Firhouse Residential Development, Dublin 24

Energy Efficiency & Climate Change Adaptation Design Statement

ISO 9001:2015 QUALITY ASSURED COMPANY

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A Future Built on Sustainable Design

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1. Executive Summary

This Design Statement sets out a residential, fabric-first, low-carbon strategy for the Firhouse apartment development. The approach prioritises passive design, high-efficiency building services, and on-site renewables, supported by EV infrastructure, nature-based solutions, and resilience measures. The strategy is structured to:

- Comply with TGD Part L (2022) – Dwellings and NZEB requirements.
- Target BER A2/A3 ratings across dwellings through envelope performance, airtightness, and efficient electrified systems.
- Deploy air-source heat pumps (ASHP) and mechanical ventilation with heat recovery (MVHR) in apartments, with landlord-area electrification.
- Provide EV charging readiness across parking with initial chargers installed to current standards.
- Reduce light pollution via full cut-off LED luminaires with zero upward light ratio in external areas.
- Integrate nature-based solutions (greenery, SUDS, shade) and climate adaptation measures for heat and flood resilience.

The measures are mapped to SDCC Climate Action Plan Action Areas (Energy & Buildings, Transport, Flood Resilience, Nature-Based Solutions, Circular Economy & Resource Management, Community Engagement) and support the county-wide ambition for energy efficiency improvement and GHG reduction to 2030.

Table 1. Summary of proposed measures to adhere to local policies

SDCC Development Plan Reference	Measure(s) Taken	Outcome(s)
CDP: 2.1, 2.2, 18.6	Development complies with and exceeds minimum requirements of TGD Part L (2022 – Dwellings) through fabric-first design, airtightness, and efficient electrified building services.	Anticipated BER A2/A3 across apartments, significantly improving energy efficiency and reducing resident energy costs.
CDP: 2.5, 2.14	Air Source Heat Pump (ASHP) technology proposed for apartment heating and hot water. Roof-mounted solar PV arrays provide renewable electricity to landlord/common areas.	Supports decarbonisation, reduces operational emissions, and facilitates transition to renewable energy.
CDP: 2.15 11.10	EV-ready infrastructure with ducting and containment for all spaces, with initial active EV chargers installed.	Encourages sustainable transport, supports EV adoption, and reduces transport-related emissions.
CDP: 2.18 2.20	Solar PV arrays installed on rooftops, generating on-site renewable energy.	Reduces reliance on external grid supply, improves resilience, and supports

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SDCC Development Plan Reference	Measure(s) Taken	Outcome(s)
		county renewable energy targets.
CDP: 4.6 6.1 6.25 6.26 10.1	Integration of energy-efficient systems, PV, ASHPs, and EV infrastructure. Landscaping designed with SUDS, native planting, and biodiversity features.	Enhances local environmental quality, strengthens climate resilience, supports biodiversity, and improves resident wellbeing.
CDP: 7.7	Low-carbon residential development with green spaces, biodiversity planting, and climate-conscious design.	Promotes sustainable community living in South Dublin, creating a resilient and low-carbon neighbourhood.
CDP: 11.42	LED lighting with zero upward light ratio used for all external lighting.	Minimises light pollution, protects local ecology, and maintains safe, energy-efficient site lighting.

The recommended strategy takes into consideration the site layout and requirements for the building to produce a design that incorporates the most appropriate technologies available to the site that are commercially viable, whilst targeting compliance with all policies applicable to this development.

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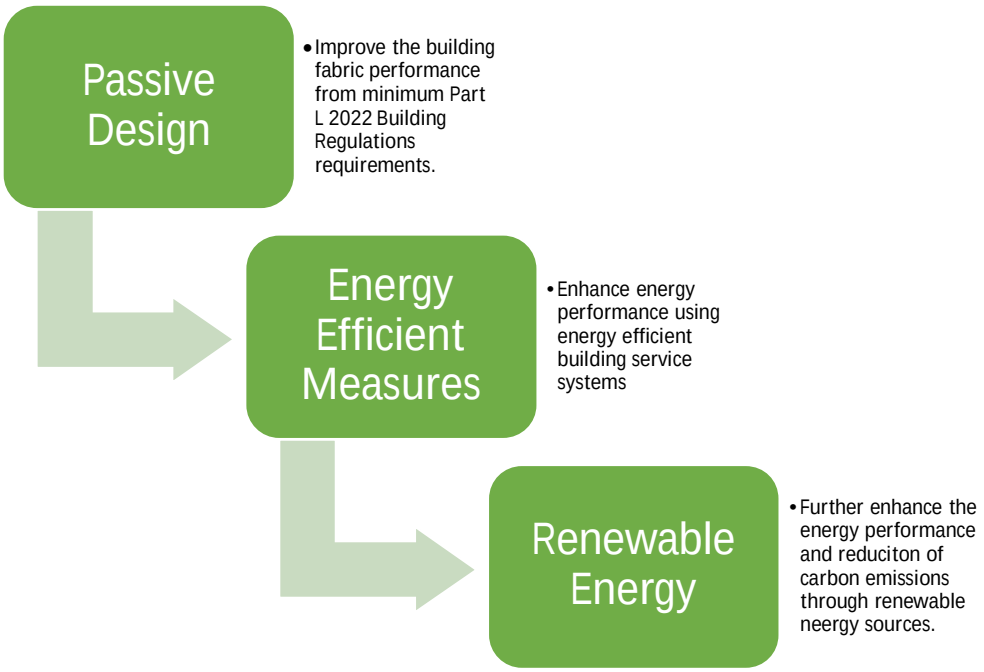
2. Introduction

The team at Lawler Sustainability consists of a variety of qualified Engineers and Environmental Consultants with a broad range of backgrounds including Mechanical & Electrical Engineering, Building Services Engineering, and Environmental Science. The team are CIBSE Low Carbon Consultants, CIBSE Low Carbon Energy Assessors, SEAI registered Non-Domestic BER Assessors, BREEAM Assessors, LEED & WELL Accredited Professionals, and Fitwel Ambassadors. This broad range of knowledge and qualification allows the team to produce documentation for planning submissions that are tailored to the individual sustainability requirements of the Development and to ensure National and Local Policy compliance is clearly demonstrated.

An energy hierarchy methodology is employed by Lawler Sustainability to assess the potential energy demand and carbon emissions of the proposed development and demonstrate the improvements towards a building which has a very low energy demand. This methodology is outlined below.



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3. Policy Review

The National Planning Framework (NPF), Project Ireland 2040, establishes a national vision for sustainable development in Ireland, aiming to achieve compact growth, low-carbon urban centres, and resilient rural communities. The South Dublin County Development Plan 2022–2028 has been prepared in alignment with national strategies and policies, reflecting the objectives outlined in the NPF. This ensures that development across South Dublin contributes to a balanced approach addressing environmental, social, and economic sustainability.

3.2.1. Dimensions of Sustainable Development

Sustainable development encompasses three key dimensions economic, social, and environmental. Each of these dimensions is interconnected and requires careful consideration to ensure a holistic and equitable approach to development:

1. Supporting a strong, competitive economy through initiatives that lower energy costs, enhance productivity, and attract green investments into South Dublin. By integrating energy-efficient systems and renewable technologies, this development reduces operational costs for residents and communities, contributing to long-term economic resilience.
2. Enhancing community well-being by fostering high-quality, accessible built environments that promote equity and inclusivity. This project aligns with the South Dublin County Development Plan's emphasis on creating sustainable neighbourhoods by incorporating energy-efficient homes, active travel infrastructure, and landscaped spaces that improve the quality of life for residents and the wider community.
3. Protecting the county's natural, built, and historic assets by reducing carbon emissions, conserving resources, and promoting biodiversity. The proposed development integrates renewable energy systems, nature-based solutions, and sustainable transport options to mitigate environmental impacts and support South Dublin's transition to a low-carbon economy.

These three dimensions form the foundation of this Energy Efficiency & Climate Change Adaptation Design Statement, ensuring that the proposed development contributes positively to South Dublin's overarching sustainability goals.

3.2.2. Alignment with South Dublin County Development Plan Policies

The development incorporates key objectives from the South Dublin County Development Plan 2022–2028, which prioritises climate resilience, decarbonisation, and the transition to a sustainable economy. Specific policies addressed by the project include:

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3.2.3. Climate Change

It is South Dublin County Council's objective to:

• "CDP 2.1:
o To support the implementation of the National Climate Action Plan 2023 and the National Climate Change Adaptation Framework, enabling South Dublin to transition to a low-carbon and climate-resilient region.
o To adopt sustainable planning strategies by integrating land use and transportation, and by facilitating compact, mixed-use developments that reduce greenhouse gas emissions and align with national climate mitigation objectives.
o To raise awareness and understanding of climate change impacts on the local economy and communities, fostering resilience and a proactive response to these challenges."

3.2.4. Climate Change Mitigation, Adaptation, and Resilience

It is South Dublin County Council's objective to:
• "CDP 2.2:
o To support the implementation of the South Dublin Climate Action Plan 2024–2029, building on resilience measures and emergency planning.
o To promote nature-based solutions, including green roofs, permeable paving, and biodiversity-focused landscaping to reduce climate impact.
o To raise awareness of climate adaptation measures during the project lifecycle.
o To collaborate with stakeholders to advance renewable energy generation and innovative climate solutions.
o To integrate flood mitigation and climate-adaptive infrastructure into all developments."

3.2.5. Decarbonisation Zones

It is South Dublin County Council's objective to:
• "CDP 2.5:
o To facilitate the sustainable development of Decarbonisation Zones within South Dublin, ensuring compliance with the Climate Action Plan 2023.
o To prepare and implement strategies that highlight energy-efficient designs, renewable energy technologies, and low-carbon transport systems."

3.2.6. Transition to a Low Carbon Economy and Society

It is South Dublin County Council's objective to:
• "CDP 2.14:
o To accelerate the transition to a low-carbon economy through the promotion of green technologies and renewable energy.
o To integrate solar photovoltaic (PV) panels and air-source heat pumps into new developments, reducing carbon emissions.
o To encourage sustainable transport, including walking, cycling, and the provision of EV charging points and infrastructure for future readiness.
o To improve energy efficiency in residential buildings, with the goal of achieving BER Rating A, aligning with national energy efficiency targets."

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3.2.7. Renewable Energy and Micro-Generation

It is South Dublin County Council's objective to:
• "CDP 2.18:
o To promote the use of solar energy technologies, including solar PV panels in residential developments."
• "CDP 2.20:
o To facilitate the development of micro-renewable energy installations such as smart meters, zonal heating controls, and smaller-scale renewable energy technologies throughout the county."

3.2.8. Sustainable Communities and Compact Growth

It is South Dublin County Council's objective to:
• "CDP 4.6:
o To ensure compact growth in urban areas by creating vibrant, mixed-use neighbourhoods with access to high-quality amenities.
o To encourage developments that integrate green spaces and active transport infrastructure, improving the quality of life for residents."

3.2.9. Economic Development and Enterprise

It is South Dublin County Council's objective to:
• "CDP 6.1:
o To attract inward investment in green technologies by facilitating energy-efficient developments and renewable energy projects.
o To create job opportunities in sustainable construction and renewable energy sectors during both construction and operational phases."

3.2.10. EV and Sustainable Transport Infrastructure

It is South Dublin County Council's objective to:
• "CDP 11.10:
o To promote sustainable mobility by requiring the installation of EV charging points and ducting infrastructure for future expansion in all new developments.
o To encourage compact growth that reduces car dependency and promotes walking and cycling as primary modes of transport."

3.2.11. Light Pollution and Sustainable Design

It is South Dublin County Council's objective to:
• "CDP 11.42:
o To ensure that external lighting is designed to minimise light spillage and protect the natural environment.
o To adhere to the principles of energy-efficient lighting by using LED technology and task-specific downward lighting to reduce light pollution."

3.2.12. Design and Built Environments

It is South Dublin County Council's objective to:
• "CDP 18.6:

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o To encourage excellence in energy-efficient design by promoting innovative architectural solutions.
o To adopt low-carbon building materials and sustainable construction practices.
o To integrate safe and convenient pedestrian and cycling routes into all developments, prioritising active travel modes over car dependency."

3.2.13. Best Practices in Energy and Climate Adaptation Design

Guidance from the South Dublin County Development Plan has informed every aspect of this Energy Efficiency & Climate Change Adaptation Design Statement. By integrating renewable energy sources, improving building fabric efficiency, and promoting biodiversity, the development exemplifies a balanced and sustainable approach to growth.
The proposed measures ensure that the development:
• Reduces reliance on non-renewable resources.
• Enhances the quality of life for residents and the wider community.
• Demonstrates leadership in achieving South Dublin's climate and energy goals.
By prioritising sustainability across economic, social, and environmental dimensions, this project contributes to South Dublin's vision of being an attractive, resilient, and climate-forward county, aligned with the principles outlined in Project Ireland 2040 and the National Planning Framework.

3.2.14. Proposed Strategy and Development

This statement adopts the following approach to ensure compliance with Local and National Planning Policies:
• To propose to improve the building fabric from minimum Part L 2022 Building Regulations requirements.
• To propose to reduce energy consumption and carbon dioxide emissions through passive and energy-efficient measures.
• To propose to reduce energy consumption and carbon dioxide emissions further using on-site renewable energy technologies.
• To propose provision of EV charging points.

3.1. Proposed Development

The proposed development is to be located on a 0.46 hectare site in Firhouse, South Dublin. The development consists of a new residential apartment scheme, designed to align with sustainability objectives outlined in the South Dublin County Development Plan and the South Dublin Climate Action Plan 2024–2029.

The scheme will provide high-quality homes and supporting facilities, including:
• Modern apartments designed to meet Nearly Zero Energy Building (NZEB) standards.
• High-performance building fabric and energy-efficient systems, including Air Source Heat Pumps (ASHP) and Mechanical Ventilation with Heat Recovery (MVHR).
Parking and active travel infrastructure will include:
• 10 active EV Charging Points at handover.
• 50 EV-Ready Spaces with ducting and containment for future expansion.
• Dedicated disabled parking spaces in line with accessibility requirements.
• Secure bicycle parking facilities to encourage sustainable transport options.

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The development also incorporates extensive landscaped green areas designed to enhance biodiversity, improve environmental quality, and provide communal outdoor spaces for residents. Nature-based solutions such as permeable paving, planting, and shade trees will also contribute to climate resilience and resident wellbeing.

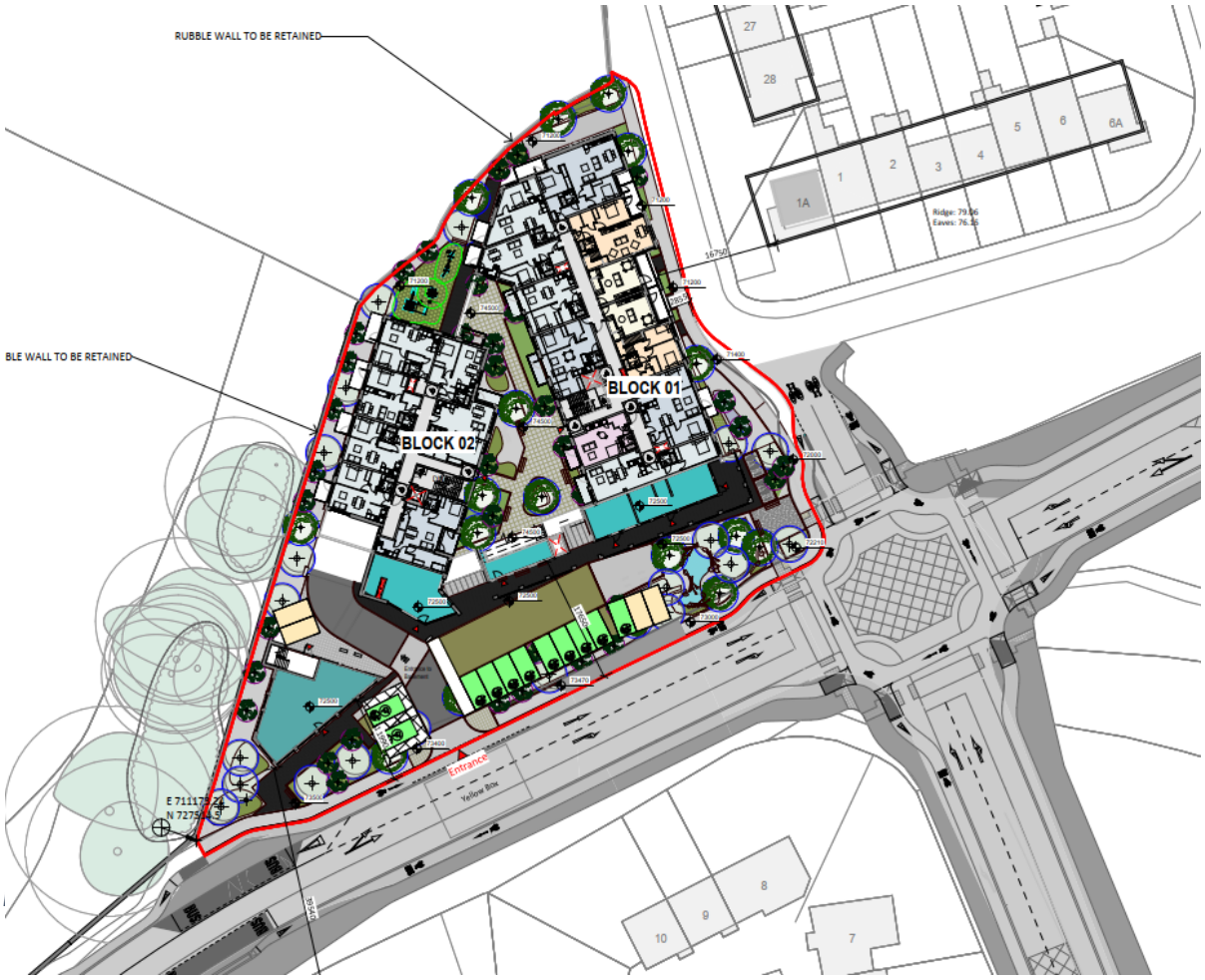

Figure 1. Proposed Site Plan

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4. Building Regulations TGD Part L (2022)

4.2. Buildings other than Dwellings

The proposed development consists of a new build residential apartment scheme, which will be assessed under Part L (Dwellings) 2022 of the Building Regulations.

The requirements regarding conservation of fuel and energy are laid out in Part L of the Second Schedule to the Building Regulations 1997 (S.I. No. 497 of 1997) as amended and the European Union (Energy Performance of Buildings) Regulations 2021 (S.I. No. 393 of 2021).
For new dwellings, compliance with Part L of the Second Schedule to the Building Regulations is achieved as follows:
L1. A dwelling shall be designed and constructed so as to ensure that the energy performance of the building is such as to limit the amount of energy required for the operation of the dwelling and the amount of Carbon Dioxide (CO_2) emissions associated with this energy use insofar as is reasonably practicable.
L3. For new dwellings, the requirements of L1 shall be met by:
a. Providing that the energy performance of the dwelling is such as to limit the calculated primary energy consumption and related CO_2 emissions to a Nearly Zero Energy Building (NZEB) level insofar as is reasonably practicable, when both energy consumption and CO_2 emissions are calculated using the Dwelling Energy Assessment Procedure (DEAP) published by the Sustainable Energy Authority of Ireland.
b. Providing that the nearly zero or very low amount of energy required is covered to a very significant extent by energy from renewable sources produced on-site or nearby (e.g., solar PV, heat pump renewable fraction).
c. Limiting the heat loss and, where appropriate, availing of the heat gains through the fabric of the dwelling.
d. Providing and commissioning energy-efficient space heating systems, hot water systems, and ventilation systems, with effective controls.
e. Ensuring that the dwelling is appropriately designed to limit the need for cooling and that installed systems (e.g., MVHR) are energy efficient, appropriately sized, and adequately controlled.
f. Limiting the heat loss from pipes, ducts, and vessels used for the transport or storage of heated water or air.
g. Providing energy-efficient artificial lighting systems and adequate control of these systems.
h. Providing to the dwelling owner/occupier sufficient information about the dwelling, the fixed building services, controls, and their maintenance requirements so that the dwelling can be operated in such a manner as to use no more fuel and energy than is reasonable.
The European Union (Energy Performance of Buildings) Regulations 2021 (S.I. No. 393 of 2021), insofar as it relates to new dwellings, provides as follows:

Regulation 5
a) A new dwelling shall, where technically and economically feasible, be equipped with self-regulating devices for the separate regulation of the temperature in each room or, where justified, in a designated heated zone of the dwelling.
e) A residential development, which has more than 10 car parking spaces, shall have installed at least one recharging point and ducting infrastructure (consisting of conduits for electric cables) for at

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least one in every 5 car parking spaces to enable the subsequent installation of recharging points for electric vehicles.

5. Energy Efficient Design Strategy

This section analyses the proposed residential development using an energy hierarchy methodology employed by Lawler Sustainability. The methodology outlined below highlights the steps taken to optimise the proposed design in terms of energy efficiency. It prioritises the "Fabric First" approach, which focuses on optimising the performance of building components and materials before sizing building service systems. Lawler Sustainability consider this methodology to be well recognised both internationally and by many local authorities as an appropriate set of principles to adhere to in developing low-carbon residential neighbourhoods.

1. Passive Design is crucial during the initial stages of building conception for various reasons. Its main goal is to improve energy efficiency and ensure resident comfort while reducing operational costs and environmental impact. By incorporating passive design principles early, the need for costly retrofitting or adjustments during construction or operation can be greatly reduced. Important factors to consider include apartment orientation, insulation levels, airtightness, natural ventilation strategies, and external shading. Addressing these factors from the outset helps avoid expensive fixes later on. A well-executed passive design also provides better indoor environmental quality, including improved thermal comfort, ample daylighting, and enhanced indoor air quality. Considering these elements early enables occupants to experience increased comfort and wellbeing, supporting a healthier and more resilient living environment.
2. Energy Efficient Measures incorporated into the design can further reduce energy consumption and carbon emissions for the development. The following measures have been considered:
   a. The use of mechanical ventilation with heat recovery (MVHR) in apartments,
   b. Air source heat pumps (ASHPs) with high efficiency ratings for space and water heating,
   c. The provision of zonal thermal controls within apartments,
   d. Metering of landlord energy use (HVAC, lighting) with smart controls,
   e. Thermal insulation for pipework and ductwork,
   f. An airtightness target of 3.0 $m^3/hr/m^2$,
   g. The provision of energy-efficient LED lighting, achieving an average luminous efficacy of ≥110 lm/W,
   h. The use of lighting controls, including PIR sensors and occupancy detection in landlord/common areas.
3. Renewable Energy Sources contribute to a greener development by supplying emission-free energy to building services. For Firhouse, roof-mounted solar PV arrays are proposed to generate on-site renewable electricity, helping to meet the TGD Part L Renewable Energy Ratio (RER) requirement and reducing reliance on external supply.

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5.1. Passive Design and Energy Efficiency Measures

The following recommended passive design and energy-saving measures enable the proposed development to achieve compliance with the South Dublin County Development Plan 2022–2028 and provide a strategy to reduce carbon emissions beyond the baseline (Part L minimum requirements) model.

5.2. Building Fabric

The following U-values will be incorporated into the residential development in compliance with Part L (2022 – Dwellings) and aligned with the South Dublin County Development Plan 2022–2028. The external walls, ground floor, roof, and external glazing exceed the minimum requirements of Part L to minimise the heating demands of apartments. This design approach also facilitates the downsizing of heating and ventilation systems, resulting in reduced energy consumption and operational costs.

Table 2. Proposed building fabric performance.

Element	Part L Requirements (W/m²K)	Proposed U-value (W/m²K)
External Wall	0.21	0.20
Ground Floor	0.21	0.18
Flat Roof	0.16	0.15
Windows	1.60	1.20
Personnel Doors	1.60	1.60

In addition to the above, the proposed glazing details will have a g-value of 0.44 to help with minimising the amount of solar gain penetrating into apartments, thus reducing the cooling demand and improving resident comfort.

5.3. Energy Efficiency Measures

In conjunction with the passive design measures detailed above, the development incorporates the following energy efficiency strategies, ensuring alignment with the South Dublin County Development Plan's objectives for decarbonisation and sustainability:
Installation of energy-efficient LED lighting systems, achieving a minimum average luminous efficacy of ≥110 lm/W.

- Integration of lighting controls, including PIR sensors and occupancy-based dimming, to minimise unnecessary energy usage in landlord/common areas.
- Implementation of zonal thermal controls in apartments, allowing precise heating adjustments and improved energy management.
- Enhancement of thermal insulation for pipework and ductwork to prevent heat loss or gain during energy transfer.

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Utilisation of mechanical ventilation with heat recovery (MVHR) systems in apartments, capable of achieving heat recovery efficiencies of up to 85%, significantly reducing heating energy demand.

- Installation of smart metering systems for landlord HVAC and lighting to monitor and optimise energy usage.
- Improved air-tightness, targeting an air permeability rate of 3.0 m³/hr/m², ensuring minimal heat loss through the building envelope.

These measures collectively ensure the proposed residential development exceeds regulatory requirements, reduces its carbon footprint, and aligns with South Dublin's commitment to energy-efficient, low-carbon housing.

4.4. Renewable Energy Sources

A range of renewable and low/zero carbon technologies have been assessed for implementation into the development and are addressed in the following table. The following technologies are assessed considering the generation of on-site renewable energy and their suitability to the residential scheme.

Table 2. Renewable energy technology feasibility assessment

Type of Technology	Feasibility Assessment	Feasible?
<u>Biofuel Boilers</u>  	Biofuel boilers are specifically designed to burn either solid biomass or liquid biofuel in order to heat water or raise steam. This system can be used for space heating or DHW supply. Biofuel boilers are not proposed for use within this Development for the following reasons: 1. The storage requirements for the biofuel would require a large plant space with an auxiliary storage facility to allow for a two-week period where delivery of fuel might not be available. 2. Biomass boilers generate Nitrogen Oxides (NOx) and particulates (PM10) which would affect air quality within the populated area. <u>Land Use</u> Large volumes of storage are required for fuel at ground level with sufficient vehicular access. <u>Noise</u> Noise levels are generated by the operation of the biofuel boiler and associated deliveries of the biofuel. The plant room enclosure would have to be attenuated to acceptable levels imposed by the planning and Acoustician recommendations.	No

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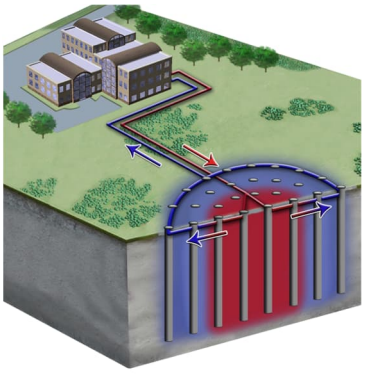
Small Scale Wind Turbines 	Wind turbines convert the kinetic energy in the wind into mechanical energy which is then converted into electricity. Wind turbines can provide electrical power either directly to a load or via a battery system. Wind turbines are not proposed for use within this Development for the following reasons: 1. Noise pollution from wind turbines can be significant within a few hundred metres. 2. Wind turbines situated at low heights could create a strobe or flicker effect. Land Use The site plans demonstrate that there may be space available for the allocation of a suitably sized wind turbine but would require further investigation. Noise Noise levels are generated by the rotating blades; these noise levels will vary dependant on wind velocity and will need to be in acceptable levels imposed by planning and Acoustician recommendations.	No
Ground Source Heat Pumps 	Space heating and cooling can be provided by circulating water heated or cooled directly by the ground or via subterranean water. Ground water cooling using aquifers makes use of the relatively stable ground/water temperature which can be available at temperature range of 10-14°C. Ground Source Heat Pumps (GSHP) are not proposed for use within the development for the following reasons: 1. The installation of GSHP for this development would involve extensive excavation works. Land Use This installation would require Environmental Protection Agency approval (if an open loop system connecting to an aquifer is selected). Ground and hydrology analysis would be required to investigate if favourable conditions exist. Noise There are no noise issues generated by this technology.	No

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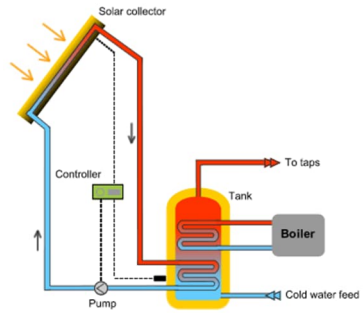
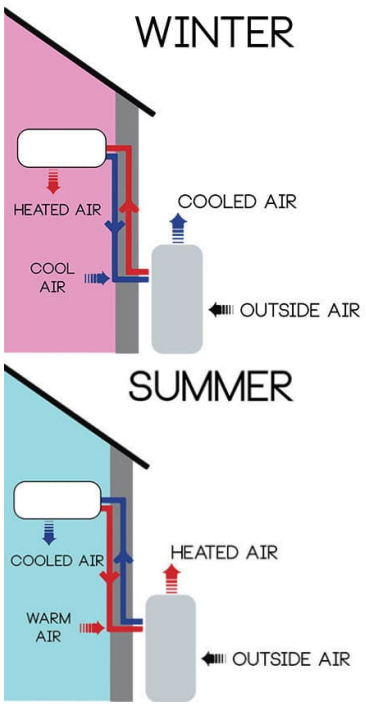
Solar Water Heating 	Solar Water Heating (SWH) systems use radiant energy from the sun to heat water. Systems comprise of a roof mounted heat collector piped to a coil located within a hot water storage cylinder. Solar Thermal Panels can be proposed for use within this Development. However, it is proposed that the electrical demand of the building will outweigh the demand for hot water. Hence, solar PV panels are proposed in lieu of solar thermal panels. 1. The hot water demand for the current development is low, therefore the panel area required would be small and the installation and maintenance costs outweigh the savings. Land Use Roof space is required for the installation of solar panels, optimum installation is south facing at an angle of 30 degrees. Noise Noise levels are generated by pumps at roof level, these are insignificant so should pose no issue.	No
Air Source Heat Pumps 	An Air Source Heat Pump (ASHP) extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can extract heat from the air even when the outside air temperature is as low as -15°C. ASHPs are proposed for use within the Development to provide heating and cooling for the following reasons: 1. They are ideally suited to serve the cooling requirement of the Development during periods when they may require heating or cooling. The times when cooling is required may differ for different spaces depending on their use, occupancy period and levels, the operation of individual air source heat pumps would allow individual control and can be efficiently accommodated within each building design. 2. Air-to-Air or Air-to-Water applications can be used to suit the future tenant's bespoke environmental requirements. 3. The heat pump units can be configured to provide internal heat reclaim from dissimilar	Yes

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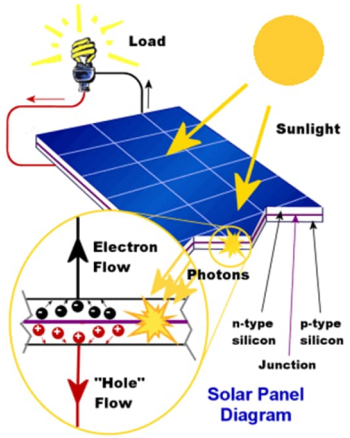
	environmental zones, reducing energy consumption and carbon emissions. 4. ASHP can be easily accommodated into the new design and plant layouts. ASHPs will be utilised in the Development as they are the most efficient way to meet the heating and cooling demands of the Development. Furthermore, ASHPs contribute to the Development carbon savings. <u>Land Use</u> ASHPs can be installed on ground mounted, roof mounted, or wall mounted frames. When installing ASHPs, there are various factors to consider; Heat Pumps should be positioned to provide shelter from high winds which can reduce efficiency by causing defrost problems and be kept free from leaves and debris. <u>Noise</u> Noise levels are generated by fans, and compressors causing vibrations. The noise levels are dependent on manufacturer and vary accordingly, these will need to be in acceptable levels imposed by planning and Acoustician recommendations.	
<u>Photovolatic Panels</u>  	Photovoltaic (PV) panels convert sunlight directly into DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases silicon. Mono-crystalline PVs are proposed for use within the development, for the following reasons: 1. The roof space is free from any over-shading from surrounding buildings. 2. PVs are a low maintenance technology. 3. They provide a visible contribution to the public, promoting the use of renewable technology. <u>Land Use</u> There are no land use issues or adverse visual impacts as the PV panels are roof mounted. <u>Noise</u> There are no noise issues generated by this technology.	No

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5.4. Targeted Building Energy Ratings (BER)

The proposed development is expected to achieve a BER of A2 & A3.

6. Sustainable Environment Infrastructure

6.2. Light Pollution

All site light fittings proposed for this residential development are LED fittings. There is zero upward light ratio from LED lighting, with direct downward light limited to task-specific levels, reducing any light spill from the fixtures. LED lighting will be dimmable and capable of trimming during late hours, thereby reducing disturbance to wildlife or neighbouring residents at night.

The Design Team includes specialist consulting engineers who use lighting simulation software such as Dialux and Relux to model car park areas and communal external spaces, assessing potential excessive light, bounce, or spill. The design adheres to the following Standards and outdoor lighting guides:

a) BS EN 12464-2:2007 'Lighting of Work Places – Part 2 – Outdoor Workplaces'
b) BS 5489-1 (2012) – Code of practice for the Design of Road Lighting – Lighting of roads and public amenity areas
c) Guidance note for the Reduction of Obtrusive Light – GN01:2011, Institute of Lighting Professionals (ILP)
d) Society of Light and Lighting (SLL) – Lighting Handbook 2012
e) CIBSE Environmental considerations for External Lighting – Factfile no.7 (2003)

Table 1 – Environmental Zones

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty etc
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

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Table 2 – Obtrusive Light Limitations for Exterior Lighting Installations – General Observers						
Environmental Zone	Sky Glow ULR [Max %][1]	Light Intrusion (into Windows) E_v [lux] [2]		Luminaire Intensity I [candelas] [3]		Building Luminance Pre-curfew [4]
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average, L [cd/m²]
E0	0	0	0	0	0	0
E1	0	2	0 (1*)	2,500	0	0
E2	2.5	5	1	7,500	500	5
E3	5.0	10	2	10,000	1,000	10
E4	15	25	5	25,000	2,500	25

Figure 2. Guidance notes for the reduction of obtrusive light (Source: GN01:2011)

6.3. EV Charging Points

In accordance with the EU Energy Performance of Buildings Directive (2021), residential developments with more than ten car parking spaces are required to provide at least one operational EV charging point and ducting infrastructure for one in every five spaces to enable future installation of EV chargers.

The proposed Firhouse development includes a total of 120 car parking spaces, distributed as follows:

- 10 EV Charging Points (operational).
- 50 EV-Ready Spaces with pre-installed ducting infrastructure.
- 10 Disabled Spaces.

Dedicated Bicycle Parking Facilities to encourage active travel and sustainable commuting options.
This provision exceeds the minimum EU Directive requirements, supporting South Dublin County Council's goals for sustainable, future-proof transport infrastructure and aligning with the South Dublin Climate Action Plan 2024–2029.

6.4. Energy Efficiency and Climate Change Adaption

IS 399:2014 ''Energy Efficient Design management'' is a management system standard developed by SEAI and NSAI to ensure buildings are designed with operational lifecycle costs and energy management in mind. This is achieved by investing in energy-efficient technologies and practices at the early design stage.

This approach has been further developed through the SEAI pilot programme known as EXEED (Excellence in Energy Efficient Design). The Firhouse residential development reflects these principles, ensuring that energy efficiency, low-carbon systems, and climate adaptation measures are embedded into the project design and delivery, consistent with South Dublin County Council's climate resilience objectives.

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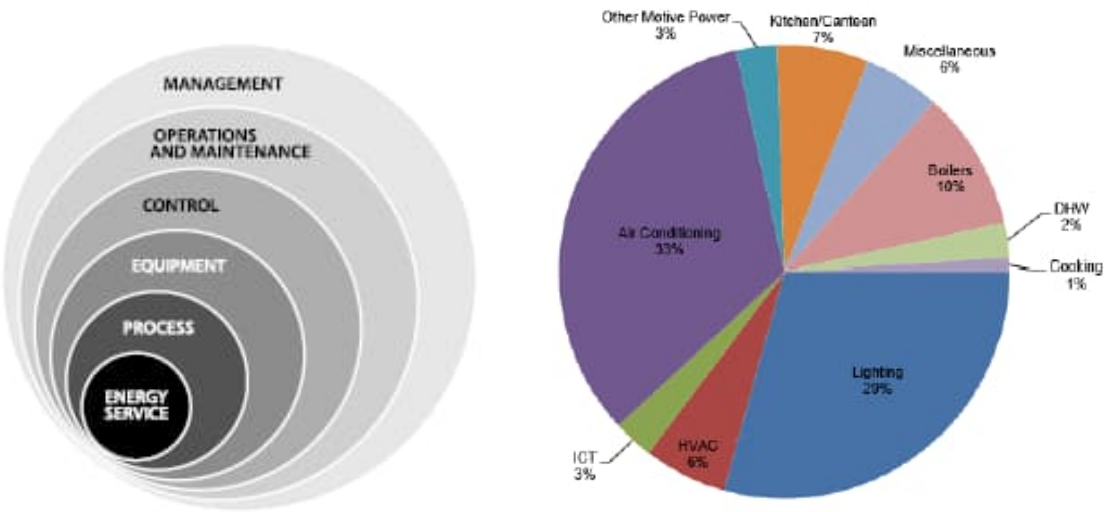

Figure 3. Energy Efficient Design Venn Diagram and Typical Energy Balance Study (Source: IS 399:2014)

This Development has been assessed by Mechanical & Electrical Consulting Engineers to implement the best energy savings in early design. The Development uses the latest technologies in their lighting, air conditioning units and heating. The Development uses fabric materials with low u-values and air tightness is tested to a high standard. The design team recognizes the benefits of early investment in energy efficient practices and appliances, to reduce energy costs of the development. Areas of high energy usage are targeted in early design by preventing the need for these in taking advantage of natural lighting and ventilation and using the best technology such as LEDs and presence and dimming detection.

The following measures will be implemented to maximise energy efficiency and reduce carbon emissions in the development:

- Energy Efficient Lighting internal and external: The building will contain LED lighting throughout. The LED lighting design offers approx. 30% cost and energy savings over conventional lighting (if utilising fluorescent or metal halide lighting). Using a minimum of 110 lm/circuit watts for general lighting and 100 lm/watts for display lighting.
- Heat recovery in the HVAC system: Outgoing air will heat incoming air and vice versa in the summer months. Systems can have efficiencies of up to 80%.
- Presence Activity: Presence detection (PIRs) in store back areas, store rooms, bathrooms will reduce energy consumption by switching off power in unoccupied rooms.
- Heat Pumps: High Efficiency air source heat pumps for Heating and Cooling of the Public House and Apartments with Seasonal Coefficient of Performance (SCOP) as high as 4.00 for Heating and Seasonal Energy Efficiency Ratio (SEER) as high as 6.40 for Cooling.
- U-Values and Air Tightness: Levels improve retention of heat within the space thus reducing heat requirement - As per previous construction specifications and in line with TGD Part L 2022.
- Water Efficient Fixtures: Water efficient fixtures and fittings in the building will reduce the need for excess water use.

LAWLER SUSTAINABILITY

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7. Conclusion

The design team has prioritised energy efficiency and sustainability from the earliest stages, recognising the importance of reducing environmental impacts associated with daily residential operations. These efforts align with the sustainability objectives outlined in the South Dublin County Development Plan 2022–2028 and the South Dublin Climate Action Plan 2024–2029.

The development incorporates the following measures, ensuring environmental, social, and economic viability while implementing robust climate adaptation strategies. These commitments are summarised below:

SDCC Development Plan Reference	Measure(s) Taken	Outcome(s)
CDP: 2.1, 2.2, 18.6	The development complies with and exceeds the minimum requirements of TGD Part L 2022 (Dwellings).	Apartments are targeting a BER of A2/A3, ensuring high energy performance and reduced operational costs.
CDP: 2.5, 2.14	High-efficiency air source heat pump (ASHP) technology is proposed for space and water heating. Roof-mounted solar PV arrays are included to generate renewable electricity.	Supports decarbonisation and the transition to low-carbon residential living.
CDP: 2.15 11.10	Provision of 10 operational EV charging points and additional EV-ready spaces with pre-installed ducting.	Promotes sustainable transport, supports EV adoption, and reduces transport-related emissions.
CDP: 2.18 2.20	Solar PV proposed at roof level to generate onsite renewable energy.	Reduces reliance on external grid supply, increases resilience, and promotes renewable energy use.
CDP: 4.6 6.1 6.25 6.26 10.1	Energy-efficient residential design incorporating fabric-first construction, ASHPs, PV, and EV infrastructure. Landscaping includes SUDS, native planting, and biodiversity features.	Enhances environmental quality, improves resident wellbeing, and supports local ecosystems.
CDP: 7.7	Low-carbon residential development with green landscaping, biodiversity planting, and renewable energy systems.	Contributes to sustainable neighbourhood development and community resilience.
CDP: 11.42	All site lighting designed with LED fittings, zero upward light ratio, and dimmable task lighting.	Minimises light pollution, protects ecology, and ensures safe, energy-efficient illumination.