PROGRESSIVE ENGINEERING

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

The intention of this report is to identify energy efficiency measures associated with the design, construction and building services of the proposed development at former Central Mental Hospital located in Dundrum, Dublin 14. The proposed development will consist of residential and commercial aspects (full description in section 1.1).

Extensive works were carried out early in the design stages to develop a sustainability strategy which can be carried through to completion. As part of this sustainability strategy, the development is targeting a BER A2 or A3 for all residential buildings. This target will contribute to the development's reduction in energy consumption, carbon emissions and the end users' operational costs. The residential aspects of the proposed development will with TGD Part L 2022 (dwellings), while the commercial aspects will comply with TGD Part L 2022 (Buildings other than dwellings).

1.1 Energy Performance Building Directive / ZEB Regulations

The Energy Performance Building Directive (Recast) EU2024/1275 was updated in 2024. Although this legislation will not be transposed into Irish law for another 1-2 years. The design team will take into consideration of the following updates , including the introduction in the future of the ZEB standards for new buildings, to help future-proof the design.

- the gradual introduction of minimum energy performance standards for non-residential buildings based on national thresholds to trigger the renovation of buildings with the lowest energy performance.
- a binding target to decrease the average energy performance of the national residential building stock by 16% by 2030 in comparison to 2020, and by 20-22% by 2035, based on national trajectories.
- an enhanced standard for new buildings to be zero-emission and the calculation of whole life-cycle carbon for new buildings
- enhanced long-term renovation strategies, to be renamed national Building Renovation Plans
- increased reliability, quality and digitalisation of Energy Performance Certificates with energy performance classes to be based on common criteria
- increased deployment of solar technologies on all new buildings and certain existing non-residential buildings where technically and economically feasible and ensuring that new buildings are solar-ready (fit to host solar installations).
- further roll-out of recharging points for electric vehicles in buildings, removing barriers to their installation, enabling smart charging and introducing measures for bike parking in buildings
- data collection and sharing, to improve knowledge on the building stock and awareness on energy consumption in buildings

Buildings will exceed Nearly Zero Energy Building (NZEB) (or current regulations) requirements for primary energy demand by a minimum 10% to align with EU taxonomy (EPC <0.27).

1.2 Proposed Development

Dún Laoghaire Rathdown County Council, in partnership with The Land Development Agency, is seeking a ten year approval to carry out the following proposed development which is located on a total application site area of c. 9.7 ha, located on the former Central Mental Hospital, Dundrum Road, Dundrum, Dublin 14 and areas of Dundrum Road and St. Columbanus Road, Dublin 14. The subject site is in the immediate setting and curtilage of a number of protected structures, namely the 'Asylum' (RPS No. 2072), the 'Catholic Chapel' (RPS No. 2071) and the 'Hospital Building' (RPS No. 2073).

The development will consist of the construction of a residential scheme of 934 no. dwellings on an overall site of c. 9.7 ha.

The development will consist of the demolition of existing structures associated with the existing use (3,677 sq m), including:

- Single storey former swimming pool / sports hall and admissions unit (2,750 sq m);
- Two storey redbrick building (305 sq m);
- Single storey ancillary and temporary structures including portacabins (618sq m);
- Removal of existing internal sub-divisions/ fencing, including removal of security fence at Dundrum Road entrance;
- Demolition of section of porch and glazed screens at Gate Lodge building (4 sq m);
- Removal of walls adjacent to Main Hospital Building;
- Alterations and removal of section of wall to Walled Garden.

The development will also consist of alterations and partial demolition of the perimeter wall, including:

- Alterations and removal of section of perimeter wall adjacent to Rosemount Green (south);
- Formation of a new opening in perimeter wall at Annaville Grove to provide a pedestrian and cyclist access;
- Alterations and removal of sections of wall adjacent to Dundrum Road (including removal of existing gates and entrance canopy), including reduction in height of section, widening of existing vehicular access, and provision of a new vehicle, cyclist and pedestrian access;
- Alterations and removal of section of perimeter wall adjacent to Mulvey Park to provide a pedestrian and cyclist access.

The development with a total gross floor area of c. 94,058 sq m (c. 93,980 sq m excluding retained existing buildings), will consist of 934 no. residential units comprising:

- 926 no. apartments (consisting of 342 no. one bedroom units; 98 no. two bedroom (3 person) units; 352 no. two bedroom (4 person) units; and 134 no. three bedroom units) arranged in 9 blocks (Blocks 02-10) ranging between 2 and 8 storeys in height (with a lower ground floor to Blocks 02 and Block 10 and Basements in Blocks 03 and 04), together with private balconies and private terraces and communal amenity open space provision (including courtyards) and ancillary residential facilities, including an 130 sq m internal residential amenity area at the Ground Floor Level of Block 3;
- 6 no. three bedroom duplex apartments located at Block 02, together with private balconies and terraces.
- 2 no. 5 bedroom assisted living units and private rear gardens located at Block 02.

The development will also consist of 4,380 sq m of non-residential uses, comprising:

- Change of use and renovation of existing single storey Gate Lodge building (former reception/staff area) to provide a café unit (78 sq m);
- 1 no. restaurant unit (266 sq m) located at ground floor level at Block 03;
- 3 no. retail units (1,160 sq m) located at ground floor level at Blocks 03 and 07;
- 1 no. medical unit (288 sq m) located at ground floor level at Block 02;
- A new childcare facility (716 sq m) and associated outdoor play area located at lower ground and ground floor level at Block 10;
- A management suite (123 sq m) located at ground floor level at Block 10; and
- A new community centre facility, including a multi-purpose hall, changing rooms, meeting rooms, storage and associated facilities (1,749 sq m) located at ground and first floor level at Block 06.

Vehicular access to the site will be from a new signalised access off Dundrum Road to the south of the existing access and the existing access of Dundrum Road will be retained for emergency vehicle, pedestrian and cyclist access only. The development will also consist of the provision of public open space and related play areas; hard and soft landscaping including internal roads, cycle and pedestrian routes, active travel routes for cyclists and pedestrians, pathways and boundary treatments, street furniture, wetland features, part-basement, car parking (524 no. spaces in total, including car sharing and accessible spaces); motorcycle parking; electric vehicle charging points; bicycle parking (long and short stay spaces including stands); ESB substations, piped infrastructural services and connections (including connection into existing surface water sewer in St. Columbanus Road); ducting; plant (including external plant for Air Source Heat Pumps and associated internal heating plantrooms); waste management provision; SuDS measures (including green roofs, blue roofs, bio-retention areas); attenuation tanks; sustainability measures (including solar panels); signage; public lighting; any making good works to perimeter wall and all site development and excavation works above and below ground.

Figure 1: Proposed Site Layout

2 TGD PART L – THE REQUIREMENTS

Technical Guidance Document Part L (Conservation of Fuel and Energy) of the Building Regulations sets the energy and carbon performance requirements to achieve Nearly Zero Energy Buildings performance as required by the EU Energy performance in Buildings Directive 2010/31/EU of 19 May 2010 and amending directive 2018/844 of May 2018.

2.1 Dwellings

TGD Part L 2022 Conservation of Fuel and Energy – Dwellings, states the following requirement for new dwellings, *"A building 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 building and the amount of carbon dioxide (CO2) emissions associated with this energy use insofar as is reasonably practicable"*. This requirement is met by the following.

a) 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 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.
b) Limiting the heat loss and, where appropriate, availing of heat gain through the fabric of the building.
c) Providing and commissioning energy efficient space and water heating systems with efficient heat sources, effective controls, and self-regulating devices.
d) Providing that all oil and gas fired boilers shall meet a minimum seasonal efficiency of 90 %.
e) Providing to the dwelling owner sufficient information about the building, the fixed building services, controls, 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.
f) Ensuring that for a new multi-unit building the installation of ducting infrastructure, namely conduits for electric cables, for every parking space to enable the installation of recharging points for electric vehicles, where:
    i. the car park is located inside the building; or
    ii. the car park is physically adjacent to the building; and
g) Ensuring that for a new dwelling house with a car parking space located within the curtilage of the dwelling house, the provision of appropriate electric vehicle recharging infrastructure to enable the installation of a recharging point for electric vehicles.

2.2 Buildings other than Dwellings

TGD Part L 2022 Conservation of Fuel and Energy – Buildings other than Dwellings, states the following requirement for new dwellings, *"A building 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 building and the amount of carbon dioxide (CO2) emissions associated with this energy use insofar as is reasonably practicable"*. This requirement is met by the following.

a) Providing that the energy performance of the building is such as to limit the calculated primary energy consumption and related Carbon Dioxide (CO2) emissions to a Nearly Zero Energy Building level insofar as is reasonably practicable, when both energy consumption and Carbon Dioxide emissions are calculated using the Non-domestic Energy Assessment Procedure (NEAP) published by Sustainable Energy Authority of Ireland.
b) Providing that, the 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.
c) Limiting the heat loss and, where appropriate, availing of the heat gains through the fabric of the building.
d) Providing and commissioning energy efficient space heating and cooling systems, heating and cooling equipment, water heating systems, and ventilation systems, with effective controls.
e) Ensuring that the building is appropriately designed to limit need for cooling and, where air-conditioning or mechanical ventilation is installed, that installed systems 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) Limiting the heat gains by chilled water and refrigerant vessels, and by pipes and ducts that serve air-conditioning systems.
h) Providing energy efficient artificial lighting systems and adequate control of these systems; and
i) Providing to the building owner sufficient information about the building, the fixed building services, controls, 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.

Plus, Regulation 5 requirements.

a) A new building 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 building unit.
b) A new building, 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 least one in every 5 car parking spaces to enable the subsequent installation of recharging points for electric vehicles.

3 THE ENERGY HIERARCHY PLAN

The energy hierarchy plan aims to reduce energy before it can be consumed. This can be achieved by implementing passive design strategies across the development, like maximising the building fabric performance, building orientation, HVAC, and Lighting.

The key steps in the Energy Hierarchy Plan are outlined as follows:

- **BE LEAN** - The first step of this plan is the most important, its aim is to first reduce energy demand by improving the building's thermal envelope, increasing air tightness, improving thermal transmittance, and applying passive design techniques.
- **BE CLEAN** - The second step is to utilise energy in the most efficient way through the selection and installation of energy efficient plant and equipment.
- **BE GREEN** - The final step is to introduce energy from renewable sources to reduce the burden on fossil fuels.

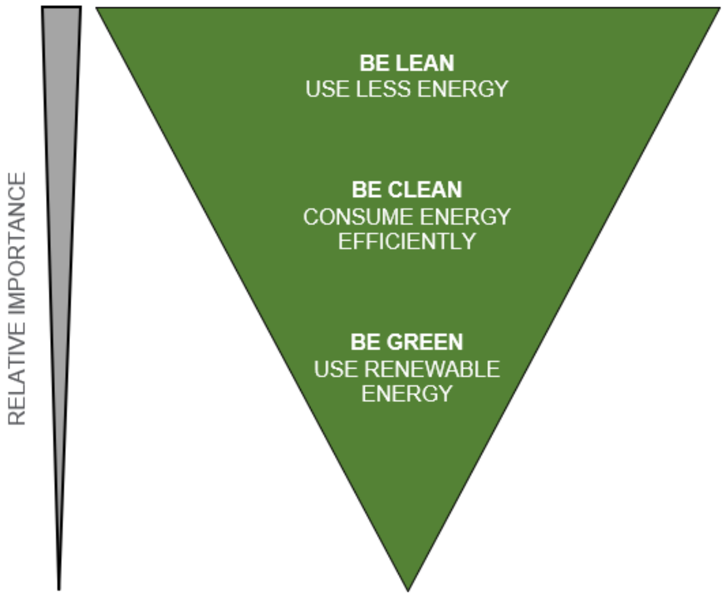


Figure 2: The Energy Hierarchy Plan

3.1 Be Lean – Use Less Energy

The following measures will be implemented to reduce the energy consumption of the proposed development.

- High performance U-values.
- Improved air tightness. and
- Improved thermal transmittance and thermal bridging design.

3.1.1 High Performance U-Values

To limit heat loss through the façade, careful consideration will be shown when designing the external envelope. The specification of the insulation utilised, and the continuity of insulation are crucial. Insulation slows the rate at which heat is lost to the outdoors. Heat flows in three ways: by conduction, convection, and radiation.

The maximum average elemental U-values from Part L 2022 (NZEB) are outlined in Table 1 below.

Table 1: Proposed Building Fabric Performance

Fabric Element	TGD Part L (2022) Maximum Average Elemental U-value ($W/m^2.K$)	Proposed Elemental U-value ($W/m^2.K$)
Ground floor	U-Value = 0.18	U-Value = 0.18
Exposed floor	U-Value = 0.18	U-Value = 0.18
Wall (External)	U-Value = 0.18	U-Value = 0.18
Roof (pitched)	U-Value = 0.16	U-Value = 0.16
Flat roof	U-Value = 0.20	U-Value = 0.20
Windows and glazed doors	U-Value = 01.40	[1]Total system u-value: 1.10W/m2K for windows, and 1.40W.m2k for sliding doors
Opaque doors u-value	U-Value = 01.40	U-Value = 1.40
Thermal bridging factor	0.08 W/m2k	0.08 W/m2k
Internal heat capacity	NA	Medium light
Air permeability	5m3/(hr.m2) @50pa	3m3/(hr.m2) @50pa or 0.15 ach

Note 1: Targeting Home Performance Index (HPI) credit HW4.1: Winter Comfort – Radiant Asymmetry.

3.1.2 Air Tightness

One major contributing factor to unnecessary heat loss is infiltration. Infiltration is the air leakage of external air into a building due to the pressure difference associated with internal and external temperatures.

Under the Part L 2022 (Domestic) the minimum air permeability performance of not greater than 5 m3/hr/m2 @ 50 Pa. It is intended that the residential development will target an air permeability rate of 3 $m^3/hr/m^2$ @ 50 Pa. By reducing the number of infiltration/ external air changes per hour, the buildings energy demand and carbon emissions will reduce as the buildings ability to retain conditioned thermal energy has increased i.e., the space heating system will not be required as often.

Common areas where air infiltration occurs in buildings can be seen in figure 3 below.

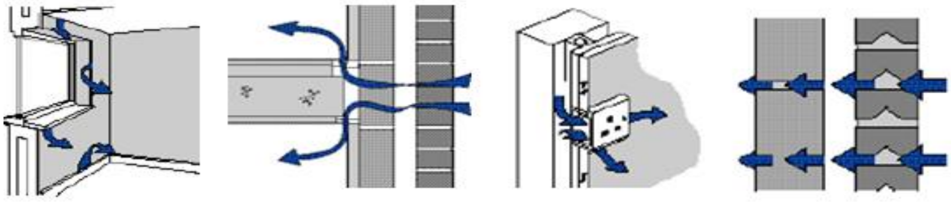


Figure 3: Typical Air Leakage Paths

3.1.3 Thermal Transmittance

Thermal bridges occur where the insulation layer is penetrated by a material with a relatively high thermal conductivity and at interfaces between building elements where there is a discontinuity in the insulation. It is intended to target a Thermal Bridging Factor of 0.08 W/m2k as per TGD Part L 2022 Accredited Construction details.

Figure 4 below shows thermal images of typical building details where a thermal bridge has occurred.

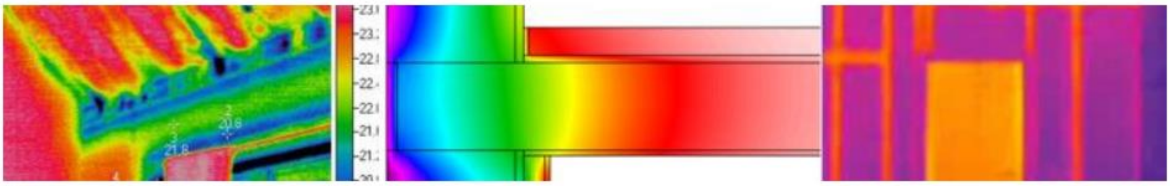


Figure 4: Typical Thermal Bridging Details

3.2 Be Clean – Consume Energy Efficiently

To maximise the effectiveness of enhancing the building fabric, it is important to utilize energy efficient system to further reduce the energy consumption, carbon production and annual running costs, while maximising the occupancy thermal comfort and wellbeing.

A centralised heating system per block has been proposed to meet the space heating and domestic hot water for the development. Continuous mechanical ventilation is proposed for all dwellings/apartments.

3.2.1 Ventilation System

To reduce heat loss through the building fabric, a continuous whole-house ventilation system has been proposed. By implementing this system, it mitigates the requirement for open vents, flues, and intermittent fans in the building envelope. It will increase the thermal comfort of the building and ensure adequate fresh air is being supplied.

The system will be selected in the detailed design stage.

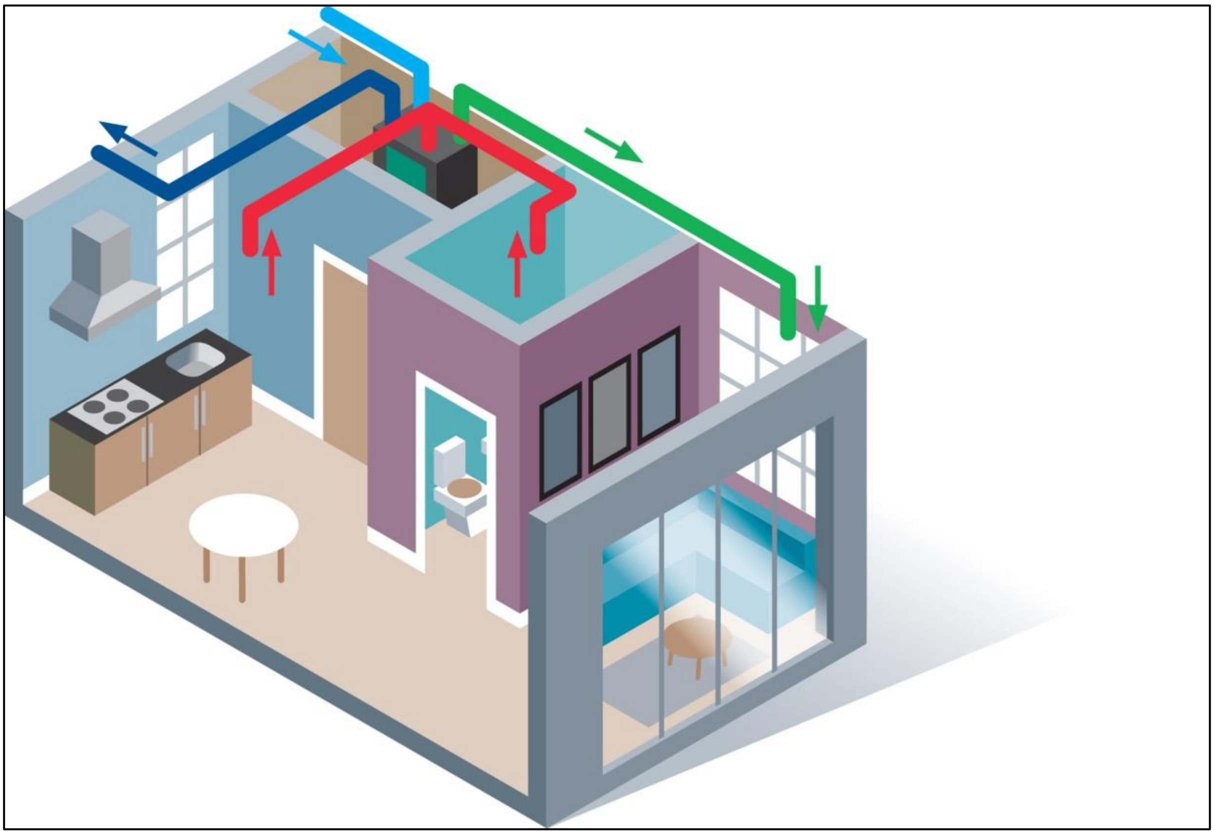


Figure 4: Mechanical Ventilation System

3.2.2 Space Heating & Domestic Hot Water

3.2.2.1 Centralised/ Communal Heating Scheme

A centralised/ communal heating scheme per block is proposed to meet the space heating and domestic hot water requirement for the development. The centralised heating scheme is intended to be made up of air source heat pumps.

The heat network will be heated by the air-water heat pumps in a centralised location. Hot water is distributed through a heat network, providing space heating and domestic hot water for the complete development. A Heat Interface Unit (HIU) is located within each dwelling, within this unit a plate heat exchanger transfers the heat from the heat network to the dwellings internal space and domestic hot water system. A management company or a third party ESCO company will bill individually for heat consumed.

This system has many advantages for the development.

- It can provide Part L compliance and meet renewable targets from a centralised location.
- Most system maintenance can be carried out without access to the individual apartments (some maintenance will be required for HIUs).
- Reduces space requirement for plant within the units when compared to individual heating systems.
- Space heating can also be met in common areas by the communal heating system removing the requirement for additional HVAC system and reducing maintenance.
- Future proofs the development as it allows for other renewable gases such as green hydrogen to be used in the future, with minimal changes to the heat network.

Refer to appendix A for more detail on the centralised/communal heating scheme.

Figure 5 below provides an example of a communal heating system.

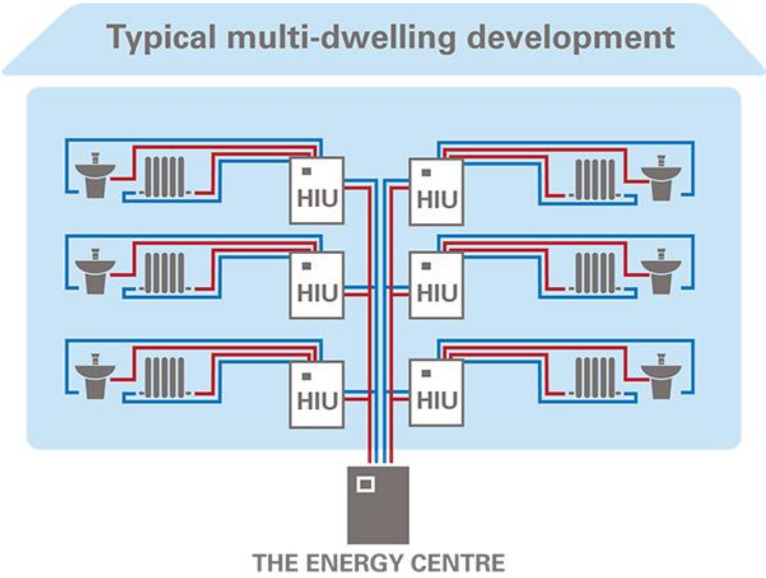


Figure 5: Centralised/ Communal Heating System

3.2.3 Lighting

The Lighting design intent is to introduce artificial lighting in all applicable areas. Energy efficient light fittings will be installed throughout. They will be controlled by PIR and will be designed to reduce energy consumption.

For the lighting to the public open space the distance to lighting columns and maintaining coverage has been considered in the design. Sufficient light coverage in opens spaces accounts for security, visibility and access for maintenance.

The external lighting design also takes into account the requirements for biodiversity such as the lux levels suitable for bats and the badger sett. Please refer to drawing CMHD-EDC-00-00-DR-E-3000 & report CMHD-EDC-00-XX-RP-PL-3000 for more details on the external lighting.

3.2.4 Electric Vehicle Charging

It is intended to provide up to 20% of all public parking spaces with electric vehicle charging facilities. Ducting infrastructure (electrical conduits) are intended to be provide to all public car parking spaces, where:

i. the car park is located inside the building; or
ii. the car park is physically adjacent to the building.

3.2.5 Water Efficiency

A demand reduction approach will be taken in relation to water in line with the LDA Sustainable Development Strategy. 95 l/p/day will be the proposed target here. Flow meters should be installed in all developments for each home in addition to bulk water metres and contractors will be required to put water management plan in place.

3.3 Be Green – Use Renewable Technologies

The following renewable technologies will be considered for implementation, in so far as is practical and feasibly possible.

3.3.1 Renewable Energy from Heat Pumps

The main source of renewable energy for this development will be produced by Heat Pumps. The centralised communal heating scheme per block is proposed to generate heat through air source heat pumps. This is intended to provide sufficient renewable energy contribution to meet the TGD Part L renewable energy requirements.

A heat pump provides renewable (thermal) energy through their operational efficiencies. They can produce 4.5 – 5 times the amount of energy that is put into the system, reducing the demand and energy requirements substantially.

3.3.2 Solar Photovoltaics

Photovoltaic (PV) are proposed for areas that require an additional renewable energy contribution to meet TGD Part L. The required quantity of PV will be located on the roof of each block.

PV panels convert the solar radiation into electricity, which can be connected to the mains supply of a dwelling. Panels are typically arranged in arrays on a building roof, with the produced electricity fed directly into the building.

Figure 6 below shows a diagram of how a PV system works in an apartment application. The sun provides solar radiation through sunlight that hits the PV cells, converting the solar energy into DC electricity. DC electricity passes through an inverter which converts the electricity to AC making it ready to use. The current is then fed through a meter before passing through the consumer unit. The dwelling will automatically use the PVs energy to power appliances, any electricity that is not used can be exported back to the national grid.

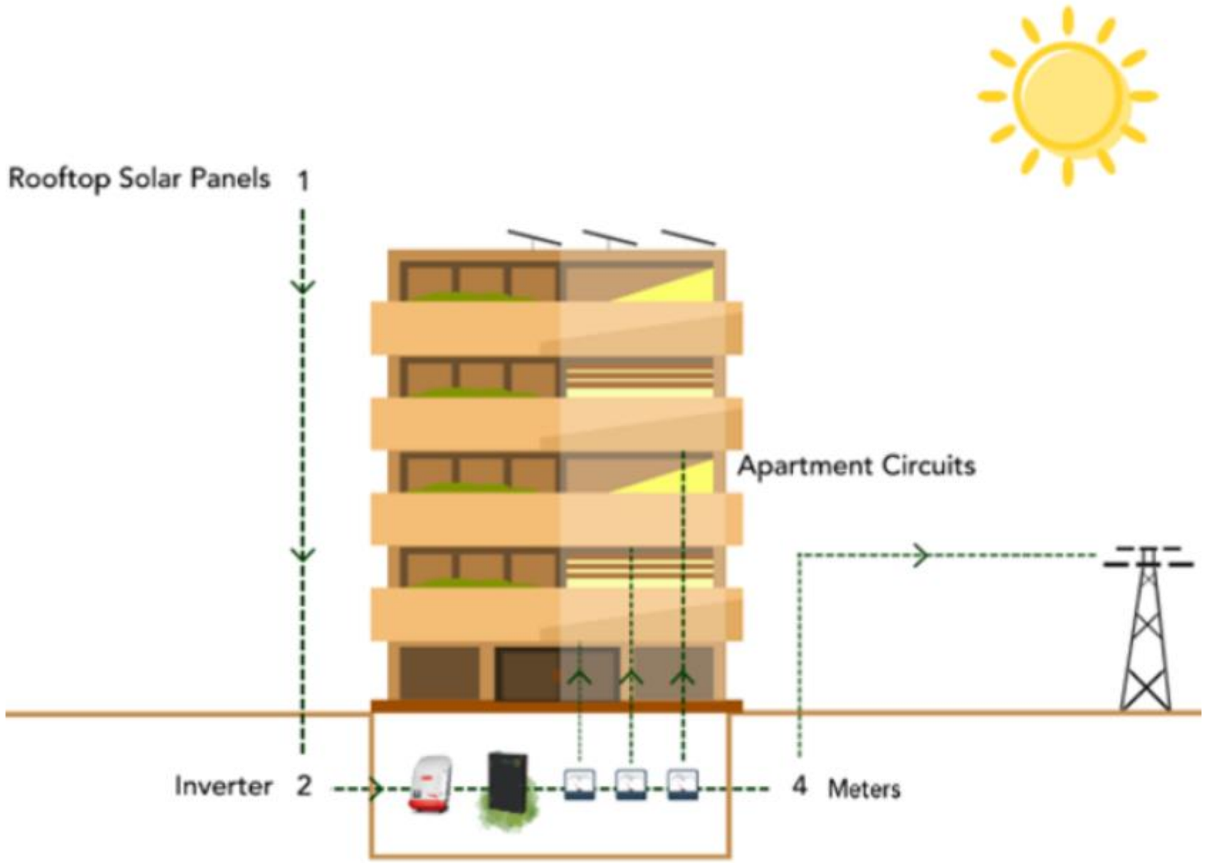


Figure 6: Solar PV Diagram

4 DEVELOPING THE ENERGY PERFORMANCE STRATEGY

Extensive works have been conducted in the early design stage to provide a coordinated energy strategy for the development. The proposed strategy will help to reduce energy consumption, carbon emissions and annual running costs throughout the development.

The works included investigating independently validated sustainability assessment methodologies, such as the Home Performance Index (HPI), IGBC Carbon Designer tool for Ireland, "OneClick LCA", and preforming several DEAP calculations to improve building fabric and HVAC systems.

Dynamic Thermal Energy Modelling will be used as the design progresses to enhance thermal comfort and wellbeing throughout the development. It is intended to perform overheating risk, and internal daylight assessments in the detailed design phase.

4.1 Home Performance Index (HPI)

HPI certification is an independently certified sustainability assessment methodology for Ireland. It is like certifications for commercial developments such as LEED and BREEAM, except that its specifically designed for residential developments and aligns to the Irish building regulation, EU Levels Framework, and international WELL certification for communities.

HPI is independently assessed and awards certificates with a rating for the standard of a homes design, construction, and environmental sustainability. This development will achieve HPI Certified as a minimum performance. Figure 7 below shows how the HPI compares with other standards, frameworks, and systems for green buildings.

	HPI	BREEAM	LEED	EDGE	nZEB	Passivhaus	LEVEL(s)*
Energy Efficiency Energy use + CO_2 emissions	Fully considered	Fully considered	Fully considered	Fully considered	Fully considered	Fully considered	Fully considered
Energy Savings	Fully considered	Fully considered	Fully considered	Fully considered	Fully considered	Fully considered	Fully considered
Indoor Air Quality Ventilation, VoCs, Radon	Fully considered	Fully considered	Fully considered	Not considered	Partially considered	Partially considered	Fully considered
Water Efficiency Water quality + Testing	Fully considered	Fully considered	Fully considered	Fully considered	Partially considered	Not considered	Fully considered
Daylight Levels Health + Wellbeing	Fully considered	Fully considered	Fully considered	Not considered	Not considered	Partially considered	Fully considered
Acoustic Comfort Wellbeing + Comfort	Fully considered	Fully considered	Fully considered	Not considered	Not considered	Not considered	Fully considered
Embodied Carbon	Fully considered	Fully considered	Fully considered	Fully considered	Not considered	Not considered	Fully considered
Improving Biodiversity	Fully considered	Fully considered	Fully considered	Not considered	Not considered	Not considered	Partially considered
Universal Design Lifetime Homes	Fully considered	Fully considered	Not considered	Not considered	Not considered	Not considered	Partially considered
Connected Location Transport links, facilities, amenities	Fully considered	Fully considered	Fully considered	Not considered	Not considered	Not considered	Not considered
Lifecycle Analysis	Fully considered	Fully considered	Fully considered	Not considered	Not considered	Not considered	Fully considered
Circular Economy Design for reuse	Fully considered	Fully considered	Fully considered	Not considered	Not considered	Not considered	Fully considered
Nationally Adapted Data fed back into national policy	Fully considered	Not considered	Not considered	Not considered	Not considered	Not considered	Partially considered

Fully considered   Partially considered   Not considered

** An EU framework from the European Commission. More information at https://ec.europa.eu/environment/topics/circular-economy/levels_en*

Figure 7: HPI compared to other standards

4.2 Carbon Designer Tool for Ireland (OneClick LCA)

The recently announced Carbon Designer Tool for Ireland is being considered for this development. The Irish Green Building Council developed the Carbon Designer for Ireland tool, and OneClick LCA, with support from the Land Development Agency (LDA) and the Environmental Protection Agency (EPA). The OneClick tool was used in the climate assessment in the EIAR.

The Carbon Designer Tool for Ireland will be used to inform material specification and construction methods during design development and delivery phases to reduce embodied energy and whole life carbon impacts of the development.

4.3 DEAP (Dwellings)

DEAP calculations were performed on several dwelling types to ensure compliance with Part L and to enhance the overall building fabric and HAVC systems as reasonably as possible. The enhancements include.

- Improving building fabric performances for windows from what is required by TGD Part L (2022),
- Improving building air permeability to a maximum of 3 m3/hr/m2, from 5 m3/hr.m2 as required by TGD Part L (2022),
- Limiting heat loss through chimneys, open flues, and intermittent fans by implementing a whole-house ventilation system.
- Enhancing the space heating and domestic hot water system by implementing a centralised heating scheme per block, which reduces cost for tenants/ building owners and increases renewable energy generation.
- Solar photovoltaic will also be used, where required, to further increase the renewable energy generation and decrease grid supplied electricity.

4.4 Dynamic Energy Modelling

4.4.1 Overheating Risk/ Thermal Comfort Assessment

It is intended to preform dynamic thermal modelling during early detailed design, using the building energy simulation software, IESVE, to analyse selected worst case dwellings for overheating risk, and to propose design changes to mitigate that risk, if required. CIBSE TM 59 sets the design performance guidelines for overheating risk in residential building. Figure 8 below represents the factors which affect Thermal Comfort.

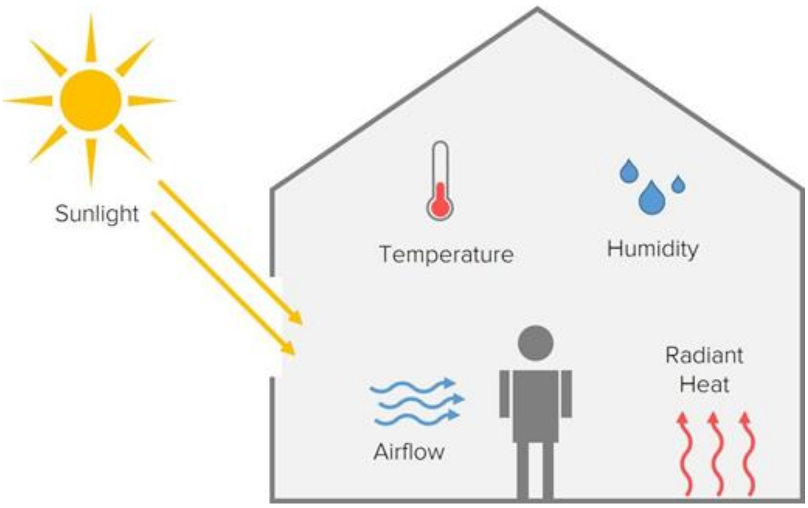


Figure 8: Factors Influencing Thermal Comfort

To further mitigate the risk of overheating, the development will meet HPI credit *HW4.2: Winter Comfort – Radiant Asymmetry.* This is based on minimising the temperature diffference between radiant surfaces and ambiant temperatures within a room. Glazing is now the main surface where significant temperature difference can occur in cold weather. This leads to precieved discomfort particularly when sitting near a window with poorer thermal performance. To mitigate this risk, it is proposed to improve the window thermal performance to achieve total system u-value of 1.10 W/m2k, and 1.40 W/m2k for sliding doors.

4.4.2 Internal Daylight, Sunlight & Overshadowing

Extensive works have been carried out to between Reddy A+U and GIA Chartered Surveyors to ensure the development will perform as well as possible regarding the availability of daylight and sunlight. The works included assessing internal daylight levels, sunlight availability, daylight availability and overshadowing on external amenity spaces.

GIA Chartered Surveyors stated within the GIA report No. 17967, "GIA believe that on the balance and in context of the site, the impacts to the neighbouring properties are within the intention and application of the BRE guidelines and therefore should be considered acceptable in daylight and sunlight terms."

For further information, please refer to the latest GIA Report No. 17967 "Daylight & Sunlight Impact on Neighbouring Properties Report" created by GIA Chartered Surveyors which is submitted as part of this application.

Figure 9: Daylight, Sunlight, Overshadowing Image from GIA Report

5 CONCLUSION

A holistic sustainable approach has been adopted by the design team for the proposed development. Several sustainability and efficiency features have been considered throughout.

The optimised approach is based on the Energy Hierarchy Plan - Be Lean, Be Clean, Be Green.

Be Lean

- Improving external window performances u-values from what is required by TGD Part L (2022),
- Improving building air permeability to a maximum of 3 m3/hr/m2, from 5 m3/hr.m2 as required by TGD Part L (2022).
- Limiting heat loss through chimneys, open flues, and intermittent fans by implementing a whole-house ventilation system.

Be Clean

- Limiting heat loss through chimneys, open flues, and intermittent fans by implementing a whole-house ventilation system.
- Enhancing the space heating and domestic hot water system by implementing a centralised heating scheme per block served by air source heat pumps which reduces cost for tenants/ building owners and increases renewable energy generation.
- Low energy lighting design will be utilised to further reduce energy consumption and increase occupant thermal comfort.

Be Green

Several sustainable design features have been considered within the design to achieve the sustainability targets of the proposed refurbishment. These include:

- Utilising a centralised communal heating scheme per block served by air source heat pumps to provide a renewable energy contribution to the development.
- Solar PV will be considered where required.

Home Performance Index (HPI)

This development is targeting HPI Certified as a minimum. All mandatory requirements will be fulfilled. In particular, EC1.0 – Net space heat demand requirements and QA 2.0 – Thermal Bridging calculations (non-default).

APPENDIX A – ADDITIONAL INFORMATION ON SELECTED HEATING SYSTEM

SELECTED HEATING SYSTEM

The below is some additional information on the selected heating option.

CENTRAL HEATING (CH)

The Centralised heating system is intended to provide 100% of the space and water heating using **Air Source Heat Pumps.** The Air-water heat pumps will be in a located in an ASHP compound in each apartment block. The renewable energy requirements set out in TGD Part L 2022, are expected to be met in all unit types with this type of system.

Centralised heating systems are very similar to the District Heating (DH) systems. The main difference is the energy centres will be in a centralised location in each apartment block. Dwellings will also have HIU's located in a services cupboard.

HOW IT WORKS

- The Centralised heating system is heated by the Air-Water Heat Pumps, located in a centralised location in each apartment block.
- Hot water is distributed through a heat network, providing heat for the complete development.
- A heat interface unit (HIU) is located within each dwelling, where a plate heat exchanger transfers heat from the CH system to the dwelling internal space heating and domestic hot water system.
- A management company or a third-party ESCO company will bill each unit individually for heat consumed.

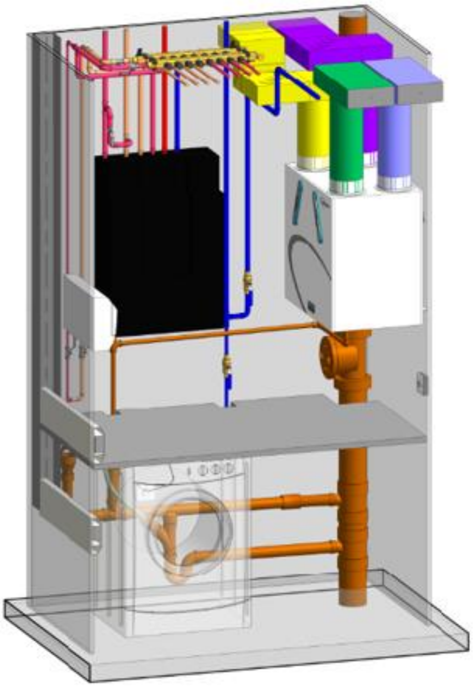
SUMMARY OF CHARACTRISTICS

- Can provide Part L compliance and meet renewable target from a centralised location.
- Most system maintenance can be conducted without access to apartments.
- Reduces space requirements for plant within the units when compared to EAHP.
- Common corridors and stairs do not require additional mechanical systems and can be run from the CH system.
- Primary plant can be easily upgraded with modern technologies in future years, providing the potential to further reduce energy consumption, CO2 emissions and operational costs.
- Combined PV system could be installed and sent to landlord panel to offset generation costs.
- The system has less distribution losses compared to DH schemes.
- To mitigate overheating in units and corridors because of circulation heat losses, an overheating risk assessment can be carried out in early design phase.
- Third party ESCO management company will be required to manage billing.
- ESCO management companies generally provide a fixed price for 12months, this is reviewed every 12 months.

SPATIAL REQUIREMENTS

The spatial requirements for the central heating plant can vary from block to block. Space for external central heat pumps and an additional heating plantroom will also be required.

The image below shows a typical dwelling service cupboard housing a Heat Interface Unit and a Mechanical Ventilation Heat Recovery (MVHR) unit. The service cupboard at low level can accommodate washing machines, clothes dryers etc. A typical CH scheme and MVHR unit spatial requirement for a district heating system heat interface unit is 0.9m x 1.5m.



Typical Dwelling Service Cupboard Housing for Central Heating

APPENDIX B – DLRCOCO COUNTY DEVELOPMENT PLAN 2022-2028

The policy objectives outlined in the *"dlrcoco County Development Plan 2022-2028 – written statement"* are noted below. The development plan sets out the following policies in relation to energy in use and the use of district heating networks.

Policy Objective CA10: Renewable Energy - It is a Policy Objective to support Country, Regional, National, and international initiatives, and pilot schemes to encourage the development and the use of renewable energy sources, including the SEAI Sustainable Energy Communities Initiatives, as a mean of transitioning to a low carbon climate resilient Country in line with national renewable energy targets.

Policy Objective CA15: District Heating – it is a Policy Objective to support the development of district heat networks and the utilisation of waste heat recovery in the County is a renewable or low energy resource which can contribute to the transition to a low carbon climate resilient County. The Planning Authority will support the development of a council wide District Heat policy following on from the forthcoming National Policy Framework for District Heat. (Consistent with RPO 7.38 of the RSES)

RPO 7.38 Local authorities shall consider the use of heat mapping to support developments which deliver energy efficiency and the recovery of energy that would otherwise be wasted. A feasibility assessment for district heating in local authority areas shall be carried out and statutory planning documents shall identify local waste heat sources.

In line with dlrcoco policy objective CA15: District Heating, and regional policy objective RPO 7.38 set out in the Regional Spatial & Economic Strategy (RSES) 2019-2031, a feasibility study for district heating systems was carried out for the proposed development. This feasibility study includes a heating strategy comparison for individual and communal district heating networks. Third party district heating and waste heat networks outside the development's curtilage have been excluded from this study, as it was found there is no current heat networks in the area and the development in not located in a SEAI district heating candidate area, as shown in the Figure below.

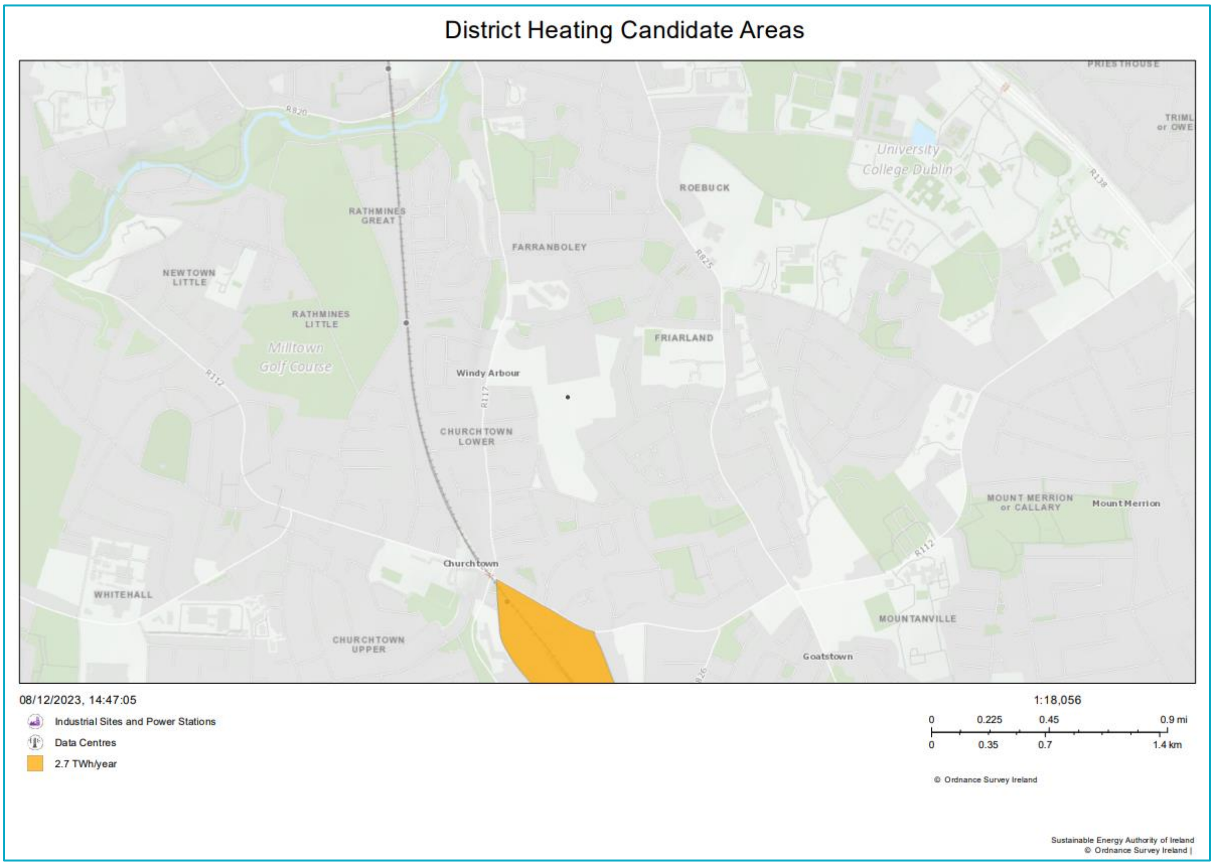


Figure - SEAI District Heating Candidate Areas

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