Climate Action Energy Statement

Residential Development at
Church Fields East, Mulhuddart, Dublin 15

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This document has been prepared and checked in accordance with Waterman Groupôs IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015)

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Comments

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Content

1. Introduction

This Climate Action Energy Statement has been prepared by Waterman Moylan as part of the planning documentation for a proposed residential development at Church Fields East in response to CAP 12 and DMSO261 in the Fingal County Development Plan 2023-2029.

The proposed development relates to a site of c.5.52 hectares at Church Fields East, Mulhuddart, Dublin 15. The development site is located south of Damastown Avenue; west of Church Road; east of previously permitted residential development at Church Fields (Planning Reg. Ref.: PARTXI/012/21); and north of a permitted linear park (Eastern Linear Park Planning Reg. Ref.: PARTXI/012/21), in the townland of Tyrrelstown, Dublin 15. The proposed development seeks the construction of 217 no. residential units (ranging from 2 ï 4 storeys in height) in a mixed tenure development, comprising of 121 no. houses and 96 no. apartments. The development will also include the provision of car parking, cycle parking, new pedestrian / cycle links, services, drainage and attenuation, and all associated site and infrastructural works.

This report identifies the energy standards with which the proposed development will have to comply and also sets out the overall strategy that will be adopted to achieve these energy efficiency targets.

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

This report also will also address the following Polices of the Fingal County Development Plan 2023-2029 as follows:

CAP 11 **Climate Adaptation Actions in the Built Environment**

(Addressed in section 6)

CAP 12 **Climate Action Energy Statements**

(Addressed in all sections of the report)

CAP 13 **Energy from Renewable Sources**

(Addressed in section 4)

CAP 18 **Waste Heat, District Heating and Decentralised Energy**

(Addressed in section 4)

CAP 19 **Supporting the Potential of District Heating in Fingal**

(Addressed in section 4)

CAP 20 **Capture and Utilisation of Waste Heat**

(Addressed in section 4)

2. Building Regulations Part L 2022 Dwellings

Compliance with Building Regulations *Part L 2022 Dwellings* is broken down into six distinct categories, known as Regulation 8; 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 8 Part (a)

The regulation requires that:

> *Providing that the energy performance of the building is such as to limit the calculated primary energy consumption and related carbon dioxide (CO2) to that of a nearly zero energy building within the meaning of the Directive insofar as is reasonably*

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 70% in energy consumption and 65% in carbon emissions are achieved. The baseline against which this reduction is to be measured is considered to be a dwelling which is constructed to perfectly comply with the 2005 version of Building Regulations Part L.

The ratio of the energy consumed by the proposed dwelling to a similar dwelling constructed to 2005 energy efficiency standards is referred to as the ñEnergy Performance Co-efficientò

2.2 Regulation 8 Part (b)

The regulation requires that:

> *Providing that, the nearly zero or very low amount of energy required is covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby;*

This requires that the all new dwellings are provided with a renewable energy source. The regulations state that 20% of the total energy consumed within the dwelling must be provided from renewable thermal sources (solar thermal, biomass, heat pumps) or renewable 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 considered to be the waste heat which is generated as a by-product of the electricity produced. Specific calculation methods are set out within TGD *Part L 2022 Dwellings* which detail how compliance should be demonstrated.

2.3 Regulation 8 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 minimise heat loss from the building and that the air permeability of the structure limits the unwanted passage of air into the building.

Typical compliant U-Values are as follows.

Pitched roof	0.16 W/m^{2}K
Flat roof	0.20 W/m^{2}K
Walls	0.18 W/m^{2}K
Floor	0.18 W/m^{2}K
Windows	1.4 W/m^{2}K

The u-values of individual elements can be relaxed if required provided that compensatory measures are taken on other elements and that the overall area weighted u-value for the entire dwelling is the same as it would have been if all individual elements had complied.

The thermal bridging details of junctions in the envelope of the building (floor-wall; wall-window; wall-roof, etc) must also be designed and constructed in accordance with the guidance set out in Limiting Thermal Bridging and Air Infiltration ï Acceptable Construction Details

Every dwelling must also be subjected to an air pressure test to determine the air tightness. All dwellings must achieve and air tightness of less than 5m^3/m^2/hour when tested at 50 Pascals. In multiple dwelling developments with repeating apartment types, testing can be conducted on a representative sample of units in accordance with Table 1.5.4.3 of TGD *Part L 2022 Dwellings*.

2.4 Regulation 8 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 100m^2) 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 8 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 dwelling. Instructions on how to control the heating & hot water systems based on time and temperature requirements.

2.6 Requirements for Common Areas

Section 0.1.2.3 requires that:

> *Where a new dwelling forms part of a larger building, the guidance in this document applies to the individual dwelling, and the relevant guidance in Technical Guidance Document L - Conservation of Fuel and Energy – Buildings other than dwellings applies to the non-dwelling parts of the building such as common areas (including common areas of apartment blocks), and in the case of mixed-use developments, the commercial or retail space.*

This requires that the common areas of the apartment blocks are design to meet *Part L 2022 BOTD*

for Buildings Other Than Dwellings and will require that a portion of the energy demand for the common areas is met by a renewable energy source.

2.7 S.I No 393 of 2021 - Regulation 5 Part (e)

The regulation requires that:

> *For a new building (containing one, or more than one, dwelling), where there are more than 10 car parking spaces, ducting infrastructure, consisting of conduits for electric cables, should be provided for every parking space, to enable the subsequent installation of recharging points for electric vehicles where:*
>
> • *the car park is located inside the building, e.g. a basement car park; or*
>
> • *the car park is physically adjacent to the building, i.e. the car park is within the curtilage of the site.*

This requires that ducting provision for the future installation of car charging point be made in all carparks with more than 10 parking spaces associated with multi-unit residential buildings.

3. Building Fabric

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

3.1 Elemental U-Values

The U-Value of a building element is a measure of the amount of heat energy that will pass through the constituent element of the building envelope. Increasing the insulation levels in each element will reduce the heat lost during the heating season and this in turn will reduce the consumption of fuel and the associated carbon emissions and operating costs.

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

U-Values	**Range of Target Values Proposed**	**Part L 2022 (Dwellings) Compliant Values**
Floor	0.10 to 0.18 W/m^{2}K	0.18W/m^{2}K
Roof (Flat)	0.12 to 0.20 W/m^{2}K	0.20 W/m^{2}K
Roof (Pitched)	0.10 to 0.16 W/m^{2}K	0.16 W/m^{2}K
Walls	0.10 to 0.18 W/m^{2}K	0.18 W/m^{2}K
Windows	0.9 to 1.4 W/m^{2}K	1.4W/m^{2}K

3.2 Air Permeability

A major consideration in reducing the heat losses in a building is the air infiltration. This essentially relates to the ingress of cold outdoor air into the building and the corresponding displacement of the heated internal air. This incoming cold air must be heated if comfort conditions are to be maintained. In a traditionally constructed building, infiltration can account for 30 to 40 percent of the total heat loss, however construction standards continue to improve in this area.

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.

In order 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 m3/m2/hr** has been identified for the apartments and houses on the site.

The air permeability testing will be carried out in accordance with BS EN 13829:2001 ôDetermination of air permeability of buildings, fan pressurisation methodô and CIBSE TM23: 2000 ôTesting buildings for air leakageò

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. The Thermal Bridging Factor is used in the overall dwelling Part L calculation, this value can be entered in three different ways:

0.15W/m^2K	Used where the ACDs are not adhered to
0.08W/m^2K	Used where the ACDs are fully adhered to
< 0.08 W/m^2K	Used where the thermal details are thermally modelled and considered to perform better than the ACDs

It is intended that the ACDs will be adhered where suitable benchmarks exist, and that thermal modelling will be carried out for any non-standard junction details within proposed development and that the resultant Thermal Bridging Factor will be less than 0.08W/m2K for houses. For apartments thermal modelling of non-standard details will not be required and the resultant Thermal Bridging Factor will be 0.15W/m2K.

Confirmation will be required from the Architect and/or Contractor that all key junctions in the scheme have been designed and constructed in accordance with the ACDs.

They will require the following:

- List of thermal bridging junctions in the building, noting all key junctions
- Plan, elevation and section drawings identifying all key junctions and the ACD that are designed and constructed in accordance with signed details sheets of all ACDs used.

4. Heat Sources & Renewable Energy Options & Proposals

The following section addresses the policy CAP 13, CAP 18, Cap 19 and CAP 20 of the Fingal Development Plan 2023-2029. Section 4.1 ï 4.6 address CAP 13 and section 4.3 addresses CAP 18, CAP 19 and CAP 20 of the Fingal Development Plan 2023-2029.

All new dwellings must meet overall energy performance levels (as defined by the Energy Performance Coefficient - EPC) and must have a portion of their annual energy demand provided by renewable energy sources.

The renewable energy source 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. The minimum renewable energy contributions defined in *Part L 2022 Dwellings* Part (b) is 20% of the total energy consumption for the dwelling.

Two main fuel sources are generally available for developments of this nature, natural gas and electricity. Each present distinct options for compliance with the new standards. Solutions involving gas as the primary fuel source will typically include a solar technology such as PV panels to meet the renewable energy requirements while solutions relying on electricity will include heat pump technology.

The options presented in Sections 4.1 to 4.3 below set out three possible means of complying with *Part L 2022 Dwellings* for the apartments. Each is based on the building fabric performance levels identified in Table 1 in Section 3. Section 4.4 sets out the typical means for complying with *Part L 2022 BOTD* for the landlord areas. Section 4.5 and 4.6 sets out the possible means of complying with *Part L 2022 Dwellings for the houses.*

The final selection and combination of technologies will most likely be selected from these options based on a more in-depth technical and financial appraisal of the technologies which will be carried out during detailed design.

4.1 Apartments Option 1 – Individual Plant with Exhaust Air Heat Pumps

The following section addresses Cap 13 and complies with objective DMSO261 by evaluating the possible low carbon and energy heating solutions for the apartments.

Exhaust Air heat pumps (EAHPs) operate in a very similar manner to the more conventional air source heat pumps and utilise grid supplied electricity to extract thermal energy from a heat source, in this case, the internal air within the apartment. The internal air is extracted from kitchens and wet rooms and is drawn into the heat pump via ductwork in the ceiling void. The heat pump extracts heat from this air before expelling it from the apartment.

As noted in Section 2.2 above, the electricity consumed is not renewable energy but the efficiency at which a heat pump operates allows a significant portion of the heat delivered to the dwelling be considered as renewable.

There are a number of manufacturers offering products of this type and the certified seasonal efficiencies of some models can exceed 450% in heating mode and 170% to 190% in hot water mode. These efficiencies can deliver Part L 2022 compliance in most circumstances but in some instances may need supplementary PV panels in order to meet the required energy targets.

There is no requirement for a separate Mechanical Extract Ventilation (MEV) systems when an exhaust air heat pump is used as the heat pump draws the air from all wet rooms in the same manner as an MEV system would. The fan will run continuously to ensure that the minimum ventilation rates are maintained and the supply air to the dwelling is provided through trickle vents in each habitable room.

4.2 Apartments Option 2 – Electric Heaters, Hot Water Heat Pumps, Heat Recovery Ventilation & PV Panels

The following section addresses Cap 13 and complies with objective DMSO261 by evaluating the possible low carbon and energy heating solutions for the apartments.

This approach includes the provision of electric storage and/or convector heaters in the living & sleeping areas to meet all of the space heating requirements with electric towel rads provided in main bathrooms and en-suites.

The hot water demand is met by a hot water heat pump which utilise grid supplied electricity to extract thermal energy from a heat source in a similar manner to an Exhaust Air Heat Pump. The heat pump is ducted directly to the external façade through insulated supply & exhaust ductwork and uses external air for the hot water needs. It can use up to 3 times less electricity than direct acting water heaters and produces renewable energy to aid Part L compliance.

Heat Recovery Ventilation would then be provided in order meet the ventilation needs of the apartments. 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 uses the heat recovered to raise the temperature of the incoming air stream leading to improved overall efficiency.

PV panels are also then needed to improve the overall renewable energy contribution and improve the overall energy performance of the dwellings. Generally, 1 or 2 PV panels will be required for each apartment.

4.3 Apartments Option 3 - District Heating/Waste Heat

The following section address CAP 13, 18, 19 & 20 and complies with objectives DMSO258 and DMSO259 by assessing the feasibility of district heating and utilisation of waste heat and objective DMSO261 by evaluating the possible low carbon and energy heating solutions for the apartments.

This approach would involve the generation of heat in a central location on the site and the distribution of this heat to each apartment via a network district heating pipework. The central plant used to generate the heat could include Air Source Heat Pumps, Combined Heat and Power (CHP) plan and high efficiency gas fired condensing boilers.

A CHP unit uses gas as its energy source to create electricity which can be utilised within the proposed development. This process of creating electricity results in the generation of ñwaste heatò which can then be used to meet a proportion of the heating and hot water demands of the housing development. Since the waste heat is captured it can be considered to be renewable energy and therefore contributes towards the overall 20% renewable energy requirement.

The large Air Source Heat Pumps (ASHPs) operate in the same manner as the smaller units incorporated in houses or apartments but at a larger scale, with outputs of up to 90kW. The heat generated is fed in to the district heating network from where it can be supplied to the apartments. Typically, approximately 40% to 50% of the heat supplied is considered to be renewable energy.

The gas fired boilers act to top-up the heat produced by the CHP and heat pumps by raising the temperature of district heating system to the required level and by supplementing the overall heat production in the coldest periods of the year. Averaged over the year, the gas boilers would meet less than 30% of the total heat demand.

Heating pipework would be installed throughout the scheme to distribute the heat generated in the plant room throughout the apartment development, serving each apartment via a heat interface unit (HIU). The HIU would both control and meter the consumption of heat and hot water within each individual dwelling allowing occupants to set the times they need space heating and ensuring they would be charged accordingly.

The no. of apartments in this scheme is below the threshold where District/Waste Heat Networks become a viable solution. Generally, district heating becomes commercially viable in high density schemes within

excess of 200 apartments. This scheme includes 96 apartments which are split between 3 blocks and the distance between 2 of the blocks is approximately 230m. The relatively low density of the site and the capital costs associated with the central plant and below ground heating pipework would render a district heating network unviable for this site.

4.4 Apartment Corridors/Landlord Areas

The following section addresses CAP 13 and complies with objective DMSO261 by evaluating the possible low carbon and energy heating solutions for the landlord areas.

In accordance with the requirements of *Part L 2022 Dwellings*, the common areas within the apartment blocks are required to meet the requirements of Part L 2022 for ñBuildings Other Than Dwellingsò Under *Part L 2022 BOTD*, a portion (10% to 20%) of the energy demand of the common areas must be met by a renewable energy source. The energy demand within these spaces will be exclusively provided by electrical energy (lighting, space heating & lifts etc) so a photovoltaic array would be best suited to meet this renewable energy demand. Generally, 10 to 15 PV panels will be required for an unheated landlord core.

4.5 Houses Option 1 - Air Source Heat pumps

The following section addresses CAP 13 and complies with objective DMSO261 by evaluating the possible low carbon and energy heating solutions for the houses.

Air source heat pumps (ASHPs) utilise grid supplied electricity to extract thermal energy from a heat source, in this case, the external ambient air. While the electricity consumed is obviously not renewable energy, the efficiency at which a heat pump operates allows a significant portion of the heat delivered to be considered as renewable energy. The amount of heat considered to be renewable is determined by the efficiency of the heat pump and the ñprimary energy conversion factoròfor grid supplied electricity. Typically, approximately 40% to 50% of the heat supplied is considered to be renewable energy.

Air source heat pumps require an indoor and an outdoor component. The outdoor unit is the evaporator which extracts the thermal energy from the ambient air while the indoor unit typically includes the heating buffer tanks and the hot water cylinder for the dwelling. The outdoor unit is typically located in the back garden of a dwelling.

In recent years, the design of ASHPs has improved bringing about higher efficiencies and reduced costs. This, in turn, has led to an increase use of this technology in large scale housing developments. Certified seasonal efficiencies of some models can exceed 500% meaning that the use of this technology can easily deliver compliance with *Part L 2022 Dwellings*.

4.6 Houses Option 2 - Electric Heaters, Exhaust Air Hot Water Heat pumps & PV

The following section addresses CAP 13 and complies with objective DMSO261 by evaluating the possible low carbon and energy heating solutions for the houses.

This approach includes the provision of electric storage and/or convector heaters in the living & sleeping areas to meet all of the space heating requirements with electric towel rads provided in main bathrooms and en-suites.

The hot water demand is met by an exhaust air hot water heat pump which utilise grid supplied electricity to extract thermal energy from a heat source, in this case, the internal air within the apartment. The internal air is extracted from kitchens and wet rooms and is drawn into the heat pump via ductwork in the ceiling void. The heat pump extracts heat from this air before expelling it from the apartment.

There is no requirement for a separate Mechanical Extract Ventilation (MEV) systems when an exhaust air heat pump is used as the heat pump draws the air from all wet rooms in the same manner as an MEV

system would. The fan will run continuously to ensure that the minimum ventilation rates are maintained and the supply air to the dwelling is provided through trickle vents in each habitable room.

PV panels are also then needed to improve the overall renewable energy contribution and improve the overall energy performance of the dwellings. Generally, 5 to 7 PV panels will be required for each House.

5. Electric Vehicle Charging

All new commercial buildings (residential and non-residential) must make a provision for charging electric vehicles. This applies where more than 10 parking spaces are provided.

For residential buildings, the regulations state that future provision, in the form of cable ducting and capacity on distribution boards and meters etc. be made for at all parking spaces associated with multi-unit developments with more than 10 parking spaces.

The proposed multi-unit residential development includes a total of 306 parking so future provision for all spaces will be required and 20% of spaces will incorporate EV charging points. Since the development will also include Part M compliant accessible spaces, the location of the charging point will be such that it can serve one accessible parking space and one standard parking space.

6. Climate Change Adaptation Actions in the Built Environment

The following measures have been implemented in the design to address policy CAP 11 of the Fingal Development Plan 2023-2029. This is a summary of the measures with separate reports addressing each measure in more detail.

6.1 On-site Construction

The construction and waste management proposals for the scheme are comprehensively addressed in the Resource Waste Plan submitted with this planning application, the measures below are provided as a summary of the recommendations contained within the plan.

The demolition arising on site will consist of the following expected demolition waste: -

- MADE GROUND (sample taken on a mound of fill on the site) firm grey-brown sandy slightly gravelly CLAY with low cobbles content.
- COHESIVE DEPOSITS either firm grey brown sandy slightly gravelly CLAY or stiff black slightly sandy gravelly CLAY with low cobbles content.

Only after in-situ reuse and recycling options have been fully considered will the demolition waste will be disposed of off-site by licensed waste contractors.

During the construction phase of the project, proposals for the minimisation / reuse and recycling of construction arisings will be implemented as set out in the Resource Waste Plan including:

- In the case of topsoil, careful planning and on-site storage can ensure that this resource is reused on-site as much as possible
- Earthworks for road, drainage and structure foundation forms a major part of the quantity of waste that will be generated by the construction phase of this project. To optimise the impact of the generation of surplus material due to excavation every attempt to optimise cut and fill volumes will be undertaken
- The treatment of excavated materials (cement / lime stabilisation) where necessary to allow their reuse as fill materials, further reducing the need to remove these materials to landfill, and import stone and concrete materials
- Appropriate material ordering to minimise waste
- Reuse of Concrete blocks, engineering bricks and clay bricks that are surplus can be broken up and used for hardstanding areas.
- It is envisaged that most of the recyclable waste on site will come from house construction in a form of wood and metal. Any excess wood or metal generated on site will be kept segregated and removed off site to a licenced recycling facility.

6.2 Long-term management

Encouraging the use of public transport by using the principles of environmental assessment methodologies to reduce the reliance on cars and encourage a shift to less carbon intensive modes of transport.

All in-curtilage parking spaces will be capable of being fitted with EV charging points. All off-curtilage spaces will be ducted for EV charging, with 20% fitted out from the outset.

6.3 Transport

The traffic and transport proposals for the scheme are comprehensively addressed in the Traffic & Transport Assessment report submitted with this planning application, the measures below are provided as a summary of the recommendations contained within the assessment.

- Car and Bicycle parking for the proposed development have been designed in accordance with the requirements set out in the current Fingal Development Plan.
- The subject site is located within reasonable walking time to to bus stops along Ladyswell Road and the R121 Link Road to the South and East of the site, respectively.
- The design of the site, and its location within the Church Fields Area are such that pedestrian and cycling trips are a genuine alternative to private car use.

The use of private cars for daily commuting and for recreational purposes is unavoidable however the potential long term climate impacts of private car use can be off-set by forward planning of electrical vehicle charging infrastructure. Providing ducting & ESB metering capabilities within the scheme will allow for future expansion of electric vehicle charging facilities to meet increasing demand in the short to medium term.

6.4 Environmental Assessment Methodologies

Addressing operational energy use in a manner set out in the preceding sections of this report is a vital component of any construction project however consideration must also be given to other aspects of sustainable design such as water use, material selection and minimising pollutants.

Various assessment methodologies have been developed by organisations such as the Building Research Establishment (BREEAM Methodology) and the US Green Building Council (LEED Certification) to measure the performance of various environmental and sustainable aspects of the design, construction and operation of proposed developments.

The Irish Green Building Council has also developed a similar assessment methodology in recent years which is specifically aimed at residential developments in Ireland. **The Housing Performance Index (HPI)** assessment provides a method for measuring the performance of residential developments against a range of verifiable indicators that are divided into five technical categories.

- Environment
- Economic
- Health and Wellbeing
- Quality Assurance
- Sustainable Location

It allows several levels of achievement based on good, better and best practice. The award of the certificate is based on the overall attainment across all categories.

A decision will be made during detailed design as to whether formal HPI certification will be sought on the project, however, the principles set out within the HPI system will be used as guidance throughout the design process regardless of whether certification is targeted.

6.5 Embodied Carbon

Recent advances in the energy efficiency of buildings have reduced operational energy use to such an extent that the life cycle carbon emissions of a building are actually influenced more by the carbon that is

embodied in the materials and processes used during the construction than it is by the carbon emitted as a result of energy used in the buildings operation. As such, the embodied carbon of a building must now be considered if a construction project is to be considered low carbon or ñet-zeroòcarbon.

Addressing the embodied carbon requires that all the key building element categories (substructure, structure, façade, MEP services) are assessed to identify the optimal solutions in terms of embodied carbon and assess them through a multidisciplinary and holistic approach, considering implications in different areas such as efficiency, cost, programme etc.

The process of design and of material and product selection must include an analysis of the final embodied carbon and comparison with benchmarks to identify the areas that need to be optimised. This process allows the building designers and procurement managers to focus on how to eliminate the impact of the key identified hotspots, through comparative assessments and specification of products that demonstrate low embodied carbon and facilitate the production of the final embodied carbon assessment at the end of the detailed design to identify the expected impact of the Development.

6.6 Sustainable Urban Drainage.

The Surface Water drainage proposals for the scheme are comprehensively addressed in the Engineering Assessment Report submitted with this planning application, the measures below are provided as a summary of the recommendations contained within the assessment.

It is proposed to discharge the surface water from the proposed development, via a series of SuDS features and downstream defender manholes, into the existing downstream stormwater system. The methodology involved in developing a Storm Water Management Plan for the subject site is based on recommendations in the Greater Dublin Strategic Drainage Study (GDSDS) and in the SuDS Manual. It is proposed to incorporate a Storm Water Management Plan though the use of various SuDS techniques.

Based on three key elements, Water Quantity, Water Quality and Amenity, the targets of SuDS train concept will be implemented in the design. The following SuDS measures are proposed for the site:

- **Source Control**

  the provision of permeable paved driveways, rain garden planters for each residential property, green roofs at apartment blocks, roadside swales & infiltration trenches.
- **Site Control**

  the use of raingarden, swales, and an attenuation system to provide attenuation throughout the site
- **Regional Control**

  A flow restriction device will be used to limit the outflow to a maximum rate of 3.7l/s/ha (13.7x4.54 = 16.8l/s) as permitted by FCC.

  A Class 1 petrol interceptor will be provided before the surface water outfall.

7. Proposed Solutions and Conclusions

To address Policy CAP 12 and DMSO261 of the Fingal Development Plan 2023-2029 a comprehensive evaluation of the building fabric and the energy systems has been carried out on the development at Church Fields.

This evaluation considered several different energy systems evaluating both central and individual plant for both heating and renewable energy systems. The recommendations produced from this evaluation are shown below. All of which provide low carbon, low energy heating solutions.

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

The proposed approach to achieving Part L Compliance will be based on a combination of the solutions below once a detailed analysis has been completed at detailed design stage. A final decision will be made once capital costs, renewable targets and regulation compliance have all been compared to find the most appropriate solution.

The most likely solutions that will be implemented for each building typology are set out below, each of which demonstrates the preferred method of compliance with DMSO261:

7.1 Apartments

- Meet or exceed minimum U-Value standards identified in *Part L 2022 Dwellings*
- Achieve air tightness standards of 3m^3/m^2/hr
- Ensure thermal bridging details are designed to achieve thermal bridging factors of 0.15W/m^2K.
- Provide an appropriate combination of technologies to ensure energy consumption is in line with *Part L 2022 Dwellings* requirements. This will include individual plant in each apartment (exhaust air heat pumps or electric heaters and hot water heat pumps).
- Install centralised mechanical ventilation systems to ensure adequate ventilation rates are achieved in the dwelling which maximising the benefits of the airtight construction.
- To comply with DMSO258 and DMSO259 district heating has been evaluated and has been deemed not suitable for the development.

7.2 Houses

- Meet or exceed minimum U-Value standards identified in *Part L 2022 Dwellings*
- Achieve air tightness standards of 3m^3/m^2/hr
- Ensure thermal bridging details are designed to achieve thermal bridging factors of 0.08W/m^2K or less.
- Provide an appropriate combination of technologies to ensure energy consumption is in line with *Part L 2022 Dwellings* requirements. This will include individual plant in each house (air source heat pumps or electric heaters and hot water exhaust air heat pumps).
- Install centralised mechanical ventilation systems to ensure adequate ventilation rates are achieved in the dwelling which maximising the benefits of the airtight construction.

7.3 Landlord Areas

The most likely overall solution that will be implemented will include the following measures:

- Meet or exceed minimum U-Value standards
- Achieve air tightness standards of 5 $m^3/m^2/hr$
- Provide PV panels to meet Part L renewable contribution requirements (no. of panels will depend on size and if corridor is heated or unheated corridor) (unheated corridor typically 10-15 PV panels)

UK and Ireland Office Locations