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MULTIDISCIPLINARY CONSULTING ENGINEERS

K455/3: BLACKGLEN ROAD RESIDENTIAL DEVELOPMENT

ENERGY & SUSTAINABILITY REPORT/ CLIMATE ACTION REPORT

For
Zolbury Ltd.

12 November 2024

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DOCUMENT CONTROL & HISTORY

OCSC Job No: K455/3	Project Code	Originator	Zone Volume	Level	File Type	Role Type	Number	Status / Suitability Code	Revision
	K455/3	OCSC	XX	XX	RP	YS	0001	S4	P05

Rev.	Status	Authors	Checked	Authorised	Issue Date
P01	For Comment	KR	MT	MT	16/05/2024
P02	For Lodgement	KR	MT	MT	22/05/2024
P03	For Lodgement	KR	MT	MT	27/05/2024
P04	For Lodgement	KR	MT	MT	5/06/2024
P05	For Lodgement	KR	MT	MT	12/11/2024

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1 EXECUTIVE SUMMARY

This document provides an overview of how the project intends to integrate sustainability as a key strategy into the development's design. The report focuses on the performance targets required by the Building Regulations Part L – Conservation of Fuel and Energy and what energy measures are needed to ensure compliance. Furthermore, a Building Energy Rating (BER) of A3 has been targeted.

The following document sets out the energy design approach that requires the design to initially focus on an energy demand reduction. This will primarily be through passive strategies such as an energy efficient envelope, which in turn reduces the demands relating to items such as HVAC and renewable energy systems. This initial approach in reducing the energy demand significantly aids the project in obtaining the desired energy goals while reducing running costs. Performance criteria relating to the development's building envelope are set out within this document.

The energy systems design must also focus on specifying energy efficient equipment to ensure the day to day running of the energy systems are optimised to further enhance energy savings and related energy cost. Specifications relating to efficient heating, cooling, lighting and auxiliary equipment are also set out in this document.

This report confirms that if the energy and sustainability strategy is successfully implemented, the proposed Blackglen Road Residential Development will achieve all energy and sustainability targets.

2 INTRODUCTION

The purpose of this report is to identify the energy efficiency measures associated with the design, construction, ongoing management, and maintenance of the proposed Blackglen Road Residential Development located at Blackglen Road, Sandyford, Dublin 18.

The proposed residential aspects of the development will comply with Part L 2022 (Dwellings), and Part L 2022 (Buildings Other Than Dwellings) for non-residential areas. As part of the development's efforts to further reduce energy consumption, the project is targeting a minimum A3 BER (Building Energy Rating) across the development.

Extensive work has been carried out to develop a balanced design approach to achieve these onerous targets with a number of sustainable features being incorporated into the design from the early stages.

Table 1: Energy Performance Targets

Standard / Rating	Mandatory	Target
Part L Residential	Yes	2022 (Dwellings)
Part L Non-residential	Yes	2022 (Buildings Other Than Dwellings)
BER Residential	Yes	A2/A3
BER Non-residential	Yes	A3 minimum

The following sections identify a range of energy efficient measures that have been considered for the proposed Blackglen Road Residential Development.

3 POPOSED DEVELOPMENT

Zolbury Ltd., intend to apply to Dun Laoghaire Rathdown County Council for permission for development for a Large-Scale Residential Development (LRD) on a site of approx. 3.83ha on lands at Blackglen Road, Sandyford, Dublin 18.

The development will consist of 192 no. residential units ranging from 2-5 storeys in height, associated resident amenity facilities, a childcare facility, all boundary treatment and landscaping works, site services connections and all site development works to include:

a) Construction of 192 no. residential units, in the form of 6 no. new apartment buildings (A1 – B4), 40 duplexes (C1, C2, C2A) and 14 houses (D1 & D2), to include 33 no. 1-beds, 84 no. 2 -beds, 61 no. 3-beds and 14 no. 4-beds as follows:
    - Block A1 (4 storeys) comprising 15 no. apartments (3 no. 1 bed units, 6 no. 2 bed units & 6 no. 3 bed); a crèche facility of approx. 378 sq. m with associated outdoor play space of approx. 170 sq. m; and resident amenity facilities of approx. 33.3 sq. m.
    - Block A2 (3-4 storeys) comprising 26 no. apartments (2 no. 1 bed units, 20 no. 2 bed units and 4 no. no. 3 bed units) and resident amenity facilities of approx. 353.6 sq.m.
    - Blocks B1 and B2 (2-5 storeys) comprising 51 no. apartments (15 no. 1 bed units, 29 no. 2 bed units, 7 no. 3 bed units).
    - Blocks B3 and B4 (2-5 storeys) comprising 46 no. apartments (13 no. 1 bed units, 23 no. 2 bed units and 10 no. 3 bed units).
    - Duplex Units C1 (4 storeys), C2 and C2A (3 storeys) comprising 40 duplexes (6 no. 2 bed units, 20 no. 3 bed units and 14 no. 4 bed units).
    - House Units D1 and D2 (2 storeys) comprising 14 houses (14 no. 3 bed units).

b) Total Open space (approx. 10,854 sqm) is proposed in the form of public open space (approx. 8, 686 sqm), and residential communal open space (approx. 2,168 sqm). Each residential unit is afforded with associated private open space in the form of a garden/terrace / balcony.

c) The development will be served via a new vehicular access via Blackglen Road. This will be designed as a priority junction with pedestrian and cycle crossings where required to tie in with the Blackglen Road Improvement Scheme.

d) A new toucan crossing is proposed across Blackglen Road just to the east of the new vehicular access. This toucan crossing has been designed as per TL607 of the Cycle Design Manual to allow crossing of pedestrians and cyclists to the northern side of Blackglen Road for improved public transport access.

e) Emergency access only is proposed via Woodside Road.

f) A dedicated wildlife corridor is proposed to the east/south-east side of the site and a public open space (approx. 307 m in length) tree trail to the west/north-west side of the site.

g) Basement/Podium car park areas are proposed below Blocks B1, B2, B3 and B4. A total of 234 no. car parking spaces are proposed, which includes 2 no. car club spaces, 12 no. accessible

spaces and 47 no. EV charging spaces (206 no. long-stay spaces, 18 no. visitor space & 10 no. car parking spaces for creche use), in addition to 9 no. motorcycle spaces.

h) A total of 484 no. bicycle spaces are proposed in the form of 442 no. long stay bicycle spaces 42 short-term stay visitor parking.

i) 2 no. ESB substation at surface level.

j) Bin Storage areas for the Duplex blocks are proposed at ground level adjacent to the Duplex blocks.

k) All associated site and infrastructural works to include provision for water services; foul and surface water drainage and connections; internal roads, attenuation proposal; permeable paving; all landscaping works including green infrastructure zones; green roofs; and general plant areas; photovoltaic panels; landscaped boundary treatment; footpaths; public lighting; and electrical services.



Figure 1: Proposed Development Site Plan

4 DUN LAOGHAIRE/RATHDOWN DEVELOPMENT PLAN 2022-2028

The County Development Plan 2022-2028 was adopted by the elected members at a Special County Development Plan. The adopted Plan will come into force on the 21st of April 2022. The proposed Blackglen Road Residential Development will comply with the new standards set out within the policy.

4.1.1 POLICY CA5: ENERGY PERFORMANCE IN NEW BUILDINGS

''It is a Policy Objective to support high levels of energy conservation, energy efficiency and the use of renewable energy sources in existing and new buildings, including retro fitting of energy efficiency measures in the existing building stock.''

The social housing stock of Dún Laoghaire-Rathdown County Council (DLR) promotes high quality energy efficiency in new build and has a programme of energy upgrade supported by other stakeholders.

The Development Plan can play a role in supporting and encouraging energy efficiency in the built environment.

According to the 'Dún Laoghaire-Rathdown Baseline Emissions Report' it was estimated that buildings equated to 63.7% of the total carbon emissions within Dún Laoghaire-Rathdown County Council.

The Planning Authority will support the actions of the Dún Laoghaire-Rathdown County Council Climate Change Action Plan and overall energy conservation and energy efficiency in new and existing buildings. Design of both new and existing buildings should consider orientation, energy conservation and energy efficiency so as to promote the transition to net zero carbon.

4.1.2 POLICY CA7: CONSTRUCTION MATERIALS

"It is a Policy Objective to support the use of structural materials in the construction industry that have low to zero embodied energy and CO2 emissions. (Consistent with the RPO 7.41 of the RSES)"

The proposed Blackglen Road Residential Development will refer to Action 118 of the National Climate Action Plan 2019 which is to "work with industry stakeholders to increase the use of low carbon materials, taking into account international best practice".

4.1.3 POLICY CA8: SUSTAINABILITY IN ADAPTABLE DESIGN

"It is a Policy Objective to promote sustainable approaches to the improvement of standards for habitable accommodation, by allowing dwellings to be flexible, accessible and adaptable in their spatial layout and design."

It is important that the design of the proposed Blackglen Road Residential Development individual buildings facilitate a good quality of life for residents and secures long-term sustainability of the overall development.

The design of new residential developments should consider not just the immediate needs of the prospective occupants, but also their possible changing needs over the life of the building.

The Planning Authority will also support developments that manage the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

4.1.4 POLICY CA10: RENEWABLE ENEGRY

"It is a Policy Objective to support County, Regional, National and International initiatives and pilot schemes to encourage the development and use of renewable energy sources, including the SEAI Sustainable Energy Community initiatives, as a means of transitioning to a low carbon climate resilient County in line with national renewable energy targets."

Renewable energies will play an increasing role in the future in the drive to reduce GHG emission and transition to a low carbon society. Dún Laoghaire-Rathdown County Council offers a range of opportunities for renewable energy. Dún Laoghaire-Rathdown County Council supports the increase in use of renewable energy resources, namely solar photovoltaic, geothermal, heat pumps, district heating, solar thermal, hydro, tidal power, offshore and small-scale onshore wind.

5 PART L CONSERVATION OF FUEL & ENERGY- DWELLINGS

5.1 PART L 2022 (DWELLINGS)

Part L 2022 (Dwellings) of the Technical Guidance Document has been issued by the Minister for Housing, Local Government and Heritage. This document is the new standard for dwellings constructed after 25th October 2022.

The Part L 2022 (Dwellings) regulations set energy performance requirements to achieve Nearly Zero Energy Buildings performance as required by Article 4 (1) of the Directive for new buildings.

The definition of Nearly Zero Energy Buildings is defined as:

> *"'Nearly zero-energy building' means a building that has a very high energy performance, as defined in Annex 1. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby".*

In line with the requirements detailed within the Technical Guidance Document, renewable energy technologies are defined as technologies that derive their energy directly from a renewable energy source, such as:

- Solar Photo-Voltaic Systems;
- Solar Thermal System;
- CHP Units (Combined Heat & Power);
- Heat Pumps (Minimum COP of 2.5).

6 PART L CONSERVATION OF FUEL & ENERGY – BUILDINGS OTHER THAN DWELLINGS

6.1 LOCATION OF NON-RESIDENTIAL ASPECTS OF THE DEVELOPMENT

The non-residential aspects of the development will consist of common spaces and amenity spaces in apartment Blocks including corridors, bin store and bike storage.

6.2 PART L 2022 (BUILDINGS OTHER THAN DWELLINGS)

The Part L 2022 (Buildings Other Than Dwellings) building regulations is the new standard for all buildings other than dwellings constructed after 25th October 2022. The Part L 2022 (Buildings Other Than Dwellings) regulations set energy performance requirements to achieve Nearly Zero Energy Buildings performance as required by Article 4 (1) of the Directive for new buildings.

For new buildings other than dwellings, the Part L 2022 (NZEB) 'L1' requirements shall be met by:

a) providing that the energy performance of the building is such as to limit the calculated primary energy consumption and related Carbon Dioxide (CO_2) 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 (1.0 for EPC and 1.15 for CPC);

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;

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;

i) providing to the building owner or occupants 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.

6.3 RENEWABLE ENERGY RATIO (RER):

One of the most significant changes made in the newer version of the new Part L 2022 document regulations for non-residential buildings is the addition of a renewable energy contribution target for all non-residential new builds. Some of the main performance requirements are as follows:

- The new regulations will require a significant level of energy provision be provided onsite or nearby by renewable energy technologies, e.g. solar energy (thermal and photovoltaic), air and exhaust air source heat pumps, combined heat and power, biomass boiler, etc.;
- This level of renewable source contributions can also be fulfilled through efficient district heating and cooling using a significant share of renewable energy and waste heat and cold;
- The current NZEB definition does not allow the renewable requirement to be met though the purchase of off-site green electricity;
- There are two routes in achieving compliance with the renewable target:

    i. Route 1 = If the Part L compliance is achieved with no tolerance (0% margin), 20% of the building's energy use must be provided by onsite / near site renewable technologies;

    ii. Route 2 = If the Part L compliance is achieved with a minimum of 10% margin, then 10% of the building's energy use must be provided by onsite / near site renewable technologies. To achieve the 10% margin, the building envelope, lighting and M&E specification will likely have to be improved above minimum requirements.

7 PART F VENTILATION

This report is primarily focused around achieving compliance with Part L of the building regulations, but in doing so, the ventilation systems proposed must also comply with Part F (Ventilation) of the Technical Guidance Documents (TGD).

The TGD Part F (2019) document revolves around two requirements as outlined below:

Means of ventilation.

- F1 – Adequate and effective means of ventilation shall be provided for people in buildings. This shall be achieved by:

(a) Limiting the moisture content of the air within the building so that it does not contribute to condensation and mould growth, and

(b) Limiting the concentration of harmful pollutants in the air within the building.

Condensation in roofs.

- F2 - Adequate provision shall be made to prevent excessive condensation in the floor or in a roof void above an insulated ceiling.

The proposed development will be designed to achieve compliance with Part F of the building regulations.

8 BUILDING ENERGY RATING (BER)

As of 1st July 2009, all newly built domestic and non-domestic buildings and existing buildings that are for sale or rent require a Building Energy Rating (BER) certificate.

The actual building energy rating is based on the primary energy used for one year and is classified on a scale of A1 to G with A1 being the most energy efficient. It also provides the anticipated carbon emissions for a year of occupation based on the type of fuel that the building systems use. The following determines the extent of primary energy consumption within the building:

- Building type (residential, office, retail, etc.);
- Building orientation;
- Thermal envelope (insulation levels of the façade, roofs, ground floor etc);
- Air permeability (how much air infiltrates into the building through the façade);
- Heating systems (what type of plant is used and how efficient it is);
- Cooling systems (what type of plant is used and how efficient it is);
- Ventilation (what form of ventilation is used - natural ventilation, mixed mode mechanical ventilation);
- Fan and pump efficiency (how efficient are the pumps and fans);
- Domestic hot water generation (what type of plant is used and how efficient it is); and
- Lighting systems (how efficient is the lighting).

The areas identified above will be described within this report and categorised under three main headings through “The Energy Hierarchy Plan”. i.e. Be Mean, Be Lean, Be Green.

9 THE ENERGY HIERARCHY PLAN

Through the specification of an energy efficient façade and HVAC systems, the energy consumption of a building will be reduced compared to a set baseline. This ensures the environmental and economic impact of the operation of the building is reduced.

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

1. The key philosophy of this plan is to first reduce energy demand by improving the building's thermal envelope, increasing air tightness, improving thermal transmittance and applying passive design techniques.
2. The second step is to utilise energy in the most efficient way through the selection and installation of energy efficient plant and equipment.
3. The final step is to introduce energy from renewable sources to reduce the burden on fossil fuels.

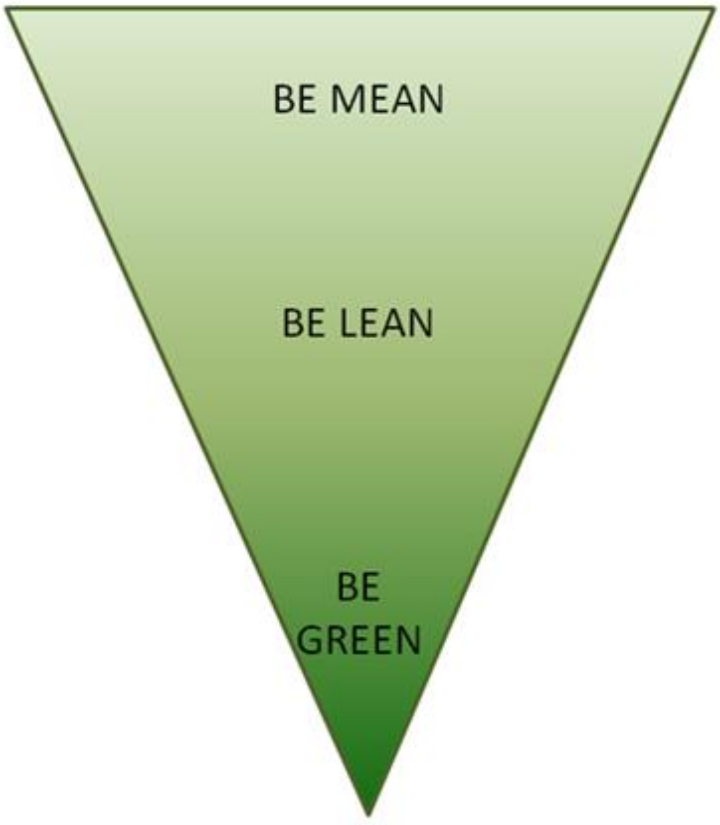

Figure 2: Energy Hierarchy Plan

9.1 STEP 1 (BE MEAN) – USE LESS RESOURCES

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.

9.1.1 HIGH PERFORMANCE U-VALUES

To limit the heat loss through the façade, careful consideration must be shown when designing the external façade. 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 targeted maximum average elemental U-Values for both the residential and non-residential aspects of the proposed development are outlined in Table 2 and Table 3 below.

Table 2: Residential Building Envelope Thermal Performance Targets

Fabric Element	Blackglen Road Residential Development Maximum Average Elemental U-value ($W/m^2.K$)
External Walls	0.18
Flat Roof	0.18
Pitched Roof	0.16
Ground Contact & Exposed Floor	0.18 (0.15 if underfloor heating installed)
External Windows, Roof-lights & Doors	1.40

Table 3: Non-Residential Building Envelope Thermal Performance Targets

Fabric Element	Blackglen Road Residential Development Maximum Average Elemental U-value ($W/m^2.K$)
External Walls	0.21
Flat Roof	0.20
Pitched Roof	0.16
Ground Contact & Exposed Floor	0.21 (0.15 if underfloor heating installed)
External Windows, Roof-lights & Doors	1.40

9.1.2 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.

It is intended that the residential and non-residential aspects of the development will both target an air permeability rate of ≤ 3 $m^3/hr/m^2$ @50 Pa.



Figure 3: Air tightness testing examples

9.1.3 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. The residential and non-residential aspects of the development will be designed to achieve low thermal bridging values throughout.

Residential:

A Y value of ≤ 0.08 $W/m^2.K$ is being targeted for the residential side of the development, in accordance with Part L (2022) – Dwellings requirements. The risks relating to mould growth/ condensation risks will also be assessed, in accordance with Part L (2022) – Dwellings.

Non-residential:

There are no Psi value targets required for the non-domestic elements of the development. However, the risks relating to mould growth/ condensation risks will still have to be assessed, in accordance with Part L (2022) – Buildings Other Than Dwellings.

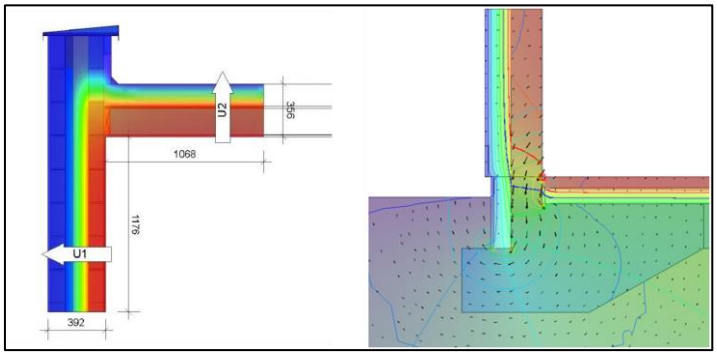

Figure 4: Thermal Bridge Assessment Examples

9.1.4 OVERHEATING ANALYSIS

Due to factors such as climate change, population increase and construction of high-rise buildings there has been an increase in high internal temperatures. Overheating of buildings can be extremely uncomfortable for the occupant and can ultimately lead to costly mitigation measures.

Residential:

The proposed Blackglen Road Residential Development will be evaluated and analysed with respect to overheating as outlined in Part L 2022 (Dwellings) and CIBSE TM59 (Design Methodology for the Assessment of Overheating Risk in Homes).

Non-residential:

The non-residential aspects of the proposed Blackglen Road Residential Development will be evaluated and analysed with respect to overheating as outlined in Part L 2022 (Buildings Other Than Dwellings) and CIBSE TM52 (Limits of Thermal Comfort: Avoiding Overheating in European Buildings).

9.1.5 PASSIVE DESIGN

The proposed Blackglen Road Residential Development will be evaluated and analysed with respect to daylight, sunlight and overshadowing, in order to determine the following:

- The daylight levels within the living and bedroom areas, to give an indication of the expected daylight levels throughout the proposed development;
- The expected sunlight levels within the living areas and bedrooms within the proposed development;
- The quality of amenity space, being provided as part of the development, in relation to sunlight;
- Any potential daylight or sunlight impact the proposed development may have on properties adjacent to the site.

Calculations and methodology used are in accordance with BRE Guidelines for daylight and sunlight and based on the British Research Establishments “Site Layout Planning for Daylight and Sunlight: A Good Practice Guide” by PJ Littlefair, 2011 Second Edition.

An extensive analysis was carried out on the proposed façade to limit the effects of unnecessary solar gains during the summer time period. The image below illustrates the design intent to provide local shading utilising the building structure which allows glazing areas to be maximised, where required.

This balance of shading and maximised glazing areas provides both enjoyable and interesting workspaces, full of natural light and without undue solar gains in summertime. The shading coefficient of the glazing units has also been optimised to limit unnecessary solar gains, while allowing as much natural daylight to enter the workspace as possible.



Figure 5: Façade views of the proposed development

Lighting accounts for typically 12% of the overall primary energy. Typically, this is even higher for non-residential spaces. Maximising natural daylighting in the main non-residential areas reduces this demand during daylight hours.

9.2 STEP 2 (BE LEAN) – USE RESOURCES EFFICIENTLY

To maximise the effectiveness of changes to the construction, it is important to use the energy sources within the development as efficiently as possible.

9.2.1 LOW ENERGY PLANT

To improve the overall energy efficiency of the residential aspect of the development, plant is to be selected based on performance and energy efficiency.

Space Heating: The plant options for space heating are:

- Electric Panel Heaters, or
- Air Source Heat Pumps (ASHP), or
- Exhaust Air Heat Pumps (EAHP)

Domestic Hot Water: The plant options for domestic hot water are:

- Air Source Heat Pumps (ASHP), or
- Exhaust Air Heat Pumps (EAHP), or

Ventilation: The plant options for ventilation are:

- Mechanical Ventilation and Heat Recovery (MVHR), or
- Mechanical Extract Ventilation (MEV) via the EAHP

Variable Speed Drives (VSDs): Variable speed drive motors are to be fitted to all fans and pumps servicing all HVAC systems. Standard fans and pumps operate at a constant speed to meet maximum demand even though only half the building may be occupied. VSDs have the ability to ramp up or down depending on the load requirements, making this the most efficient auxiliary system to install.

9.2.2 LIGHTING

The design intent for internal lighting design is to introduce artificial lighting in all applicable areas. Energy efficient light fittings will be installed throughout. The design of the developments façades also allows high levels of natural daylight to enter into occupied zones.

9.2.3 ONGOING MONITORING

A BEMS (Building Energy Management System) system is to be installed to monitor the use of all major systems in the building. The BEMS system is a graphical interface that allows the facilities/building manager to monitor and control all systems throughout the building.

9.3 STEP 3 (BE GREEN) – USE OF RENEWABLE TECHNOLOGIES

The following renewable technologies are being considered for implementation in the Blackglen Road Residential Development.

9.3.1 AIR SOURCE HEAT PUMP – RESIDENTIAL

Air source heat pumps convert energy from the air to provide heat and hot water for buildings. They are powered by electricity and are highly efficient. The air source heat pump is located outside in the open air and it uses a fan to draw air across it. This air then flows over a heat exchanger, which contains a refrigerant liquid. An evaporator uses the heat from the air to heat the refrigerant sufficiently until it boils and turns to a gas. This gas is then compressed which causes a significant rise in temperature. An additional heat exchanger removes the heat from the refrigerant which can then be used as useful heat within a building.

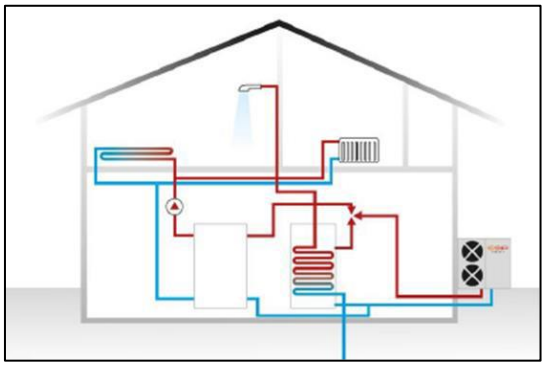

Figure 6: Air-Source Heat Pump Diagram

9.3.2 EXHAUST AIR HEAT PUMP

Exhaust air heat pumps collect warm air as it leaves a building via the ventilation system and then reuse the heat that would otherwise be lost to the outside to heat fresh air coming into the building or to heat water. Exhaust air heat pumps operate on a similar basis to other heat pumps such as air source heat pumps and ground source heat pumps and are suitable for providing hot water and heating for buildings such as houses, apartments or flats.

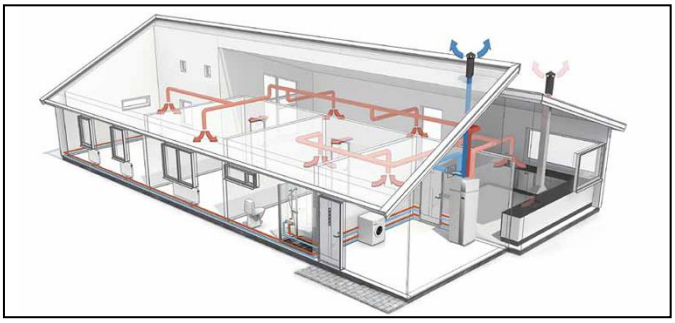

Figure 7: Example Diagram of Typical Exhaust Air Heat Pump Layout

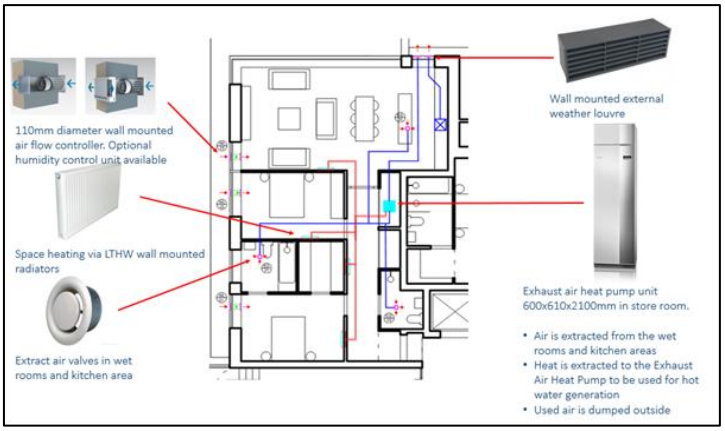

Figure 8: Example Diagram of Typical Exhaust Air Heat Pump Layout

9.3.3 SOLAR PHOTOVOLTAICS

Photovoltaic (PV) Panels convert the solar radiation into electricity, which can be connected to the mains supply of a building. The panels are placed on the roof and are most efficient with an incline angle of 30°. Panels are typically arranged in arrays on building roofs, with the produced electricity fed either directly into the dwelling, office or into the landlord's supply.

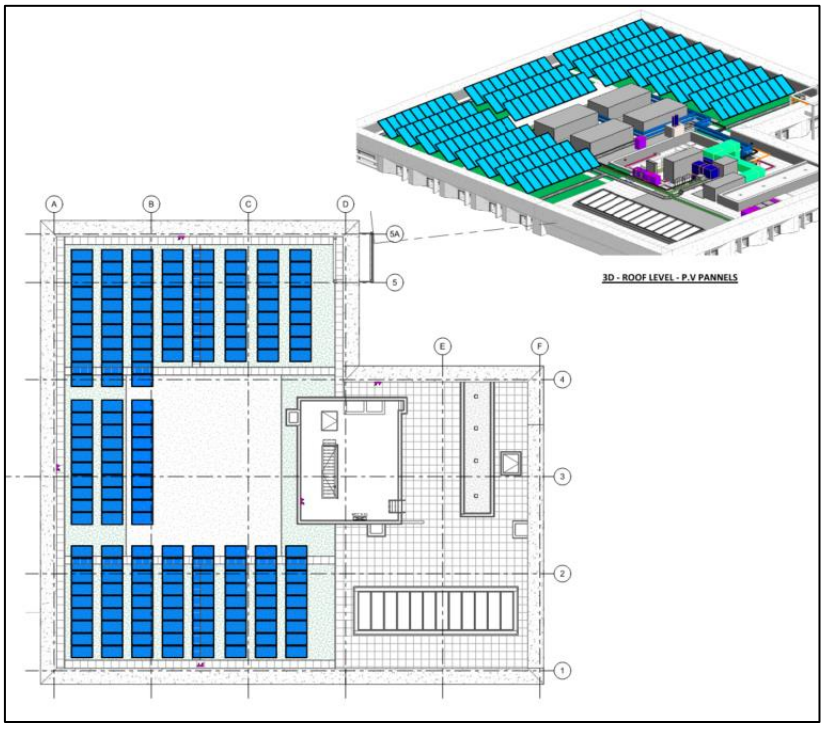

Figure 9: Solar PV Diagram

10 KEY SUSTAINABLE FEATURES

The location of the Blackglen Road Residential Development provides availability to alternative modes of transportation, use of water efficient fixtures, consideration for materials and resources and indoor environmental quality for the building occupants.

10.1 LOCATION AND TRANSPORTATION

The proposed development will offer occupants travelling to and from the development alternative modes of transport other than the need to rely on a car. Developing in an area that has strong public transport nodes offers users the opportunity to travel to and from the site using alternative modes of transport.

The following figures identify the local Luas stops, Dublin bus stops, bicycle lanes and local car sharing locations and their proximity to the proposed development.

Bus/Luas:



Figure 10: Local Dublin & Luas Bus Stops

Dublin Bikes/Trails:

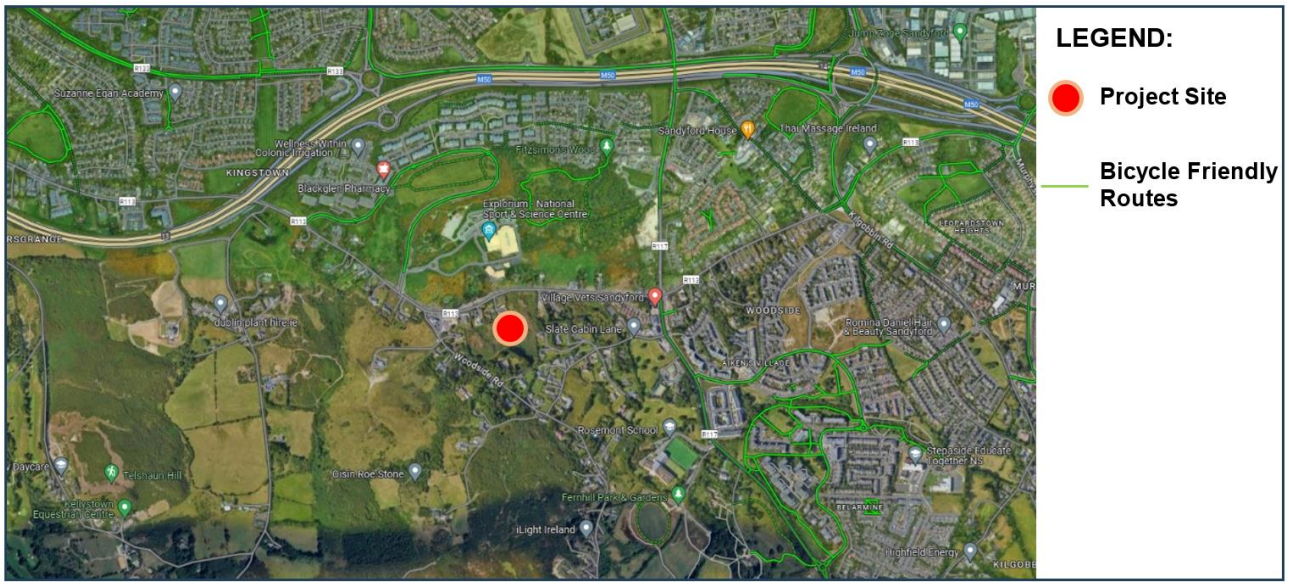

Figure 11: Local Bicycle Lanes

Go-car and Yuko:

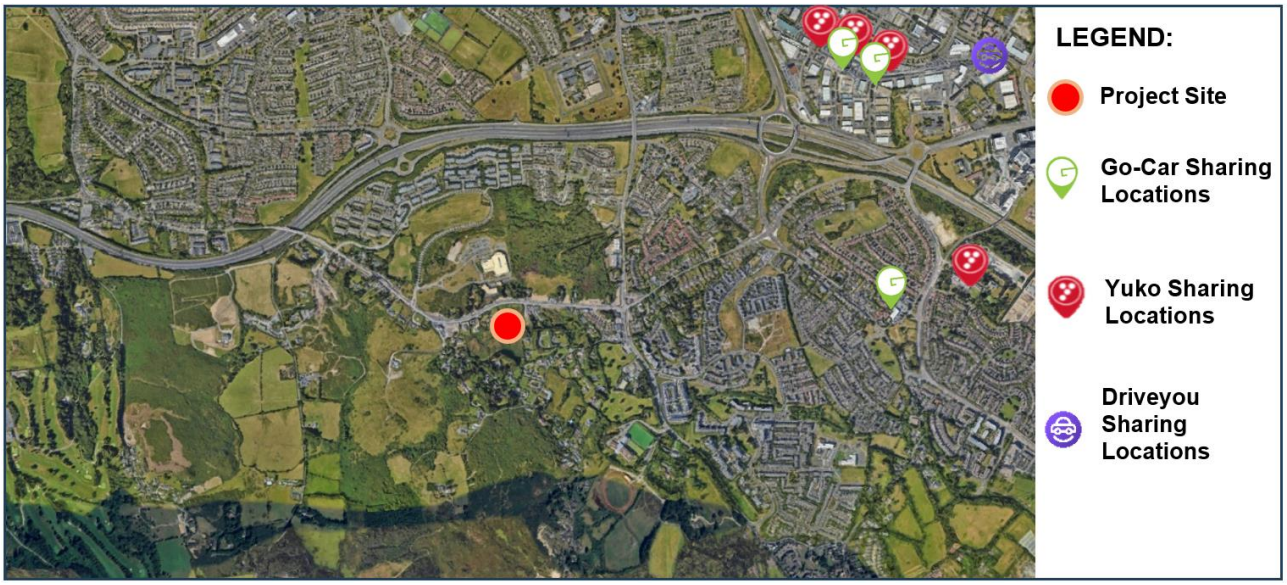

Figure 12: Local Car Sharing Locations

10.2 COMMISSIONING

To ensure efficient operation of the development, all systems will be commissioned. Commissioning of a developments systems ensures that the sustainable energy-design can be fully realised, with fewer operational issues during the building's lifetime. Building users' productivity improves and operational costs decrease also.

10.3 MATERIALS AND RESOURCES

The development will be designed and operated with the aim of a reduction in waste generation through construction and operation. Where possible waste streams will be separated on site and recycled or re-used. Where possible local materials will be specified, and in addition materials that contain recycled content will be considered as preferable.

10.4 WATER EFFICIENCY

With increasing costs associated with potable water use, the proposed development will incorporate measures to reduce water usage through the appropriate selection of low consumption sanitary fittings, leak detection systems and water monitoring facilities.

10.5 BICYCLE FACILITIES

Cycling offers a sustainable alternative to personal vehicle use, which reduces gas and particulate emissions, noise pollution and also congestion in busy urban areas. The proposed development will provide private bicycle spaces for tenants.

10.6 INDOOR ENVIRONMENTAL QUALITY

As part of the sustainable design strategy, consideration of occupants and staff will be an integral part of the design process. As the productivity and well-being of building users depends strongly on the quality of the indoor environment, the following aspects will be addressed:

- Adequate ventilation and filtration;
- Low-emitting materials; and
- Natural daylight and views to the external environment.

10.7 ELECTRIC VEHICLE CHARGING

As part of the sustainable design strategy, the development will provide more than 10% of E.V charging spaces installed at construction (42 E.V points) and 'infrastructure' to allow future installation recharging points as required for residential buildings with more than 10 car parking spaces.

11 CONCLUSION

A holistic sustainable approach been adopted by the design team for the proposed Blackglen Road Residential Development located at at Blackglen Road, Sandyford, Dublin 18 . Through detailed design, a number of sustainability and efficiency features have been considered throughout.

The proposed residential development will comply with residential Part L 2022 (Dwellings), as well as targeting an A3 BER, while the proposed non-residential development will comply with non-residential Part L 2022 (Buildings other Than Dwellings), targeting an A3 BER.

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

Be Mean

- The façade performance specification has been optimised to limit heat loss, improve air tightness and thermal transmittance and to maximise natural daylight.

Be Lean

- High efficiency plant will be specified to take advantage of the optimised façade design measures that have been introduced;
- A low energy lighting design will be utilised to further reduce energy consumption and increase occupant thermal comfort.

Be Green

- Renewable energy technologies such as Air Source Heat Pumps (ASHP), Exhaust Air Heat Pump (EAHP) and Solar PV will be considered for implementation.

A number of sustainable design features have been considered within the design to achieve the sustainability targets of the proposed development. These include:

- The proximity of the development to public transportation networks;
- Water efficiency measures such as low consumption sanitary fittings; and
- Improved indoor environmental quality.

This report confirms that if the energy and sustainability strategy is successfully implemented, the proposed Blackglen Road Residential Development will satisfy all Part L and BER requirements.

12 VERIFICATION

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