. As required by the EHDC validation list (see below) other sustainability aspects will be explored, such as resource efficiency, construction sustainability, and energy and water efficiency.

Sustainable Construction, Energy and Water Statement	All new development.	The Statement should demonstrate how the development responds to sustainability: • how the design, materials, construction and operation of the development would minimise overheating in summer and reduce the need for heating in the winter and cooling in summer; • how carbon dioxide emissions will be minimised across the development site; • how the development will minimise the use of mains water	Policies CC1, CC2, WAT4 East Herts District Plan 2018

2. Planning Policy

NATIONAL PLANNING POLICY FRAMEWORK

2.1. The Government released the revised National Planning Policy Framework (NPPF) on the 5th of September 2023. It explains the Government's planning policies for England and how they should be implemented. The NPPF is based on a presumption in favour of sustainable development.

2.2. Chapter 14 describes its policies on energy and climate change.

2.3. Paragraph 154. New development should be planned in ways that:

a. avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in vulnerable areas, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure and

b. can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the government's policy for national technical standards.

2.4. Paragraph 157. In determining planning applications, local planning authorities should expect new development to:

a. comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

b. take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

2.5. This chapter also establishes the requirement of Local Plans to consider climate change over the longer term, including aspects such as flood risk, coastal change, water supply, and transformation of biodiversity and landscape. The main emphasis of the NPPF is to support local and regional planning authorities.

CURRENT AND FUTURE NATIONAL POLICY STANDARDS

2.6. Government policy on the energy performance of buildings has been changing over the past decade, following Government commitments to reduce the emission of greenhouse gases – mainly CO_2. This obligation was made official in the Climate Change Act 2008, which requires the UK to achieve a mandatory 80% reduction in the UK's CO_2 emissions by 2050, compared with 1990 levels.

2.7. The built environment is vital in meeting these international commitments, as it is responsible for about a third of overall CO_2 emissions. These pledges have been translated into national policies within the built environment driven by, among other things, the EU Energy Performance of Buildings Directive and the 2012 Energy Efficiency Directive.

2.8. After introducing the 2013 edition of Building Regulations Part L, the successive updates now require regulated CO_2 emissions levels from new build domestic buildings to be about 30% lower than 2006 levels.

2.9. In 2016, the UK Government ratified the Paris Agreement, which provides a framework for Governments to pursue the target of limiting global warming below 2°C.

2.10. In June 2019, the Government announced it had set a new net zero greenhouse gas emission target for the UK by 2050, compared with the previous target of at least an 80% reduction from 1990 levels.

2.11. To acknowledge the challenge to the built environment in meeting future 'net zero' targets, the Government published the next revision to the Building Regulations Approved Document L1A (Part L) in December 2021.

2.12. The Government proposes that the Building Regulations are the appropriate mechanism to drive future standards concerning energy consumption, with local authorities able to apply the optional requirements of the national technical standards regarding water consumption and space.

2.13. These changes are stepping stones towards introducing the Future Homes Standard (FHS) 2025, mainly focusing on improving homes' heating and power systems. The FHS will ensure that all new homes will have 75% to 80% less carbon emissions than those built in 2019, requiring a 30% reduction in carbon emissions in new dwellings from the latest L1A.

THE UPLIFT TO PART L 2021

HIGHER STANDARDS FOR CO_2 EMISSIONS

2.14. This is delivered through what is expressed as a 'fabric' approach to provide a 31% reduction over past standards.

INTRODUCTION OF PRIMARY ENERGY DEMAND COMPLIANCE METRIC

2.15. The regulations introduced a primary energy demand compliance metric. This is to comply with the amended EU Energy Performance of Building Directive (2018), which states:

> "The energy performance of a building shall be expressed by a numeric indicator of primary energy use in kWh/ (m^2. y) for both energy performance certification and compliance with minimum energy performance requirements."

2.16. Primary energy measures the energy content available in a fuel / fuel source before any alteration or transformation process. Different factors are assigned to all fuel types to account for upstream processes and energy use – e.g. mains electricity has a higher factor due to the additional transformation and distribution processes that the energy undergoes before it reaches the home, compared with gas, where the fuel is burned directly within the dwelling.

LOCAL PLANNING POLICY

2.17. East Herts District Council adopted the East Herts District Plan in October 2018. Specifically referred to by the validation requirement, the District Plan contains planning policies DES4, CC1, CC2 and WAT 4 that deal with sustainable design and construction, climate change mitigation and renewable and low-carbon energy.

Policy DES4 Design of Development

All development proposals, including extensions to existing buildings, must be of a high standard of design and layout to reflect and promote local distinctiveness. Proposals will be expected to:

... (d) Incorporate high quality innovative design, new technologies and construction techniques, including zero or low carbon energy and water efficient, design and sustainable construction methods. Proposals for residential and commercial development should seek to make appropriate provision for high-speed broadband connectivity, ensuring that Fibre to the Premises (FTTP) is provided;

Policy CC1 Climate Change Adaptation

All new development should:

a) Demonstrate how the design, materials, construction and operation of the development would minimise overheating in summer and reduce the need for heating in winter; and
b) Integrate green infrastructure from the beginning of the design process to contribute to urban greening, including the public realm. Elements that can contribute to this include appropriate tree planting, green roofs and walls, and soft landscaping.

Policy CC2 Climate Change Mitigation

i. All new developments should demonstrate how carbon dioxide emissions will be minimised across the development site, taking account of all levels of the energy hierarchy. Achieving standards above and beyond the requirements of Building Regulations is encouraged.
ii. Carbon reduction should be met on-site unless it can be demonstrated that this is not feasible or viable. In such cases effective offsetting measures to reduce on-site carbon emissions will be accepted as allowable solutions.
iii. The energy embodied in construction materials should be reduced through re-use and recycling, where possible, of existing materials and the use of sustainable materials and local sourcing.

Policy WAT4 Efficient Use of Water Resources

Development must minimise the use of mains water by:

a) Incorporating water saving measures and equipment;
b) Incorporating the recycling of grey water and utilising natural filtration measures where possible;
c) Designing residential development so that mains water consumption will meet a target of 110 litres or less per head per day.

3. Energy & CO_2 Reduction Solutions

OVERVIEW

3.1. The energy demand of dwellings is a crucial factor in the overall sustainability strategy, as it is one of the main areas of continuing impact of any development.

3.2. The minimum requirement for new dwellings in terms of energy performance is stated in the Building Regulations.

3.3. As shown in the table below, the CO2 standards in Part L were "improved" in 2010, 2013, and 2021, reducing the Residential 'Target Emission Rate' (TER) by approximately 25%, 6%, and 31%, respectively. This requires significant improvements to thermal insulation and heating services or a substantial increase in on-site renewable energy provision.

3.4. If the proposed 2025 uplift to the regulations is implemented it could require a further 30% reduction in emissions.

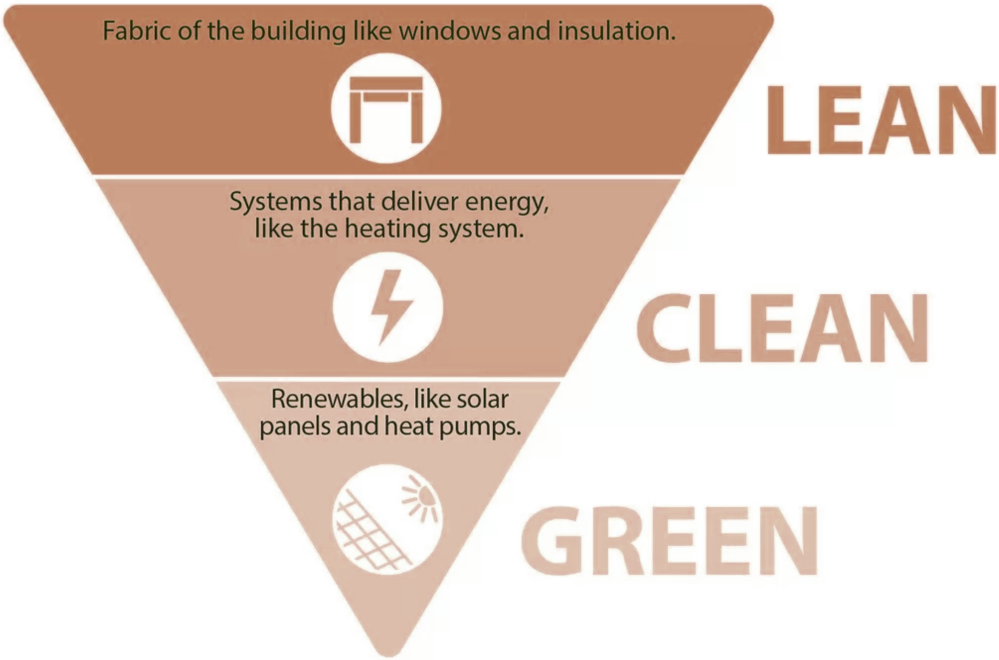
3.5. The development will be constructed to the Building Regulations requirements valid at the time of construction.

Building Regulations	CO_2 Emissions Reductions	Cumulative %
L1A 2006	-	
L1A 2010	25%	
L1A 2013	6%	28.5%
L1A	31%	51.7%
FHS 2025	≈30%	65.5%

3.6. The following paragraphs will explore the potential energy reduction strategy for the Site.

ENERGY REDUCTION STRATEGY – FABRIC FIRST

3.7. The energy demand reduction strategy identifies the first step of the Energy Hierarchy (image below) is to lower energy consumption by implementing measures that go beyond the minimum requirements of Part L. This way, the financial and technical resources can be focused on enhancing energy efficiency.



BE LEAN – REDUCE ENERGY DEMAND

3.8. The development's design, from the overall layout, to the individual buildings, will help lower energy demand in various ways, focusing on reducing the need for heating, cooling and lighting. Some critical factors are:

- Building orientation – optimising natural sunlight and daylight
- Building placement – avoiding excessive shading and wind exposure
- Landscaping – regulating daylight, glare and prevent heat island effects
- Building design – reducing energy demand through fabric choice

BE CLEAN – SUPPLY ENERGY EFFICIENTLY

3.9. The next step of the hierarchy is to design and select building services that use energy efficiently, considering:

- Heating and cooling systems with high efficiency
- Ventilation systems (with heat recovery when possible)
- Lighting with low energy consumption
- Appliances and ancillary equipment with high efficiency

BE GREEN – USE LOW-CARBON / RENEWABLE ENERGY

3.10. The final stage of the energy hierarchy is to use low-carbon and renewable energy systems to supply or offset the energy demand that cannot be avoided. This could include:

- Low carbon fuel sources – e.g. biomass
- Heat pump technologies
- Renewable energy systems at the building scale
- Heat networks at the small scale
- Heat networks at the development-scale

3.11. The hierarchy shows that reducing energy use is more important than generating low-carbon or renewable energy to compensate for unnecessary demand. This approach called 'fabric first', prioritises improving U-values, reducing thermal bridging, improving airtightness, and installing energy-efficient ventilation and heating systems for the development.

BUILDING REGULATIONS STANDARDS – FABRIC ENERGY EFFICIENCY

3.12. The importance of energy demand reduction is further supported by introducing a minimum fabric standard into Part L1A 2013, based on energy use for heating and cooling a dwelling. This is referred to as the 'Target Fabric Energy Efficiency' (TFEE) and expressed in kWh/m² / year. This standard enables the dissociation of energy use from CO_2 emissions. It acknowledges the importance of reducing demand rather than simply offsetting CO_2 emissions through low-carbon or renewable energy technologies.

3.13. The TFEE is calculated based on the specific dwelling being assessed with reference values for the fabric elements contained within Approved Document L1A. These reference values are described as 'statutory guidance' instead of mandatory requirements, allowing complete flexibility in the design approach and balancing different aspects of dwelling energy performance to be struck so that the ultimate goal of achieving the TFEE is met. Part L1A 2021, implemented in June 2022, has seen a 31% reduction in CO_2 emissions compared to the previous standard (Part L1A 2013).

3.14. A new Primary Energy target, along with the Carbon Emissions (DER vs TER) and Fabric Energy Efficiency Standard (DFEE vs TFEE), has also been introduced. The Primary Energy target measures the total energy a dwelling uses, including direct and indirect energy consumption.

FABRIC STANDARDS

3.15. The detailed design of the dwellings will reduce fabric heat loss as much as practicably possible to lower the development's energy demand. The table below shows the fabric specification of major building elements, with the first column comparing the Part L1A 2013 and Part L1A 2021 limiting fabric parameters to demonstrate the improvements.

	Part L1A 2013 Limiting Fabric Parameters (W/m^3K)	Part L1A 2021 Limiting Fabric Parameters (W/m^3K)
External Wall	0.30	0.26
Party Wall	0.20	0.20
Plane Roof	0.20	0.16
Ground Floor	0.25	0.18
Windows	2.00	1.60
Doors	2.00	1.60

THERMAL BRIDGING

3.16. Thermal bridging is a potential primary source of fabric heat loss that is becoming more recognised. The U-values for the main building fabric can only be improved by adequately addressing the thermal bridging, otherwise, the energy and CO2 reduction targets would not be met. The specification aims to minimise the unnecessary interruption of the insulation layers and reduce the avoidable heat loss as much as possible.

3.17. The accurate calculation of these heat losses is an essential part of the SAP calculations that are completed to determine the energy demand of the dwellings. Therefore, at the appropriate design stage, thermal modelling should be implemented to evaluate the performance of all main building junctions.

ENERGY EFFICIENT HEATING AND LIGHTING

3.18. The design and specification of the systems that provide heating and cooling should give the occupants a high level of control over their operation, promoting and enabling energy-efficient behaviour. High-efficiency combination boilers or Air Source Heat Pumps could be fitted to properties to eliminate the need for hot water cylinders where feasible. Primary pipework should be fully insulated, and time and temperature controls should be installed in all dwellings.

3.19. Internal lighting should be low energy, and areas of infrequent use could be equipped with occupancy sensors. External security and space lighting should be low energy and equipped with PIR and daylight sensors where appropriate.

3.20. Waste Water Heat Recovery (WWHR) systems are a consideration. WWHR recovers thermal energy from hot water used in a shower before it goes down the drain. This happens through a heat exchanger, in which cold mains water is passed around a copper waste pipe to gain a temperature rise before continuing to the pre-heated boiler. This, in turn, reduces the workload of the boiler.

PASSIVE DESIGN MEASURES AND OVERHEATING RISK MITIGATION

3.21. The building design should consider the glazing's solar transmittance value (G-value) to balance the benefits of solar gain in the winter and the drawbacks of solar gain in the summer.

3.22. With these measures to reduce internal heat gain, natural ventilation through window openings and cross ventilation would allow sufficient air exchange rates to remove heat accumulation.

3.23. By following these principles, the development would be designed to adapt to a possible changing climate over the lifetime of the buildings and minimise overheating risk, which can be worsened by the ambition to build better insulated, more airtight homes if not considered within the design and construction process.

3.24. In addition to the design of the building, the occupant of the dwelling should be given all necessary information and guidance on how to operate fixed building services in an energy-efficient way.

ELECTRIC VEHICLE CHARGING POINTS

3.25. As part of its commitment to cut vehicle emissions, the UK Government gave a commitment, as part of the Zero Emission Vehicle (ZEV) Alliance, at the International Climate Conference in December 2015 that all passenger vehicle sales by 2050 would be of zero emission vehicles. In 2018, the Government stated that it wished to "ensure the houses we are building over the coming years are EV ready. It is our intention that all new homes should have a chargepoint available".

3.26. Paragraph 110 of the NPPF, 2019, further states that applications for development: "should be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations".

3.27. Supplying active electric charging points to every residential property may not be feasible due to current energy network supply availability, but the infrastructure to enable future connection should be provided.

4. Overheating Risk & Passive Design

OVERVIEW

4.1. Homes built today are likely to face a significantly different climate in the future and, therefore, should be designed to ensure that they can adapt and reduce the risk of overheating with possibly higher Summer temperatures and longer heat waves. Critical design decisions that can be taken into account at the detailed design stage and reduce the potential risk of overheating:

- Consideration of orientation of large glazed façades
- Low-density development to avoid urban heat island effects
- Evaluate glazing ratios to avoid contributing to excessive solar gain
- Ventilation strategies
- High levels of thermal insulation also considering heat build-up

COOLING HIERARCHY

4.2. Not all solutions will be appropriate for this development, but are provided at this stage for guidance on the options available.

4.3. Similar to sustainable heating strategies, a sustainable 'cooling hierarchy' can be considered at the detailed design stage, which shows the priorities to minimise the risk of overheating. These include:

- Minimising internal heat gain
- Managing heat through internal thermal mass and design of spaces
- Passive ventilation strategies
- Mechanical ventilation systems
- Active cooling systems

OVERHEATING RISK

4.4. The cooling hierarchy should inform the detailed design, with passive measures of reducing overheating risk being given due consideration. Key actions that may be taken within the development include:

- A layout that provides for significant green space around the Site and in rear gardens, reducing the potential for heat build-up in enclosed and low reflective external areas such as tarmac and dark roofs
- Glazing specification that has been balanced to consider the need for beneficial solar gain with unwanted summer gain
- Consideration of thermal mass of construction materials to regulate internal temperature profiles, storing excess heat during the day and releasing at night
- Solar Shading, Natural Ventilation, and Water Elements

5. Low Carbon & Renewable Energy

OVERVIEW

5.1. A range of technologies are presented for consideration as per Regulation 25A of the Building Regulations and to evaluate the systems applicable on-site to meet Part L 2021 or any future regulatory standards.

COMBINED HEAT AND POWER (CHP) AND DISTRICT ENERGY NETWORKS

5.2. A CHP unit can produce heat and electricity from a single fuel source. The electricity produced by the CHP unit is used to replace electricity that would otherwise come from the national grid, with the heat produced as a valuable by-product for space and water heating. However, the lower national grid emissions now mean CHP systems will not save CO_2.

5.3. In addition, the feasibility and cost-effectiveness of a CHP system depend primarily on a steady demand for heat throughout the day to ensure that it operates for over 5,000 hours per year. Heat demand from mainly residential schemes could be more favourable for efficient system operation, with a defined heating season and irregular daily profile, with peaks in the morning and the evening.

5.4. There are no existing heat networks near the proposed development. High network heat losses associated with distribution to individual houses, as opposed to large high-rise apartment blocks and commercial developments, mean that a new heat network to serve the area would not be considered an environmentally preferential option.

WIND POWER

5.5. Placing wind turbines near areas with buildings poses several challenges for deployment. These include the land area required for effective operation, access for installation and maintenance, the environmental impact from noise and vibration, visual impact on landscape amenity and potential turbulence caused by nearby obstacles.

5.6. With the continued support for large-scale wind power schemes, the UK Power Network benefits from this source of generation generally. It is not considered appropriate to pursue wind power for this development.

BUILDING SCALE SYSTEMS

5.7. The remaining renewable or low-carbon energy systems considered are at a building scale. These are as follows;

- Individual biomass heating
- Solar thermal
- Solar photo-voltaic (PV)
- Air Source Heat Pumps (ASHPs)
- Ground Source Heat Pumps (GSHPs)

5.8. The advantages and disadvantages of these technologies are discussed in the tables below.

INDIVIDUAL BIOMASS HEATING

Potential Advantages	Risks & Disadvantages
Potential to significantly reduce CO_2 emissions as the majority of space and water heating will be supplied by a renewable fuel Decreased dependence on fossil fuel supply Cheap running costs	A local fuel supply is required to avoid increased transport emissions Fuel delivery, management and security of supply are critical Space is required to store fuel, a thermal store and plant A maintenance regime would be required even though modern systems are relatively low maintenance Local environmental impacts potentially include increased NOx and particulate emissions Expensive initial set-up cost
Conclusions Biomass heating is considered technically feasible in large dwellings provided sufficient space can be accommodated for fuel supply, delivery and management, however air quality concerns mean that it is not considered appropriate in this instance. There may be hesitation from buyers to purchase a house that uses biomass heating because they lack familiarity with it.	

SOLAR THERMAL SYSTEMS

Potential Advantages	Risks & Disadvantages
Mature and reliable technology offsetting the fuel required for heating water (typically gas) Solar thermal systems require relatively low maintenance Typically, ~50% of hot water demand in dwellings can be met annually	Installation is restricted to favourable orientations on an individual building basis, so not suitable for all dwellings The benefit of installation is limited to the water heating demand of the building Safe access must be considered for maintenance and service checks Buildings need to be able to accommodate a large solar hot water cylinder Distribution losses can be high if long runs of hot water pipes are required Visual impact may be a concern if the apparatus contrasts with the roof material used
Conclusions Solar thermal systems are considered technically feasible on houses with suitable roof orientations, and similarly coloured roof tiles (to reduce visual impact).	

SOLAR PHOTOVOLTAIC SYSTEMS

Potential Advantages	Risks & Disadvantages
The technology offsets the higher carbon content of grid supplied electricity which can be used for lighting, appliances ,heating and hot water Mature and well proven technology that is relatively easily integrated into building fabric Adaptable to future system expansion Solar resource is not limited by energy loads of the dwelling as any excess generation can be transferred to the national grid Service and maintenance requirement minimal, and 2-3 storey houses should not require significant additional safety measures (man-safe systems etc.) for roof access	Poor design and installation can lead to lower-than-expected yields (e.g. from shaded locations) Installation is restricted to favourable orientations Feed in Tariff support mechanism has been discontinued Safe access must be considered for maintenance, service checks and annual cleaning Visual impact may be a concern if the apparatus contrasts with the roof material used Reflected light may be a concern in some locations

Conclusions

PV panels are considered technically feasible for houses with suitable roof orientations. The relatively low cost, carbon saving potential and limited additional impacts mean that PV is considered likely to be a feasible option for this development.

AIR SOURCE HEAT PUMP SYSTEMS

Potential Advantages	Risks & Disadvantages
Heat pumps are relatively mature technology providing heat using the reverse vapour compression refrigeration cycle Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 320% With grid de-carbonisation ASHP's will become a low carbon heating source in future Hot water and heating	Low temperature heating circuits (underfloor heating) would be required to maximise the efficiency of heat pumps Air source heat pumps are powered by electricity, with a significantly higher unit price than gas, leading to potentially increased running costs It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved. Residents must be educated in how heat pump systems should be operated for optimal efficiency Air source heat pump plant must be integrated into the building design to mitigate concerns regarding the visual impact of bolt-on technology Noise in operation may be an issue particularly when operating at high output

Conclusions

Air source heat pumps are likely to be technically feasible for the houses in this scheme. However, the capital and running cost increases in comparison to a gas baseline means that they may not be the preferred low carbon technology at this stage. This position can change as the scheme progresses to detailed design.
The Government has yet to make a final decision on banning gas boilers from 2025, at the time of writing it appears the ban will be delayed by 10 years to 2035.

GROUND SOURCE HEAT PUMP SYSTEMS

Potential Advantages	Risks & Disadvantages
Heat pumps are relatively mature technology providing heat using the reverse vapour compression refrigeration cycle Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 250% With grid de-carbonisation ASHP's will become a low carbon heating source in future Hot water and heating	Low temperature heating circuits (underfloor heating) would be required to maximise the efficiency of heat pumps A hot water cylinder would also be required for both space and water heating Ground source heat pumps are powered by electricity with a significantly higher unit price than gas, leading to potentially increased running costs It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved Ground source heat pumps either require significant land to incorporate a horizontal looped system or significant expense to drill a bore hole for a vertical looped system

Conclusions

Ground source heat pumps could be considered technically feasible for houses in this scheme. However, the cost and difficulty associated with vertical boreholes or land required for a horizontal looped system means that they are unlikely to be considered a viable option for this development.

6. Sustainable Design & Water Conservation

OVERVIEW

6.1. This section details additional resource efficiency and sustainable design principles that could be applied to the development.

MATERIALS

6.2. The construction materials have impacts ranging from natural resources to greenhouse gas emissions and water use related to their production and installation.

6.3. Within the development, choices should be made to reduce the use of primary resources and use materials with less negative impacts on the environment, including the following:

- Use less resources and energy by designing buildings more efficiently
- Choose and select materials and products that balance social, economic and environmental factors responsibly
- Include recycled content, use resource-efficient products and consider end-of-life uses carefully
- Influence, specify and source more materials that can be reused and consider future deconstruction and recovery
- All insulating materials should have a Global Warming Potential (GWP) of < 5 in production and installation
- All materials used in construction should be sourced responsibly, with certification obtained where possible. Materials with a low environmental impact, as per the BRE Green Guide, should be preferred

WASTE

6.4. Landfill waste causes various harms to the environment, such as local pollution, ecological damage and methane emissions, as well as increasing resource scarcity. Two main sources of waste in housing are construction waste and domestic waste during occupancy.

CONSTRUCTION WASTE

6.5. The construction site waste should be monitored and managed effectively and appropriately. Resource efficiency benchmarks should be set following best practice – e.g. m^3 of waste per $100m^2$ or tonnes waste per m^2. Materials should be diverted from landfill as much as possible by reusing on-site, reclaiming for reuse, returning to the supplier where a 'take-back' scheme exists or recovering and recycling by an approved waste management contractor.

HOUSEHOLD WASTE

6.6. The policy advice in the NPPF and the Council's current guidance will be considered to ensure that adequate storage facilities for both waste and recyclable materials are provided for the new dwellings.

6.7. The domestic waste collection services operated by East Herts District Council allow households to recycle materials such as paper and cardboard, plastic bottles and food containers, tins, glasses and metal foils, and garden waste.

WATER CONSERVATION

6.8. The development will manage water use effectively, following current Building Regulations using suitable efficiency measures.

6.9. Approved Document Part G stipulates requirements for washing facilities and hot water services. Conservation is focused on cold water supply, water efficiency, hot water supply and systems, sanitary conveniences and washing facilities, bathrooms, kitchens and food preparation.

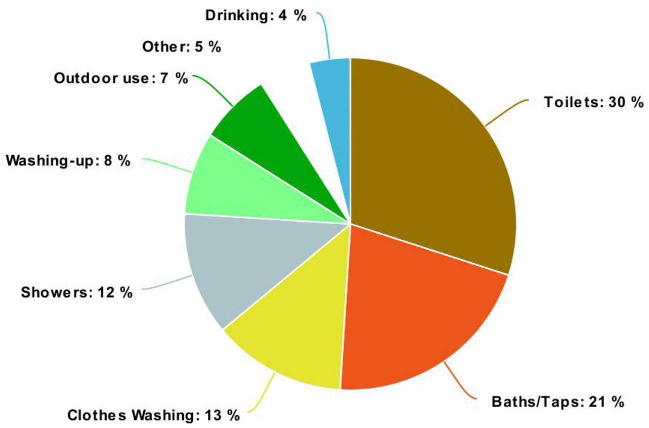
6.10. Water metering is now compulsory on new buildings and serves to make homeowners more inclined to conserve supply to reduce costs.

6.11. Approved Document G (Amendment 17k) specifies that in new dwellings, the maximum allowable consumption of potable water is 125 litres per person a day. With 150 litres of average consumption, legislation is looking to decrease consumption by at least 25 litres.

6.12. The Sustainability SPD 2021 states that following a technical standards review in 2015, water-stressed areas such as East Herts should comply with the water consumption standard of 110 litres per person per day in new homes. This level is in line with the optional water efficiency requirement contained within Part G of Building Regulations and is supported by the Environment Agency.

6.13. The aim is to limit water use during development by encouraging water efficiency measures such as efficient dual flush WCs, low flow showers and taps and appropriately sized baths.

6.14. In the UK, the Environment Agency estimate that every person uses around 150 litres of water a day, and the figure has been rising by about 1% per annum since the 1930s. Toilet flushing and personal washing make up the majority of usage:



TOILET USE

6.15. Flushing appliances must meet the requirements of the Water Supply (Water Fittings) Regulations 1999, which stipulate a use of 6 litres per flush (and a secondary flush, on dual-use toilets, should provide no more than two-thirds of the full flush). A 4.5 single flush or 6/3 or 4/2 dual flush system should significantly contribute to water efficiency measures, delivering a maximum use of 18-20 litres per occupant per day and exceeding the Regulations' requirements.

BATHS

6.16. Homeowners typically take more showers than baths, but when it comes to bathing, a typical bath requires a fill of around 80 litres. To conserve water, several 'water-efficient' designs use shaping to reduce the volume of water needed.

INDOOR TAPS

6.17. Spray or water-efficient taps should be considered, particularly when hand washing is the primary use (for example, a downstairs bathroom), delivering a potential flow as low as 1.7 litres / minute. Variable flow rate taps offer more flexibility in a bathroom or kitchen where the need will likely be a quick basin fill.

WHITE GOODS - WASHING MACHINES AND DISHWASHERS

6.18. Manufacturers of dishwashers and washing machines have significantly improved energy and water efficiency without compromising overall performance.

6.19. Efficient washing machines use far less water than the Water Supply (Water Fittings) Regulations 1999 stipulate - many now use less than 8 litres per kilogram, a significant reduction when considering a typical maximum volume of 48 l/kg.

6.20. Dishwashers using less than 2 litres per place setting are easy to find and offer savings far beyond the 4.5 litres per set in the Regulations.

SHOWERS

6.21. Customers want shower fittings that work like power showers. Some showers use less water but still feel the same as power showers. They do this by adding air to water or using other features that reduce water use without losing performance.

6.22. The development should integrate showers that use less than 10 litres per minute. Even via mains pressure (about 1.5 to 2 bar), there are shower heads that give the same experience as power showers but use less water.

6.23. Showers that use pumps depend on the pump's specification - some pumps can produce 24 litres per minute (twice as much as an average power shower), so are not suitable for saving water.

OUTDOOR WATER USE

6.24. Harvesting water utilising a water butt system or domestic rain gardens should negate the need to rely on tap water for most outside uses. Clever use of horticulture (selecting drought-tolerant plants and using mulch to conserve soil moisture) will also help reduce the need for watering. Where outside taps are supplied, flow limitation can help prevent wastage.

7. Conclusions

7.1. This Statement supports an outline application so there are no detailed house type designs available at this stage to assess. This will however be considered at the Reserved Matters stage.

7.2. The Building Regulations are regarded as the suitable method for setting standards related to energy use and CO_2 emissions, based on a review of the East Herts District Plan 2018, Sustainability SPD 2021, the NPPF and relevant recent Government statements, taking into account building design and site-layout to further lower energy consumption.

7.3. The applicable standards can be met by improving insulation specification, efficient building services, reducing thermal bridging and unwanted air leakage paths, and applying more passive design measures while incorporating low energy design and future climate resilience into the design and construction of the dwellings.

7.4. This Statement details possible approaches to addressing overheating risk and climate resilience, sustainable and responsible materials usage.

7.5. The fabric first approach will drive a design intent to provide building U-values and air leakage rates that meet or exceed the minimum requirements of Part L and, therefore, offer a significant reduction in the heat demand to the buildings.

7.6. Furthermore, the passive design, optimised use of natural ventilation where appropriate, and reduced unwanted solar gain will minimise the extent of comfort cooling to the buildings.

7.7. The combination of these measures will significantly reduce the initial energy demand to the buildings and subsequent carbon emissions.

7.8. The design process can also incorporate energy efficiency measures such as:

- Low energy LED lighting
- Demand operated controls

7.9. These systems deliver the required services such as heating, ventilation and lighting in an energy-efficient manner and, therefore, further reduce energy use and subsequent carbon emissions.

7.10. Another aspect of the detailed design will be to further explore how to incorporate renewable and low carbon technologies such as:

- Air Source Heat Pumps
- Photovoltaic panels
- Solar Thermal systems

7.11. The final aspect of the design has been to incorporate the efficient use of mains water and, where possible, use of rainwater, using techniques such as:

- Reducing water pressure where appropriate
- Harvest water by means of water butt system or rain gardens
- Using A-rated appliances

SUMMARY OF TECHNOLOGIES

Key:

✓ - Could be incorporated

✗ - Not appropriate

	SUITABLE FOR CONSIDERATION	COMMENTS
REDUCE DEMAND		
Natural Ventilation	✓	Should be used where possible
Good Natural Daylight	✓	Should be used where possible to reduce the reliance on artificial lighting
Thermal Mass	✗	To be most effective requires exposed soffits with no ceilings
Air Tightness	✓	Minimise air leakage and reduce heat losses
Solar Shading	✓	Solar shading by recessing of windows
Thermal Insulation that exceeds minimum standards	✓	Helps to minimise heat losses
Low 'G-value' glass specification	✓	Helps limit summertime overheating
A rated white goods & appliances	✓	Potentially part of the fit-out requirements to reduce electricity and water demand
ENERGY EFFICIENCY		
Ventilation Heat Recovery	✗	Could incorporate heat recovery
Low Energy Lighting	✓	Use of LED fittings throughout the development helps reduce energy use
RENEWABLE TECHNOLOGIES		
Wind		
Wind Turbines	✗	Not suitable for this development
Biomass		
Biomass Boilers	✗	High NOx levels a concern in environment and will not comply with Part L 2021 Building Regulations therefore discounted
Biomass Community Heating Scheme	✗	High NOx levels a concern. Will not comply with new Part L 2021 Building Regulations therefore discounted
Combined Heat & Power (CHP)		
Biofuel	✗	Gasification process too large for scale of site. Biodiesel considered immature feedstock and unreliable. Will not comply with Part L 2021 Building Regulations therefore discounted
Gas Fired CHP	✗	Feasible but not in line with government strategy for de-carbonisation of electricity grid. Will not comply with Part L 2021 Building Regulations therefore discounted

	SUITABLE FOR CONSIDERATION	COMMENTS
Heat Pumps		
Ground Source Heat Pumps	✘	Extensive underground boreholes / pipework not practical with likely plot sizes
Water Source Heat Pumps	✘	No significant water sources to reject / absorb heat
Air Source Heat Pumps	✓	This technology could generate hot water & heating for the houses
Solar		
Solar Hot Water	✓	Feasible but not as robust or effective as Photovoltaics
Photovoltaics (PVs)	✓	Can be used to offset electrical demand subject to costs

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