FALLON DESIGN
M&E ENGINEERING

CLIMATE ACTION & ENERGY STATEMENT

MIXED RESIDENTIAL DEVELOPMENT AT SOUTHGREEN ROAD, KILDARE, COUNTY KILDARE.

Mixed Residential Development,
Southgreen Road,
Kildare,
County Kildare.

Project: 2602

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1. Project Team

Project: Mixed residential development at Southgreen, Kildare, County Kildare.

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2. Introduction

Pousterle Limited intend to apply for permission for development of a Large - Scale Residential Development (LRD) on a site of approx. 6.13 ha at Southgreen Road, Kildare, Co. Kildare. The site is generally bounded to the north by agricultural fields; to the south by the recently constructed Southern Internal Link Road; to the west by Southgreen Road and an existing Electricity Station; and to the east by Old Road and existing residential properties.

The proposed development will consist of:

• The construction of a new residential scheme of 146 No.house type units ranging in height from 1-3 storeys as follows:

  o 136 No.houses (7 No. 2 bed units; 102 No. 3 bed units; and 27 No. 4 bed units) in a mixture of bungalow, detached, semi-detached, and terrace style units.

  o 10 No. Duplex apartment units (5 No. 1 beds, 3 No. 2 beds, and 2 No. 3 beds).

• Each residential unit will be afforded with private open space in the form of a front/rear/side garden for houses or terrace / balconies for duplex apartment units.

• The provision of a creche facility (approx. 161 sq m GFA) and associated areas of external open space (approx. 60 sq m).

• Public open space (approx. 6,992 sq m) is proposed in the form of 2 No. New large public open space areas within the site (approx. 3,046 sq m and 3,946 sq m respectively).

• Communal open space (approx. 82 sq m) is proposed adjacent to Block A.

• A total of 321 No.car parking spaces (305 No. For residential units and 16 No. For the creche facility) are provided. This provision includes 2 No. Accessible spaces and 17 No. Visitor spaces.

• A total of 527 No. Cycle parking spaces (517 No. For residential units and 10 No. For the creche facility) are provided. This provision includes 75 No. Visitor spaces. Resident cycle parking is proposed in the form of secure bicycle store enclosures to the front of terraced units; on curtilage spaces to the rear of units with side access; and a bicycle store for apartment units. Visitor parking is proposed in the form of Sheffield stands.

• The development shall be served via a new vehicular access point from Southgreen Road. An additional private vehicular access point is proposed via Old Road to service 1 No. New bungalow 4 bed residential unit.

• Pedestrian and Cyclist access is also proposed via Southgreen Road and via a new secondary access point from the Southern Internal Link Road to the south of the site and Old Road to the east of the site.

• 2 No. Directional single lane cycle tracks on either side of the Southgreen Road, together with amendments to the existing cycle tracks and footpaths on Southgreen Road north of the east west link road.

• A new pedestrian/cycle link is delivered to the north connecting South Green Road to Old Road.

• The associated site and infrastructural works include provision for an ESB Sub Station; water services; foul and surface water drainage and connections; attenuation proposals; permeable paving; all landscaping works; boundary treatment; internal roads and footpaths; waste storage areas, all electrical services and all associated site development works.

1. Executive Summary

The Dublin City Development Plan 2022 – 2028 (Policy CA10) mandates that all new developments involving 30 residential units and/ or more than 1,000 sq. m. of commercial floor space, or as otherwise required by the Planning Authority, will be required to submit a Climate Action Energy Statement as part of the overall Design Statement to demonstrate how low carbon energy and heating solutions, have been considered as part of the overall design and planning of the proposed development, so that the European Energy Performance of Building Directive (EPBD) is complied with.

This report acts as said Climate Action Energy Statement; it identifies the energy standards with which the proposed development will have to comply and sets out the overall strategy that will be adopted to achieve these energy efficiency targets. In brief the strategy is to develop an energy efficient envelope and then determine what energy efficient equipment will be installed to achieve energy and sustainability targets.

The dwellings will be required to minimize overall energy use and to incorporate an adequate proportion of renewable energy in accordance with Building Regulations Part L 2022, Conservation of Energy & Fuel, Dwellings (hereinafter referred to as Part L).

The Development will be designed to meet the requirements of Building Regulations Part L 2022, Conservation of Energy & Fuel, Buildings Other than Dwellings (hereinafter referred to as Part L).

Part L includes the requirement that all new buildings are “Nearly Zero Energy Buildings” (NZEB) from 31 December 2020. NZEB means a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby. NZEB compliance includes a Maximum Energy Performance Coefficient of 0.3, a Maximum Carbon Performance of 0.35 and a Renewable Energy Ratio RER of 20%. This equates to a Building Energy Rating (BER) of A2 for dwellings and typically A3 for non-dwellings.

In addition, Part F of the Building Regulations regarding Ventilation will be achieved.

2. Building Regulations Part L 2022 (Dwellings)

Compliance with Building Regulations Part L 2022 is broken down into six distinct categories, known as Regulation L3 parts (a) to (f).

A summary of each of these parts as listed in Technical Guidance Document L 2011 is provided below together with a description of what is required to demonstrate compliance and suggested routes to meeting the required standards.

2.1 Regulation L3 Part (a)

The regulation requires that: Providing that the energy performance of the dwelling is such as to limit the calculated primary energy consumption and related carbon dioxide (CO2) emissions insofar as is reasonably practicable, when both energy consumption and carbon dioxide (CO2) emissions are calculated using the Dwelling Energy Assessment Procedure (DEAP) published by Sustainable Energy Authority of Ireland;

Part (a) is the overarching compliance target which stipulates the required overall reduction in energy consumption and carbon emissions for new dwellings.

This requires that the energy consumption and carbon emissions of every dwelling is assessed using the DEAP software and that reductions of 60% in energy consumption and 54% in carbon emissions are achieved. The baseline against which this reduction is to be measured is a reference dwelling which is constructed to perfectly comply with the 2005 version of Building Regulations Part L.

Note: Complying with the 5 remaining elements (b) to (f) of these regulations will not guarantee compliance with Part (a). It is likely that the requirements of at least one of the remaining sections will need to be exceeded.

2.2 Regulation L3 Part (b)

The regulation requires that: Providing that, for new dwellings, a reasonable proportion of the energy consumption to meet the energy performance of a dwelling is provided by renewable energy sources;

This requires that the all new dwellings are provided with a renewable energy source. The regulations state that 10kWHrs/m2/year must be provided from thermal sources (solar thermal, biomass, heat pumps) or 4kWHrs/m2/year from electrical sources (Photovoltaic, Micro-wind).

In practical terms, for a multiple unit development, this requirement is usually met by incorporating PV panels at roof level, incorporating air source heat pump technology or by adding an element of biomass or micro-CHP to a district heating scheme. Where CHP is included, the renewable energy is the waste heat which is generated as a by-product of the electricity produced.

2.3 Regulation L3 Part (c)

The regulation requires that: Limiting heat loss and, where appropriate, availing of heat gain through the fabric of the building;

This requires that the fabric of the building is designed to minimize heat loss from the building and that the air permeability of the structure limits the unwanted passage of air into the building. The thermal bridging details of junctions in the envelope of the building must also be properly designed and constructed.

Every dwelling (or a representative sample in a multiple dwelling development) must be subjected to an air pressure test to determine the air tightness. All dwellings must achieve and air tightness of less than 7m3/m2/hour when tested at 50 Pascals.

2.4 Regulation L3 Parts (d & e)

The regulation requires that: Providing and commissioning energy efficient space and water heating systems with efficient heat sources and effective controls; Providing that all oil and gas fired boilers shall meet a minimum seasonal efficiency of 90%;

These require that gas or oil fired boilers are at least 90% efficient and that heating controls allow independent time control of the heating (2 zones for dwellings larger than 100m2) and hot water. Heating in each zone should also be controlled by room thermostats (in the case of heating) and cylinder stats (in the case of hot water).

2.5 Regulation L3 Parts (f)

The regulation requires that: Providing to the dwelling owner sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable.

This requires that information is provided to the dwelling owner which relates to the effective and efficient operation of the systems installed in that house. Instructions on how to control the heating & hot water systems based on time and temperature requirements.

3. Building Fabric

Before considering efficient building services or renewable energy systems, the form and fabric of a building must be assessed and optimized so as to reduce the energy demand for heating, lighting and ventilation. Target performance levels will be identified by the design team and are presented below.

3.1 Elemental U-Values

It is the intention of the design team to exceed the requirements of the building regulations. Target U-Values are identified below. [Vary as required]

U-Values	Range of Target Values Proposed	Part L 2022 (Residential) Compliant Values	Part L 2022 (Commercial) Compliant Values
Floor	0.15 to 0.18 W/m2K	0.18W/m2K	0.21W/m2K
Roof (Flat)	0.12 to 0.18 W/m2K	0.20 W/m2K	0.20 W/m2K
Roof (Pitched)	0.10 to 0.16 W/m2K	0.16 W/m2K	0.16 W/m2K
Walls	0.15 to 0.18 W/m2K	0.18 W/m2K	0.21 W/m2K
Windows	0.9 to 1.4 W/m2K	1.4W/m2K	1.6W/m2K

3.2 Air Permeability

A major consideration in reducing the heat losses in a building is air infiltration. This essentially relates to the ingress of cold outdoor air into the building and the corresponding displacement of the heated internal air. With good design and strict on-site control of building techniques, infiltration losses can be significantly reduced, resulting in equivalent savings in energy consumption, emissions and running costs.

To ensure that a sufficient level of air tightness is achieved, air permeability testing will be specified in tender documents, with the responsibility being placed on the main contractor to carry out testing and achieve the targets identified in the tender documents.

A design air permeability target of 3 $m^3/m^2/hr$. has been identified for this development. The air permeability testing will be carried out in accordance with BS EN ISO 9972:2015 'Determination of air permeability of buildings, fan pressurization method' and CIBSE TM23: 2022 'Testing buildings for air leakage".

3.3 Thermal Bridging

Thermal bridges occur at junctions between planar elements of the building fabric and are typically defined as areas where heat can escape the building fabric due to a lack of continuity of the insulation in the adjoin elements. Careful design and detailing of the manner in which insulation is installed at these junctions can reduce the rate at which the heat escapes. Standard good practice details are available and are known as Acceptable Construction Details (ACDs). Adherence to these details is known to reduce the rate at which heat is lost. The rate at which heat is lost is quantified by the Thermal Bridging Factor of the dwelling and measured in W/m2K. It is intended that thermal modelling will be carried out for all thermal bridges on the dwellings within proposed development and that the resultant Thermal Bridging Factor will be in the range of 0.04W/m2K to 0.08W/m2K.

4. BUILDING SERVICES

4.1 Heat Sources & Renewable Energy Options.

All new dwellings and commercial buildings must have a portion of their annual energy demand provided by renewable energy sources. This can be thermal energy such as solar thermal collection, biomass boilers or heat pumps or it can be electrical energy as generated by photovoltaic solar panels or wind turbines.

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The Renewable Energy Ratio (RER), which is the ratio of the primary energy from renewable energy sources to total primary energy, must be a minimum 20% of the total energy consumption. To determine the most efficient and effective means of complying with the requirements of Part L a detailed assessment of the various renewable energy systems available will be conducted during the detailed design stage. A range of possible solutions will be assessed in terms of their technical suitability; ease of operation for end-users; operating costs to be borne by end users and capital costs of the plant and equipment required.

The most common approach to meeting the required standards are set out below.

4.1.1 Air Source Heat Pumps with CMEV or MVHR

In housing with the use of Air Source Heat Pumps (ASHPs) the amount of heat considered to be renewable is determined by the efficiency of the heat pump and the "primary energy conversion factor" for grid supplied electricity. Typically, approximately 40% to 50% of the heat supplied is renewable energy. Certified seasonal efficiencies of some models can exceed 500% meaning that the use of this technology can easily deliver compliance with current Part L requirements.

This ASHP solution provides a wet system through a heat emitter medium of either radiators or Under Floor Heating (UFH) and a standing hot water store. This solution is coupled with either a central mechanical extract system or a whole house heat recovery ventilation system.

4.1.2 Individual Exhaust Air Source Heat Pumps with CMEV.

In apartments an EAHP (Exhaust Air Heat Pumps) is an energy recycling system that extracts heat from the wet room exhaust air being expelled from the apartment through a ducting system. The wet room warm exhaust air is passed over the evaporator in the heat pump before being expelled to the external at much lower temperatures.

The EAHP transfers the extracted heat to a wet radiator circuit and to the hot water cylinder supplied as part of the one system. The EAHP solution offers heating, ventilation and hot water all in one system. The EAHP system is supplied with a back up electric heater.

Certified seasonal efficiencies of some models can exceed 400% meaning that the use of this technology can easily deliver compliance with current Part L requirements.

4.1.3 Individual Sanitary Air Source Heat Pumps, MVHR & Solar PV.

In apartments a Sanitary Air Source Heat Pump is a dedicated water generation heat pump that takes in and discharges external air for the apartment's hot water generation through a ducting system. The external ambient air is passed over the evaporator and then expelled to external at much lower temperatures, as a sealed system. Mechanical Heat Recovery Ventilation is used for the ventilation of the apartment, with direct electric panels for space heating.

Certified seasonal efficiencies of some sanitary hot water models can exceed 400% meaning that the use of this technology can easily deliver compliance with current Part L requirements.

Supplementary solar PV panels are used for achieving the required EPC and CPC Part L compliance depending on the overall fabric. The quantity of panels can be tailored to ensure that both the minimum renewable energy requirements and the overall energy performance coefficient (EPC) are compliant.

4.1.4 District Heating With MVHR

The inclusion of a district heating scheme will be considered for the development. Such a design approach would involve the generation of heat in a centrally located one block and then distribution of this heat to each dwelling via a network of heating pipework.

Such a central plant scheme would use combination of gas boilers, large commercial heat pumps and a renewable energy contribution from such plant as a combined heat and power plant or a biomass boiler.

4.2 Solar Photovoltage (PV)

The provision of solar PV shall be incorporated into the development for providing the renewable contribution to the nursing home building lowering the management running and of setting the electrical load from the heat pumps The extent of the solar PV required for the correct EPC and CPC shall be calculated using the NEAP assessment for the non-domestic landlord aspects of the scheme.

4.3 Ventilation Design

The provision of well-designed ventilation for dwellings and commercial building is vitally important to control the odors and moisture levels and to provide an adequate supply of fresh air to the dwellings.

Three different options are generally considered for schemes of this nature. These are as follows:-

4.3.1 Traditional Natural Ventilation Approach

This approach operates with intermittent extract fans in wet rooms and background ventilation provided in accordance with the guidance of Technical Guidance Document F (TGD-F)

4.3.2 Whole House Mechanical Heat Recovery Ventilation (MHRV)

Where MHRV is used, air is extracted from wet rooms and supplied to living spaces via a central unit which contains supply and extract fans and a heat exchanger. This system recovers the heat from the warm air being extracted from the dwelling and using the heat recovered to raise the temperature of the incoming air stream leading to improved overall efficiency.

4.3.3 Mechanical Whole House Extract (CMEV)

CMEV systems are like MHRV systems in that they extract air from all wet rooms using a central extract fan which runs continuously however there is no supply air provided by the system and no heat recovery.

Of the three systems discussed above, it is targeted that either an MHRV system or a central CMEV ventilation System will be selected. This will depend on the type of structure and the design constraints of void within the fabric of the units.

4.4 Water Management

An integrated Water Management and Conservation approach that incorporates the use of low water consumption equipment is part of this developments ethos to ensure the minimal use of potable water, efficient sanitary appliances (low water WC cisterns, automatic flushing controls, push spray taps), water consumption. Further such enhancements like leak detection for the Landlord areas linked to a Building Management System (BMS) will be considered.

4.5 Electric Vehicle Charging Points

4.5.1 Dwellings

New buildings that have at least one dwelling, or existing buildings that have at least one dwelling and undergoing a major renovation, must have ducting infrastructure installed for each parking space to enable the installation of electric vehicle recharging points. This only applies if the parking space is located inside the building or within its courtyard. In addition, the case of a refurbishment, it only applies if the renovations include the car park or the electrical infrastructure of the building / car park.

New dwellings (not part of a multi-unit building) must have ducting infrastructure installed, to enable the installation of electric vehicle recharging points. The requirement applies where the parking space is in the courtyard of the dwelling.

4.5.2 Non-Dwellings

New buildings or buildings undergoing major renovation, other than dwellings, which have more than 10 car parking spaces must have at least one electric vehicle recharging point. They must also have ducting infrastructure for at least one in every 5 car parking spaces to enable further installation of recharging points. This only applies to those buildings undergoing major renovation if that renovation includes the car park or the electrical infrastructure of the building or car park. This doesn't apply if the building is owned and occupied by a small or medium-sized enterprise.

5. Proposed Solutions

The preceding sections of this report set out the regulatory requirements with which the scheme will have to comply while identifying several technologies and design approaches that may be utilized to achieve compliance.

The building fabric standards and the technology solutions discussed will all be assessed in greater detail during the detailed design stage of the project. A cost benefit analysis of all these available solutions will be carried out to determine the correct balance between an efficient building envelope and the most appropriate combination of technology and renewable energy systems.

5.1 Dwellings

- To achieve Part L Compliance for the development Fallon Design proposes:
- Exceed minimum U-Value standards where possible.
- Achieve air tightness standards of 3 $m^3/m^2/hr$.
- Thermally model all thermal bridging details to achieve thermal bridging factors of less than 0.15 W/m2K
- Install high efficiency gas fired boilers and time and temperature zone control in all dwellings
- Install centralized mechanical ventilation systems to ensure adequate ventilation rates are achieved in the dwelling which maximize the benefits of the air tight construction.
- Provide roof high efficiency heat pump technology to meet the renewal requirements and low running costs.

5.2 Building Other Than Dwellings

The proposed approach to achieving Part L Compliance for the non-residential building will be as follows:

- Exceed minimum U-Value standards where possible.
- Achieve air tightness standards of 5 m3/m2/hr
- Adopt Acceptable Construction Details to limit thermal bridging.
- Analyze the proposed glazing proportions and orientations and select appropriate solar control glazing and/or shading devices to reduce the solar gain to the spaces to an appropriate level.
- Provide roof mounted PV panels to provide the required renewable energy contribution.

6. Conclusion

The proposed development will be constructed in accordance with Part L 2022 of the Building regulations and all residential units shall be certified A rated BER's to a Nearly Zero Energy Building standards. This development's fabric first design strategy will result in lower climate impact from a reduced overall heating requirement and energy consumption.