NZEB & Part L Planning Compliance

For the

Mechanical and Electrical Services Installations

At

Our Lady's Grove, Goatstown Road, Goatstown, Dublin 14

For

Colbeam Limited

Date of Issue: 08/01/2021 Revision: 2

Document History

Revision No.	Description	Prepared By	Reviewed By	Date
Rev 0	Draft Planning	RMK/EN	RM	13/03/2020
1	Revised Planning	RMK/EN	RM	15/06/2020
2	Revised Planning layouts	EN	RMK	08/01/2021

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1. Planning Overview

Colbeam Limited intend to apply to An Bord Pleanála for permission for a strategic housing development at Our Lady's Grove (which includes an existing childcare facility 'The Grove After School Care', Our Lady's Grove Goatstown Dublin 14, D14 V290 and D14 N8C2), Goatstown Road, Goatstown, Dublin 14.

The development will principally consist of: the construction of a Student Accommodation development containing 698 No. bedspaces with associated facilities located in 8 No blocks, which range in height from part 3 No. storeys to part 6 No. storeys over part lower ground floor level (7 No. storeys as viewed from an internal courtyard). Some 679 No. bedspaces are provided in 99 No. clusters ranging in size from 5 No. bedspaces to 8 No. bedspaces, each with a communal Living/Kitchen/Dining room. The remaining 19 No. bedspaces are accessible studios. The includes the provision of communal residential amenity space at lower ground floor level (349 sq m) including the provision of a movie room (108 sq m), a music room (42 sq m) and a laundry (37 sq m); communal residential amenity space (1,356 sq m) at ground floor level including the provision of a gym (228 sq m), reception desk and seating area (173 sq m), a common room (338 sq m), a study space (104 sq m), a library (64 sq m), a yoga studio (74 sq m), a prayer room (33 sq m) and group dining (33 sq m).

The development also includes staff and administrative facilities (195 sq m); 9 No. car parking spaces; 4 No. motorcycle parking spaces; 860 No. cycle parking spaces; refuse stores; signage; an ESB substation and switchroom; boundary treatments; green roofs; PV panels; hard and soft landscaping; plant; lighting; and all other associated site works above and below ground. The development includes the demolition of part of the Goatstown Afterschool building (558 sq m) and the construction of a new external wall to the remaining ope, in addition to the demolition of a prefabricated structure adjacent to the Afterschool building (161 sq m).

2. Executive Summary

With consideration to the EU energy performance of Buildings Directive (EPBD), the Building Regulations Technical Guidance Document, Part L (NZEB), and Dublin Local Authorities strategy for sustainable design and reductions in energy and carbon emissions; the building services design strategy in the proposed development building is to utilise sustainable design options and energy efficient systems that are technically, environmentally and economically feasible for a project of this kind.

Nearly Zero Energy Building (NZEB) means a building that has a very high energy performance and is designed to nearly zero or very low amount of energy required to be covered by energy from renewable sources produced on-site or nearby.

The NZEB compliance assessment is based on following on the Building Regulation 2019 Part L, Conservative of Fuel and Energy – Dwellings. Where the different requirement is included the setting of minimum energy performance requirement for buildings to achieve Nearly Zero Energy Buildings.

The current Dwelling Energy Assessment Procedure (DEAP) software preliminary calculation software and Part L of the 2019 Building regulation were used as the basis of this exercise.

3. Introduction

Axiseng were commissioned by Colbeam Limited to carry out Nearly Zero Energy Building (NZEB) assessment on the proposed 698 bed Student Accommodation at Our Lady's Grove, Goatstown Road, Goatstown, Dublin 14.

The building includes the following number of energy conservation measure in aiming to achieving best energy performance as possible as following;

- High-performance construction envelope including low u-value and g-value
- Air tightness construction
- Energy metering
- Central Heat Pump system for domestic hot water generation
- Mechanical Ventilation with Heat Recovery
- Low installed lighting power
- PV to landlord areas

The inputs used to perform the analysis are summarised in the following section. This report details the proposed design solution used in the analysis and the calculation of the building performance metrics used to show indicative results whether it is in compliant with the NZEB under the regulation.

The department of housing, planning and local government have released a Part L of the 2019 Building regulation which proposes an amendment to Regulation L3 (b), available to be downloaded from below link;

https://www.housing.gov.ie/sites/default/files/publications/files/tgd_l_dwellings_2019.pdf

To meet target set out for proposed development, the energy modelling software, the analysis used IES <VE2019> software which uses the new SBEMie 5.5h calculation engine has been undertaken to identify the best-fit proposed design in the development.

Under new Part L document, the renewable energy ratio (RER) has been revised to 0.2, which mean 20% of the primary energy delivered to the proposed residential development must be contributed by renewable energy technologies, setting the precedent challenge for the proposed development.

4. Design Inputs

The sustainable design of the proposed development presents an opportunity for each block to perform energy efficiently and meet the NZEB challenges. The following table outline a list of different elements taken through passive and active measures, which has been design to reduce energy, carbon emission, and cost through buildings lifecycle. The following table highlights the proposed inputs utilised in the SBEMie assessment for each block identified in the development;

Measures	Description	Outcome

High Performance Construction Fabric	The construction u-values set out for dwelling building is lower than u-values requirement set out in the building regulation 2019. U-value (W/m²k) Window = 1.2 (g-value 0.3) Wall = 0.16 Roof = 0.15 Floor = 0.14 A number of passive solar design has been considered including the window design option to maximising daylight and solar heat gains during winter to reduce the artificial lighting and space heating load. The high-performance wall, roof, and glazing is being considered and selected to minimise the heat transfer into the internal spaces. Aside from the reduction in heating energy consumption and carbon emissions, the reduction in loads results in reduced plant capacity and size & any potential overheating to occupied spaces. This has the net effect of reducing embodied energy consumption associated with manufacture and transportation associated with the plant, as well as the reduced input from the national electricity grid for heating	Minimise heat loss and gain impact on heating requirement all-time during year, thus lowering energy and carbon footprint impact.
Air Tightness Construction	The building will be designed to ensure it is in compliant with the building regulation and achieving air tightness <3 m3/(h.m2) or 0.10 - 0.15 ach infiltration.	Minimise heat losses through the building fabric thus lowering heating load.
Thermal Bridging	The limitation of thermal bridging will be achieved in according with guidance under section 1.3.3.2 within technical guidance Part L regulation (NZEB), where provision for thermal bridging is made in accordance with guideline with the following approach under 2) Use certified details which have been assessed in accordance, and comply with details in Part L (2017), e.g. certified by a third party certification body such as Agrément or equivalent; or certified by a member of the NSAI approved thermal modellers scheme or equivalent; or certified thermal bridging details from an accredited database such as the BRE Certified Thermal Details and Product Scheme for all key junctions. .	Minimise heat losses at junctions between construction element, thus lowering energy consumption and carbon emission. Air permeability and thermal bridging inputs should be reviewed to allow a reduction in thermal qualities of the façade elements.

HVAC system	Ventilation System The bedrooms & kitchens will be naturally ventilated. Tenant amenity spaces are fitted with balanced mechanical ventilation with plate heat exchanger recovery. The plate heat exchanger efficiency is 85%. The specific fan power of mechanical ventilation box is to be selection upon based on rating of less than 0.49 (w/(l/s)).	Heat recovery via warm air from occupied amenity spaces allow for heat transfer to incoming air thus reduce the heating load requirement in the space, thus increasing heating plant operating performance overall.
	Heating system Each bedroom/kitchen will be fit with electric heating. High performance U-values will limit heat loss from the space, reducing heater size. Amenity spaces will be heated and cooled via high efficiency VRF system.	
	Hot Water System & Appliances Air to water heat pumps in conjunction with high efficiency gas fired boilers will be used to produce hot water to each cluster. The water will be part of a central plant system, to allow for diversity, reducing the overall load/capacity required. All hot water taps including the shower head fitting in the proposed development are to be fitted with intelligent water flow regulators to all for full water flow until the discharge rate reaches six litres per minute, to allow for the conservation of water usage as well as energy used to heat hot water. Water storage tank 'Format 30' will be insulated with thickness up to 40mm to minimise heat loss.	Minimise hot water usage, thus reducing heating energy load and increasing heating plant operating performance and reducing the cost.
PV	A number of PV cells will be installed at roof level to offset landlord electrical requirements in order to achieve Part L/NZEB compliance. The number of PV required will be determined on the final plant selection for heat pump systems based on detail calculations of the central hot water plant.	Reduce electrical energy consumption
Building Energy Management System	Central BMS – check metering (heating & SDBs) of all individual floors to monitor & optimise substantive energy use. The energy management system will continuously review and fine-tune the operational efficiencies and strategy for the various building services, significantly reducing clients' overall energy consumption and carbon footprint, and reducing energy costs.	Continuously energy monitoring allows for further energy saving quantified through building lifecycle thus lowering overall cost and carbon footprint.
Result	Energy Performance Coefficient (EPC) = Carbon Performance Coefficient (CPC) =	1.00 1.07

	Renewable Energy Ratio (RER) = BER =	0.30 A

4.1 Design Forecasting

While the current design model is based on hot water heat pump system & PV cell solution to achieve Part L and NZEB compliance and taking into account design progress in energy efficient solutions a number of alternative solutions had been reviewed during the planning stage energy modelling process. When the design moves into further detail stages the latest technologies will be further reviewed to ensure the most effective solution for the project is utilised. These may include a combination of high efficiency gas fired boilers and CHP in conjunction with heat pumps.

Approximate number of PV cells required for the development for compliance – these can be located on any of the buildings within the development to meet the overall compliance.

Block	No. of PV	Total kW	Roof area requirement
South/Middle/ North/Mews	408	140	Can be distributed across any buildings

5. Results

The results show that the number of proposed student accommodation bedspaces has an average Energy Performance Coefficient (EPC) 1.0 which is in line with the maximum permitted energy performance coefficient (MPEPC) of 1.0. The results show that the number of proposed student accommodation bedspaces units has an average Carbon Performance Coefficient (CPC) 1.07 which is less than the maximum permitted energy performance coefficient (MPEPC) of 1.15. The result shows average renewable energy ratio target is achieved with results ranging between 0.31 in a number of student accommodation bedspaces units.