SUSTAINABLE CONSTRUCTION, ENERGY, AND WATER STATEMENT

FOR

PROPOSED DEVELOPMENT AT LONGCROFT GREEN,
WELWYN GARDEN CITY
7 x DWELLINGS

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PRODUCED BY

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SUMMARY

When seeking to reduce building energy in use, three strategies are used: reducing demand, increasing efficiency, and reducing the carbon intensity of the energy supply. Each area influences the others, meaning that improvements in each area have a self-reinforcing beneficial effect on the others. Our proposals seek to implement all three strategies as described within.

When seeking to reduce embodied carbon; a building should be designed to use less material overall and materials with a low embodied carbon should be chosen. This requires the specification of materials with a low environmental impact across their lifetime. The BRE's Green Guide rating system focuses on the major building element build ups of the roof, external walls, internal walls, upper and ground floor, and windows and rates each element from A+ to E across a range of environmental factors.

External Wall	806170615 – A+ Rated
External Wall	1206490022 – A+ Rated
Internal Wall	809760002 – A Rated
Ground Floor	820100048 – D Rated
Upper Floor	807280016 – B Rated

The proposed design and construction of the 7 x New Build Dwellings (6 x Apartments, and 1 x 2 Storey house) at Longcroft Green, incorporate many sustainable initiatives that will make a valuable contribution to the quality of life of new residents, the existing local community and the wider environment; contributing to the three pillars of sustainability – Economic, Environmental and Social.

Climate change is one of the planet's biggest challenges, with more extreme weather patterns creating issues including water shortage, flooding, and overheating. The climate changes affect us all, and we aim to try and reduce the environmental impact by: -

- Managing and monitoring waste, waste materials and water
- Reducing carbon emissions by building to and beyond Part L of the building regulations
- Selecting energy efficient appliances
- Using photo voltaic panels where appropriate
- Creating habitats for wildlife
- Providing facilities for hybrid and electric car charging
- Providing smart meters to monitor their own energy usage

In keeping with requirements of planning, this statement demonstrates how the development responds to the need for sustainable methods of construction and compliance. It addresses: -

- How the design, materials, construction, and operation of the development will 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, and.
- How the development will minimise the use of mains water

In this report, we have placed considerable emphasis on utilising passive design measures and targeting fabric efficiency to mitigate energy use. In conjunction with high levels of air tightness and proposed Accredited Construction Details (ACD) to all wall junctions, energy consumption for heating will be dramatically reduced, providing homeowners with a comfortable, efficient, and cost-effective dwelling. Highly efficient mechanical ventilation will ensure the dwellings will remain well ventilated and provide a comfortable living environment for homeowners.

The overall fabric energy efficiency specification significantly improves on the requirements of Part L1A 2013 and shows that the development will reduce CO2 requirements and supply energy efficiently

APPLICATION OF THE ENERGY HIERARCHY

The accepted standard approach to reducing carbon dioxide emissions in the built environment is as follows.

1. Reduce energy demand (be lean)
2. Supply energy efficiently (be clean)
3. Use renewable energy (be green)

BE LEAN – USE LESS ENERGY

Energy demand reduction provides the greatest opportunity for minimising a building's potential CO2 emissions.

Design strategies typically include building form and fabric measures (passive design) and energy efficient building services (active design). Focusing on form and fabric, at an early stage in the building process, is often the most cost-effective way to reduce energy and consequently CO2 emissions.

As required by the energy hierarchy, the overall energy demand for the development will be reduced by implementing energy efficiency measures as far as practically and economically possible. These ae typically a combination of thermal insulation to the fabric and energy saving appliances within the fabric of the building, these have been highlighted within this document.

To reduce demand for space heating, emphasis has been placed on providing a very high standard of fabric and reducing heat loss through the building envelope. Approved Document Part L1A 2013 sets out the limiting fabric parameters for each of the building elements. Each stated value represents the area-weighted average U-value. A strong emphasis has been placed on improving the building fabric with the minimum improvement over the average weighted U value being at least 25% to ensure the development's heating and cooling demands are reduced.

To further minimise heat loss through the building envelope, air leakage will be made a priority. The air tightness of the dwellings will be set to a level of 4.00m3/h/m2. Such a level of air tightness, along with the proposed enhanced fabric measures, will increase comfort and warmth as well as save future residents money on energy bills.

Focus has been placed on targeting improvement to the building fabric and therefore reducing U-values. All dwellings will have high performing glazing and enhanced insulation to external walls. There will also be enhanced insulation to exposed floors and roofs. In addition to betterment of general U-values, approved construction details will be followed to reduce heat loss due to thermal bridging.

- External Wall 0.15 W/ (m2.K)
- Windows / Doors 1.4 (m2.K) g-value 0.59
- Roof 0.13 W/ (m2.K)
- Air Leakage Rate 4.0 m3/m2.hr@50Pa

BE CLEAN – USE ENERGY EFFICIENTLY

All properties will be heated and have hot water generated by Air Source Heat Pumps. With the use of the NIBE Air Source Heat Pumps you can reduce CO2 emissions by half from a comparable sized house using gas or oil for heating. This is mainly because there is no combustion process involved; the heat pump merely upgrades naturally occurring energy from the air outside to heat the home and hot water. This leads to much lower CO2 emissions than any traditional fossil-fuel based heating system and explains why NIBE air source heat pumps are classified as a renewable energy source.

Repeated thermal bridges such as timber studs are already covered by U value calculations. Non-repeating thermal bridges are intermittent and occur at specific points in the construction. They are often caused by discontinuities in the thermal envelope. They commonly occur around openings and other instances where materials of different thermal conductivities form part of the external envelope.

Accredited construction details (Robust Details) for all wall junctions will be specified to minimise the effects of non-repeating thermal bridging and reduce heat loss further. By specifying and ensuring that ACDs are designed into the build, CO2 emissions can be reduced up to 5%

The use of ACDs will provide a continuous 'blanket' around the dwellings, minimising gaps in the insulation.

BE GREEN – USE RENEWABLE ENERGY

All dwellings will be specified to have 100% of their lighting outlets classed as low energy, thus reducing the future homeowner's electricity bill.

Overall, the proposed passive design measures for this development will provide households with a resource to reduce their energy demand and heat their homes to a satisfactory standard at an affordable cost.

The proposed specification will provide a robust long-term solution, future proofing the dwelling for years to come.

Unregulated energy

Unregulated energy will be reduced across the site by ensuring:

Where provided, all white goods, where supplied will be selected with an EU Energy Efficiency Rating equal to (or better than) the following: -

- Fridges and fridge-freezers Rating of A+
- Washing machines Rating of A++
- Dishwashers Rating of A+
- Washer-dryers Rating of A
- Tumble-dryers Rating of A

All dwellings are to be provided with mechanical ventilation with heat recovery and a summer by-pass is to also be provided to make use of “free-cooling” when the outside temperature is lower than the internal temperature during the summer months. In addition, all dwellings will have openable windows to assist with overheating mitigation and to provide purge ventilation as required.

Lighting systems - All external lighting and all fixed lighting within the dwellings and associated external communal areas will be provided by LED luminaires. External lighting will be controlled via a combination of photocell and time clock arrangement. High efficiency / low energy LED lighting will be utilised throughout the whole development to reduce heat load.

Summer overheating and cooling

With a continual drive for energy efficiency through both the Building Regulations and Local Planning Authority requirements, the risk of overheating to dwellings in the summer months is becoming more prevalent. Overheating can be a mild discomfort or a hazard to health if managed incorrectly, so it is vitally important that overheating risk be mitigated to ensure the dwellings will be both energy efficient and comfortable to live in.

Summer overheating is caused when there is excess build-up of heat within a dwelling. This can occur where there is excessive solar gain and limited means to absorb excess heat into the building fabric or purge this heat through ventilation. Summer overheating can be managed through a variety of measures and the chosen solution will vary from development to development. These measures can include:

Limiting solar gain

Glazing g value: This is a measure of how much solar radiation penetrates the glazing. The lower the g value the less solar gain enters a dwelling. Glazing with low g values may have a darker tint to the glazing, so aesthetic considerations are also a factor. Lower g values (below 0.5) are often required in apartments with single facades. Specifying g values below 0.2 will increase cost substantially and limit the number of available suppliers for glazing. Enhanced G-values (solar control) have been introduced to the glazing systems to help balance between achieving beneficial winter solar gain and mitigate against the overheating risk in the summer months.

External shading: Windows are set back within wall construction to reduce solar gain the in the summer months.

Internal Shading: Blinds can be used to limit solar gain in a dwelling. They can either be automatic, triggered by the sun’s presence on the window, or operated manually.

Purging excess heat build up

Thermal Mass: thermal mass is the measure of a dwelling’s ability to absorb energy. A dwelling with a high thermal mass has the ability to absorb heat during the day, which helps maintain a steady internal temperature. This heat can be released back into the dwelling at night-time, when the temperature of the dwelling is lower, helping to maintain a consistent internal temperature.

Ventilation: A dwelling can be ventilated to purge excess heat build-up. This can be done through openable windows, especially where cross ventilation is possible. Where ventilation through windows is not possible, due to security, noise or pollution issues, Mechanical Ventilation can be used.

The relatively shallow plan rooms and window openings allow natural ventilation and openable windows to be utilized throughout the proposals.

An efficient mechanical ventilation with heat recovery (MVHR) system will be used since this allows a high volume of air changes to be made while recycling the heat for re-use in the building.

Use of MVHR is positively reinforced by the use of air-source heat pumps, on site renewable generation and high performance fabric , since the heat recovery and superior fabric reduce the heating demand on the heat pump, while on site electricity generation powers the mechanical systems (heat pump and MVHR unit).

The detailed approach to the ventilation strategy and mechanical servicing in general would be developed in collaboration with a building services engineer.

WATER SAVING MEASURES

The following devices will be incorporated within each home:

- Water efficient taps.
- Water efficient cisterns.
- Low output showers.
- Flow restrictors to manage water pressures to achieve optimum levels.
- Water meters to all premises with guidance on water consumption and savings.
- Water butts for the collection of rainwater will reduce the need or mains water used for car washing and garden maintenance.

Advice will be provided to the residents through a comprehensive Homeowners Pack, detailing how to make optimum use of the devices installed around the home. Further, in marketing the scheme sustainable elements such as water reduction will be promoted.

Internal fittings will be incorporated on the development to ensure that the internal water use is reduced to a maximum of 110 litres per head per day in line with Policy.

CAR PARKING

All car parking spaces are to be provided with Electric Car Charging points. Electric vehicles have the benefit of eliminating emissions, including carbon dioxide, oxides of nitrogen, carbon monoxide and particulates that normal cars emit. With road transport accounting for 66% of particulate emissions and 42% of NOx emissions, measures such as electric vehicle charging points are strongly encouraged.

CONCLUSIONS

Maximizing the performance of a building's fabric reduces the *energy demand* by minimizing heat losses and excessive solar gain. This in turn reduces the energy needed to heat or cool the building as a result. Better performing building elements, combined with continuity of insulation through careful detailing, will be specified.

The beneficial effects of increasing fabric performance are magnified by a building having a good orientation, form factor, and the correct proportion of glazing to facade.

The fabric specification has been enhanced compared with the requirements in current Building Regulations. Emphasis has been placed on the attention to detail around non-repeating thermal bridges to ensure that heat loss is further reduced and that an airtight dwelling is achieved. An efficient mechanical ventilation system is proposed that will introduce fresh air to the building to ensure the internal comfort of the building is maintained.

The available options for delivery of energy have been appraised and highly efficient Air Source Heat Pumps are the optimal method of supplying the homeowners with efficient, cost effective space heating and hot water.

The heating design will be enhanced by specifying full zone and optimum start controls to ensure that the homeowners have an effective, easy to control system. A high percentage of internal lights will be low energy, which will reduce energy and CO2 emissions further.

Water saving measures are incorporated throughout both the individual houses and site in general.

Energy Consumption

The 7 x dwellings benefit from high amounts of natural lighting through larger windows to living spaces with the sun path. Internal layouts designed in response to this with more flexible living areas.

Exploiting positive solar gains whilst screening against excessive gains in summer months.

Allowance for renewable energy sources as part of a phased scheme of energy resource demands as new technologies become viable: future proofing.

Careful choice of home energy efficient appliances and fittings further reduce energy demands

Biodiversity

The scheme supports biodiversity by extensive and appropriate new supplementary native planting in combination with existing features and the creation of habitats with the installation of nest boxes, bat boxes and insect bricks where appropriate. The inclusion of green roofs.

Air, Noise and Light Pollution

Nuisances will be minimised by registering the site with, and implementing the requirements of, the Considerate Constructor's Scheme.

Waste, Recycling and Composting Facilities

Waste production during construction will be limited through a Site Waste Management Plan (in accordance with DTI guidance). There will be on-site recycling facilities where at least 80% of construction waste will be recycled. Areas for the sorting of recyclate materials and composting to be provided on plot.

Materials

Material choices and material sourcing is a key issue of sustainable construction and has been an important consideration from the beginning of the design development process such that the scheme can be built from locally sourced materials and constructed using local skills. Sourcing of materials for construction will be carefully considered in terms of sustainability and specification.

By using MMC, natural materials, using locally available materials and skills base (potentially less than 30 miles from the construction site), material consumption will be reduced and vehicle trip generation minimised reducing the carbon footprint.

Sourcing of and inspection of all materials credentials (from the Green specification and FSC certified sources and with good practices in place, for example), will further underpin the sustainability of the proposals.

Health and Well-Being

Excellent levels of daylighting are provided by introducing fenestration to all elevations (where privacy is not affected).

Large glazed windows ensure these spaces are well lit with natural light. Fenestration provides natural controllable ventilation.

Environment

The developments will respect existing natural features and resources as well as the surrounding environment. The design will use these natural resources to provide opportunities for new and improved habitat areas such as connectivity to existing wildlife corridors and wider ecology enhancement frameworks.

Orientation

A building's orientation dramatically affects the energy *demand since* North facing facades are exposed to less direct sunlight and therefore lose heat more quickly than South facing facades, which are subject to much more solar gain. Poor orientation results in either excessive heating energy demand due to unnecessary heat losses, or excessive cooling energy demand due to unnecessary heat gains.

The beneficial effects of a good orientation are magnified by a building having a good form factor, high performance fabric, and the correct proportion of glazing to facade. A good

orientation will also enhance the efficiency of any on site photovoltaic panels

Sustainability

Throughout the future detailed design stages of this scheme every effort will be made to ensue that the dwellings are of low impact, and low energy.

The twin crisis of climate breakdown, and biodiversity loss are the most serious issue of our time. Buildings, and construction play a major part, accounting for early 40% of energy-related carbon diode (CO2) emissions whilst also having a significant impact on our natural habitats.

For everyone working in the construction industry, meeting the needs of out society without breaching the earth's ecological boundaries will demand a paradigm shift in our behavior.

The Architects have seeked to design for low energy use and reduce carbon emissions as well as embodied carbon. The design adopts the standards of: -

- Airtightness
- Thermal Insulation
- Mechanical ventilation with heat recovery
- High performance windows
- Thermal bridge free construction

The proposals look to include off-site pre-fabrication where possible, by reducing waste at the source, to further reduce the impact of the materials, and products used in the construction process. Surplus material that is produced on site will be carefully managed, and segregated in skips for off-site recycling

Material, services, and labour will be sourced locally where possible, such as the proposed timber detail walls, where local craftmanship will be key to making it a success, timber cladding will be also sourced from sustainable managed forests.

The dwellings will be highly insulated to reduce heat loss and detailed to minimize air leakage as much as possible, all insulation will be CFC, and HCFC free.

Sustainability will start from the building frame, and off-site construction to reduce embodied energy creating factory quality construction. An air source heat pump will be utilized to minimize carbon emissions wherever possible. We will also be installing a highly efficient wood burner to the Living Room chimney area as a means of sustainable secondary space heating.

The orientation of the dwellings in conjunction with their fenestration pattern has already been considered in detail to optimize daylighting, and solar gain, potential summer overheating will be dealt with via internal solar shading. Low energy LED light fittings will be installed throughout the dwellings for nighttime usage or for days with low natural light levels.

The configuration of the dwellings lends itself well to natural ventilation for summer months when the ground floor glazing to the Living areas is open along with the bedroom windows, fresh air will be drawn through the building.

This proposed development represents a new chapter in the story of this Site, and will provide additional and unique accommodation, as an eco-friendly development, in a superbly landscaped setting that reflects the site's location. The aim of this development is to increase the number of units, whilst at the same time providing significant biodiversity enhancements and improving where possible the setting of the site overall.

The proposed scheme has therefore been conceived as a sustainable extension to the existing that will bring environmental improvements to the Site as a whole and achieve a comprehensive scheme that will improve the overall quality, function and appearance of the existing site.

It will meet the increasing expectations for good quality accommodation in beautifully kept grounds sympathetic to the natural environment.

The proposed units will be set in a naturalised setting of native trees, hedgerow, and scrub to be managed to create a 'wilderness' landscape setting. Integral to the scheme proposal is a desire to create a sustainable development with an emphasis on environment and ecology.

The planting included within the scheme will comprises native trees, shrub and hedgerows, diversification of the ground plain (to include areas of long grass and wild-flower), and the addition of existing water bodies all designed to increase the ecological value of the Site. Enhancement planting within the existing Site will help mitigate its visual intrusion in views.