

ENERGY AND SUSTAINABILITY REPORT & CLIMATE CHANGE ADAPTATION

FOR

**GLEN ABBEY COMPLEX,
BELGARD ROAD,
COOKSTOWN INDUSTRIAL ESTATE,
DUBLIN 24, D24 W2XA**

FOR

SQUARE FOOT PROPERTY SERVICES LIMITED

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1. INTRODUCTION

Square Foot Property Services Limited, intend to apply to An Bord Pleanála for permission for a strategic housing development at this site located at the Glen Abbey Complex, Belgard Road, Cookstown Industrial Estate, Dublin 24, D24 W2XA on a site area of c.0.91ha. The development will consist of the following:

- Demolition of the existing single storey industrial and commercial office buildings totalling c.4,628sqm;
- Construction of a Build-to-Rent Housing Development comprising 170 no. apartment units and crèche arranged in 2 no. blocks across 4- 7 storeys over basement car park (total gross floor area c.13,880sqm excluding basement);
- The residential development consists of: 9 no. 1 bedroom/2 person studio apartments (c.37-38sqm each); 94 no. 1 bedroom/2 person apartments (c.45-58sqm each); 2 no. 2 bedroom/3 person apartments (c.69sqm each); 34 no. 2 bedroom/4 person apartments (c.73- 83sqm each); 24 no. 2 bedroom/4 person duplex apartments (c.93sqm each) and 7 no. 3 bedroom/5 person apartments (c.91-98sqm each) with north, south, east and west facing terraces/balconies throughout;
- Internal communal amenity spaces at ground and fourth floor levels comprising reception, gym, lounge, cinema/tv room, events rooms and ancillary areas (totalling c.508sqm);
- External communal open space including children's play areas and informal amenity spaces at ground floor level between Blocks A and B. Communal roof garden at fourth floor level. Total external communal open space c.1,005sqm; • Public open space at ground floor level to the east and south of Block B totalling c.1095sqm;
- 1 no. creche (c.163sqm) with associated outdoor play area at ground floor level (c.75sqm);
- 73 no. car parking spaces comprising 64 no. basement spaces, 4 no. accessible parking spaces and 5 no. visitor spaces at surface level;
- 354 no. bicycle spaces comprising 264 no. resident spaces at basement level and 90 no. visitor spaces at ground floor level;
- Reconfiguration/removal of existing car parking to the north of the site and access road resulting in a total of 28 no. car spaces serving the adjoining site;
- All associated plant including heating centres, gas room, water storage room, break tank room, comms room and bin storage at basement level, ESB substation and switch room at ground level and circulation spaces and stair and lift cores throughout;
- Vehicular/pedestrian access to the east from Belgard Road. Fire/emergency vehicle and pedestrian access to the south from Colbert's Fort;
- All associated site development and infrastructural works, services provision, foul and surface water drainage, extension to the foul network, access roads/footpaths, lighting, landscaping and boundary treatment works

2. EXECUTIVE SUMMARY

The purpose of this report is to outline infrastructure services for the site and also to confirm that the proposed development will be built in compliance with NZEB requirements as per the new Part L.

The proposed development, by reason of its location on a brownfield site, together with its density and layout, will promote the efficient use of land and of energy. Its location in relation to public transport and cycling routes will also reduce greenhouse gas emissions.

The development shall be constructed to achieve a high level of thermal efficiency with highly insulated building fabric and optimising passive solar gains. Our design employs that all apartments will have a very high energy performance & amount of energy required will be covered to a very significant extent by energy from renewable sources.

Our in-depth analysis and design modelling of the development will show that the most suitable system for the development would be a centralised system located in basement plantrooms.

The centralised system would include high efficiency heat pumps working together with modulating gas boilers in cascade arrangement providing heat and hot water for each apartment via heat interface units in each apartment. The design will also include provision for connection to Heatnet District heating which is currently being developed by South Dublin City Council once the system will be extended into the area.

3. BUILDING REGULATIONS

PART L & NEARLY ZERO-ENERGY BUILDING

The new Part L - Dwelling (2019) of building regulations was put in place and this document is the new standard for dwelling constructed after October 2019.

The Part L – Dwelling 2019 set building fabric and energy performance to achieve Nearly Zero-Energy Building. Nearly Zero-Energy Building (NZEB) means a building that has a very high energy performance as determined in accordance with Annex I of the EU Energy Performance of Buildings Directive Recast (EPBD Recast). 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.

EPC & CPC

In order to achieve the acceptable primary energy consumption rate for a nearly zero energy dwelling, the calculated energy performance coefficient (EPC) of the dwelling being assessed should be no greater than the Maximum Permitted Energy Performance Coefficient (MPEPC). The MPEPC for a nearly zero energy dwelling is 0.30.

To demonstrate that an acceptable CO₂ emission rate has been achieved for a nearly zero energy dwelling, the calculated carbon performance coefficient (CPC) of the dwelling being assessed should be no greater than the Maximum Permitted Carbon Performance Coefficient (MPCPC). The MPCPC for a nearly zero energy dwelling is 0.35.

RENEWABLE ENERGY RATIO

The Part L 2019 introduces Renewable Energy Ratio (RER) is the ratio of the primary energy from renewable energy sources to total primary energy as defined and calculated in DEAP. Minimum RER is 0.2 and this index is replacing Part L 2011 Renewable contribution.

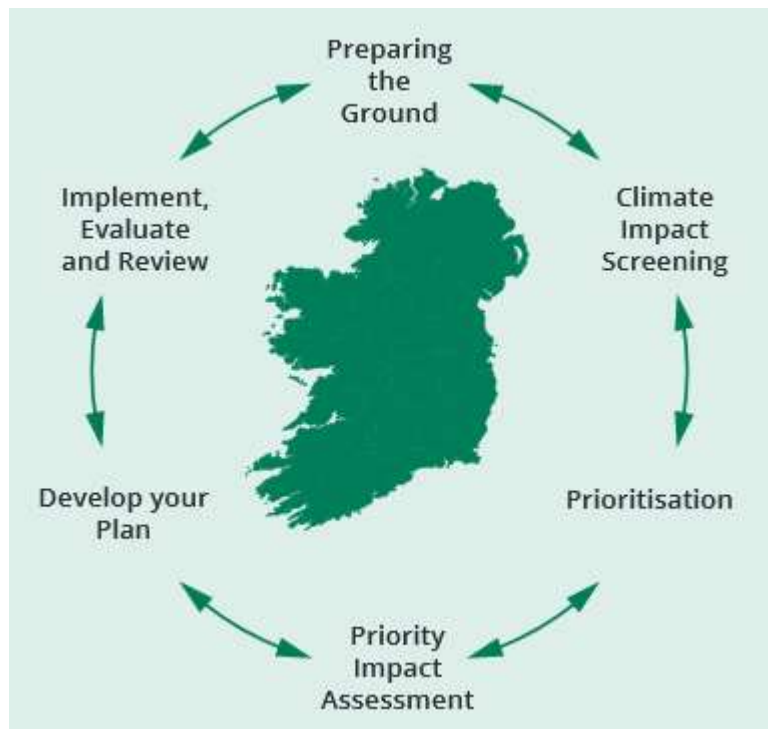
RENEWABLE ENERGY RATIO FOR COMMON AREAS

Where there are both common areas and individual dwellings in a building, reasonable provision would be to show that the average contribution of renewable technologies to all areas meets the minimum level of renewable provision to the individual dwellings and common areas combined. In case of apartment block, a proportion of the renewables should be provided to each area and individual dwelling in the building.

4. CLIMATE CHANGE ADAPTATION STATEMENT

Climate Change Adaptation Statement aims to ensure that this project will be better prepared to respond to current and future climate change impacts by reducing our vulnerability to climate change. Adaptation actions aim to reduce the impacts of climate change and also to take advantage of any opportunities presented by climate change.

Local Authority Adaptation Wizard provided by Climate Ireland was used as a baseline to prepare this statement.



This document divides adaptation responses into 3 basic categories:

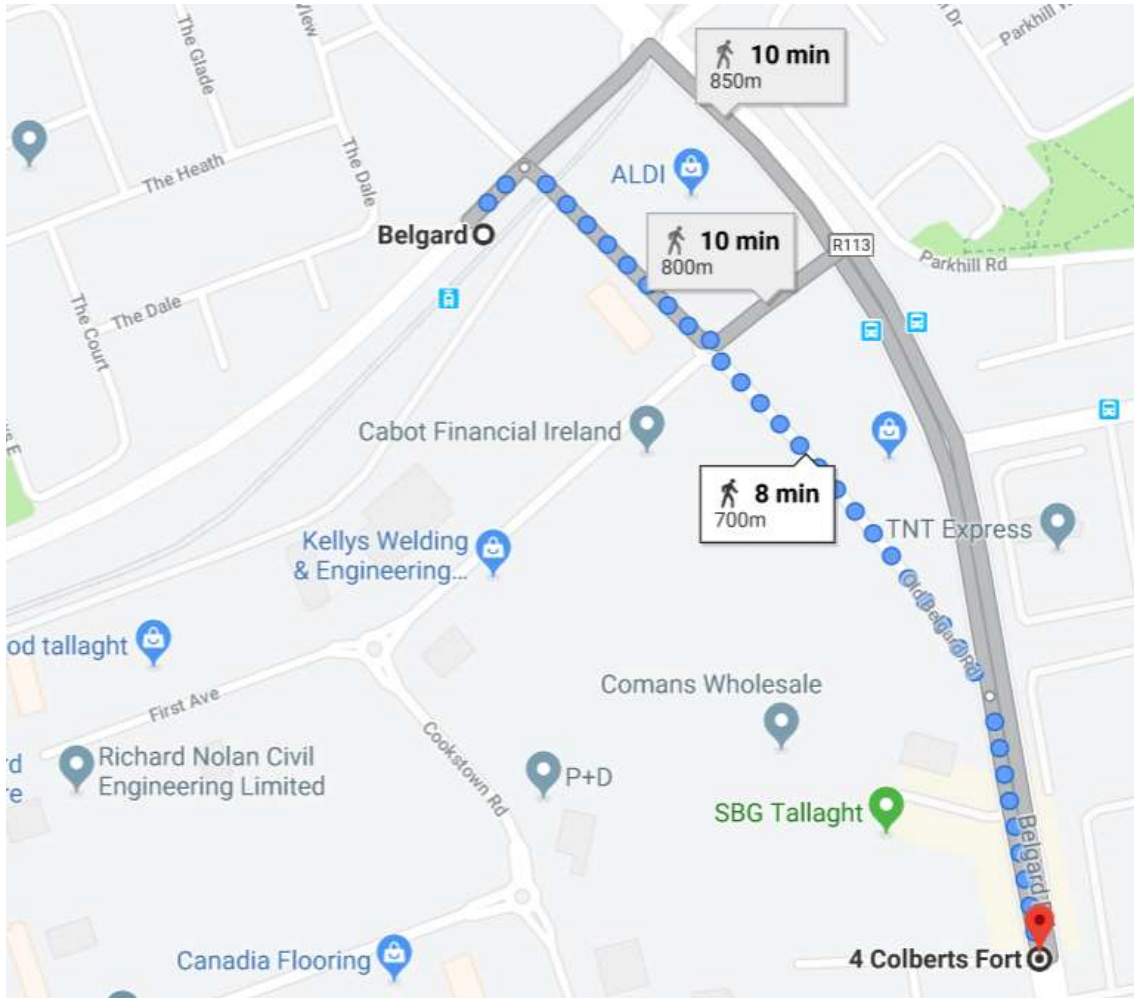
- Grey Actions - Technological and engineering solutions.
- Green Actions - Ecosystem based approaches that use the multiple services of nature
- Soft Actions - Managerial, legal and policy approaches that alter human behaviour and style of governance.

Climate Change Adaptation Statement provides effective strategies to lower Greenhouse Gases for the development, with respect to:

- Construction stage – waste management & recycling
- Services - lighting, space heating and hot water,
- Climate-dependent envelope changes – high levels of insulation, air-tightness
- Human behavior - using fewer resources, efficient appliances, efficient transport
- Renewable energy sources - solar photo-voltaics

PROJECT LOCATION

The location of the proposed development close to public transport routes will ensure good connectivity. Its location in walking distance to the Belgard LUAS stop and Bus Routes serving the area.



CLIMATE IMPACT SCREENING

Building sector has high energy demand which includes the energy used during construction, embodied energy of materials used and in addition there is energy demand of the buildings once occupied.

During the construction process waste is generated and efforts to reduce and recycle waste need to be incorporated.

Changes in climate are being observed and these impacts are expected to continue and intensify into the future. Risk of flooding would be assessed as part of the adaptation design.

ASSESS CLIMATE RISK

Energy Demand & Waste Materials – Construction

Energy demand of the construction process includes production and removal of waste generated on site.

Energy Demand – Occupied Building

Energy demand of the occupied apartments can contribute to the climate change as at present majority of generated energy comes from carbon-based fuels. Carbon footprint of the occupiers can be based on the commuting and consumption patterns.

Flood Risk

Extreme weather patterns can pose higher risk of flooding which can cause high economical damage and disruption to the community. Review of the flood risk is included in the Engineering services report and it is deemed to be outside the 1000 year flood events (Zone C)

IMPACT STATEMENT - ADAPTATION OPTIONS**Reduce Energy Demand – Grey Actions for the Occupied Building**

The development design includes measures to reduce carbon footprint of the building. High level of insulation and high-performance glazing will reduce the heating demand on the plant and on site produced renewable energy will further decrease the energy demand. Chapter 5 provides description of Energy & Sustainability which serve as the Grey actions to reduce the energy requirements of the building.

As part of the design process IS 399 was used to review the energy efficient design and to include the energy design. The design of the centralised plant will aid the adaptability of building and enable the building to be retrofitted or refurbished to meet higher energy efficiency standards into the future.

Behavioural Measures – Soft Actions for the Occupied Building

The way people use energy in the home, at work and in commuting between the two places, has the potential to save up to 20% of total energy consumption.

Many Irish households are unaware of the large ecological footprint that they have on the environment and how to easily save resources and prevent waste. Soft actions will aim to inform the building occupants on effective strategies to use less resources, efficient appliances, efficient use of their heating/hot water controls and efficient transport/commuting.

Reduce Energy Demand – Grey & Soft Actions during Construction

This is covered by the document 'CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT PLAN' which is included in this planning application. This document is intended to set a clear path and philosophy for the future nominated contractor in drawing up their own final strategy for Construction and Demolition Waste Management Plan.

Flood Risk

The site is deemed to be within Flood Zone C, i.e. outside the 1000 year flood events. The sequential approach recommended by "The Planning System and Flood Risk Management Guidelines for Planning Authorities" has been complied with for the subject site as it is within Flood Zone C.

IMPLEMENT, EVALUATE & REVIEW

The adaptation options outlined above should be implemented by the main contractor and after building handover by future management company. The management company will be responsible to develop a final implementation plan, a monitoring routine and a schedule of evaluation and review.

5. SUSTAINABILITY STATEMENT

To reduce energy demand of the dwellings the apartments will be constructed with high standard of insulation & air tightness. Additional energy demand reduction will be achieved by using heat recovery ventilation system and applying passive design techniques. The design of the fabric and plant will satisfy the requirements of new Part L Building Regulations and NZEB.

The specification of individual building elements, building services and items linked to energy efficiency was reviewed in detail for the typical apartment types occurring throughout the development to ensure compliance with the building regulations and requirements of the local council. The building shall be designed in such a way so that central core risers are all collectable & link to basement plantroom areas.

Key Sustainable Design Elements:

- High performance glazing in the windows.
- High levels of insulation
- A+ Low energy LED lighting throughout the development.
- High levels of air-tightness of the apartments.
- Demand controlled ventilation for each apartment
- High efficiency centralised plant serving heating & hot water requirements
- CHP for additional renewable energy produced on site

WINDOWS AND BUILDING FABRIC

All windows shall be double glazed windows with a combined thermal transmittance not greater than 1.2W/m²K. All windows shall comply with BS EN ISO 10077-1: 2006 - 'Thermal performance of windows, doors and shutters. Calculation of thermal transmittance'

Building fabric will include insulation levels sufficient to meet the Part L 2019 U-values.

Table 1. Building Elements U-values

Building Fabric Element	Target U values	Part L 2019 Target Elemental U-value
Exposed & Ground floor	0.18 W/m ² K	0.18 W/m ² K
External Wall	0.18 W/m ² K	0.18 W/m ² K
Flat Roof	0.2 W/m ² K	0.2 W/m ² K
External Windows & Doors	1.2 W/m ² K	1.4 W/m ² K

THERMAL BRIDGING ACCEPTABLE CONSTRUCTION DETAILS

Building Regulations TGD L Appendix D is defining thermal bridges that occur at junctions between building elements and are included in the calculation of transmission heat losses. The DEAP calculation includes thermal bridging, at junctions between elements and around openings.

For purpose of this statement and preliminary BER results a value of $\gamma = 0.08 \text{ W/m}^2\text{K}$ was used. Value 0.08 W/m²K may be used for new dwellings whose details conform with "Limiting Thermal Bridging and Air Infiltration – Acceptable Construction Details" as referenced in Building Regulations 2011 TGD L. This requires that the details described in the above document are adhered to and relevant drawings be signed off by the site engineer or architect.

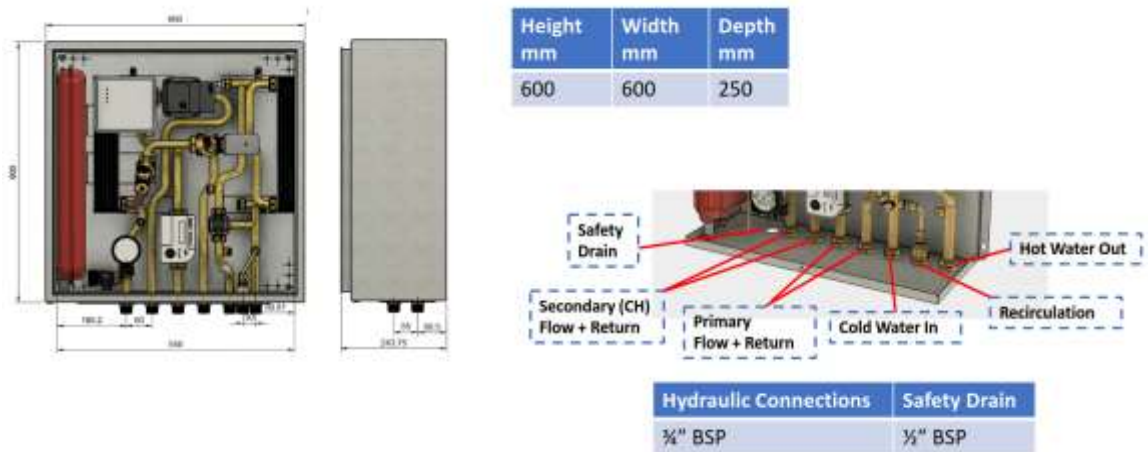
AIR PERMEABILITY

Part L (2019) specify 5 m³/m²/hr @ 50Pa as upper limit for air permeability and also that every house needs to be tested. To reduce heat loss by infiltration the target air permeability will be 3.0 m³/m²/hr @ 50Pa

Air permeability shall be measured by means of pressure testing of a building prior to completion in accordance with BS EN ISO 9972:2015 ‘Thermal performance of buildings. Determination of air permeability of buildings. Fan pressurization method ‘

HEAT INTERFACE UNIT

Each apartment will be fitted with a Heat Interface Unit (HIU) which shall be wall mounted and designed to provide indirect space heating and Instantaneous DHW. The HIU has compact dimensions and greatly reduces the area required for plant within the apartments. Each unit contains an ultrasonic heat meter to fitted with MBUS communications which will be linked back to plantroom and provide a record of heat and hot water used by the occupier for purpose of billing.



Heat Interface Unit (HIU)

VENTILATION

Part F of building regulations requires 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.

It is proposed that the demand controlled ventilation system will serve each unit to provide high indoor air quality for the occupants.

The design of dwellings shall provide required area of background ventilators via wall vents/trickle vents & undercut doors to wet rooms to provide fresh air in place of extracted air from the wet rooms. Systems should be installed, balanced and commissioned by competent installers eg Quality and Qualifications Ireland accredited or Education Training Board or equivalent. Systems when commissioned and balanced should then be validated to ensure that they achieve the design flow rates by an independent competent person eg NSAI certified or equivalent.

ENERGY SAVING LIGHTING

The new DEAP requires a detailed design of lighting for each dwelling. For this project the calculation of lighting use shall be based on the installed fixed lighting, and on the contribution of daylight. The calculation will include low-energy lighting provided by fixed outlets based on lighting design details (e.g. lamp power and efficacy), lamp type, and number of lamps.

CENTRALISED PLANT

Part L renewable energy compliance shall be achieved by implementing of high efficiency centralised heating system. The Part L renewable contribution shall be covered by the use of heat pumps and CHP. High efficiency gas boilers will be incorporated into the system. A space allowance analysis has been carried out to ensure adequate plant space is provided to facilitate Plant & Equipment and sufficiently sized services risers are provided.

All pumps serving the plant to be A rated energy efficiency. Advanced Building Energy Management system will control the plant to ensure its operation to maximum efficiency.

We have liaised with Gas Networks representative and they have confirmed there is 125 PE 4 BAR Gas Main available adjacent to the site.

Use of low carbon technology includes Combined Heat and Power (CHP) system. Design of CHP will be in accordance with CIBSE Manual AM 12 Combined Heat and Power in Buildings. Section 4.4 of CIBSE Manual AM 12 details an operating model for CHP sizing and recommends the use of an hour by hour model over a whole year with heat and electricity demand profiles representing an average year.

The design of the CHP system will take account of the output rating of the appliance and the design thermal profile for the development to ensure the system is suitable for the building application (simultaneous electrical and thermal profile requirements) and not oversized.

DISTRICT HEATING PROVISION

South Dublin County Council is now leading Heatnet project to develop South Dublin County's first public district-heating network. The project is in the area which would be covered by the network and the design will also include provision for connection to District Heating System.

The provision will entail dedicated area which shall remain sterile of services to bring the district heating pipework into the plantroom. In the plantroom space allowance will be included for the plate heat exchangers and ancillary equipment.