Part L Planning Compliance

For the

Mechanical and Electrical Services Installations

At

Hacketstown, Skerries, Dublin

For

Land Development Agency

Date of Issue: 10/03/2023 Revision: 03

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Document History

Revision No.	Description	Prepared By	Reviewed By	Date
Rev 01	Planning Issue	EN	NH	09/04/2021
Rev 02	Draft Issue	DN	NH	28/01/2022
Rev 03	Updated Planning Issue	DN	NH	10/03/2022

Contents

1. Planning Overview

[The Land Development Agency, intend to apply to An Bord Pleanála for a ten year permission for a strategic housing development at this site located at Hacketstown in the townlands of Milverton, Townparks and Hacketstown, Skerries, Co. Dublin. The subject lands are accessed via Golf Links Road to the south and Ballygossan Park Phase 1 to the north. The site is bound by the Dublin – Belfast railway line to the west, the Golf Links Road to the east and south, and by individual houses to the east and south. The application site is c. 6.7 hectares.

The development entails 345 no. residential units comprising of 84 no. 1-bed units, 104 no. 2-bed units (68 no. 2-bed apartments and 36 no. 2-bed duplexes), 157 no. 3-bed units (118 no. 3-bed duplexes and 39 no. 3 - bed houses) ranging in height from 2 no. – 4 no. storeys. The proposed development is set out in 8 blocks.

In addition the development includes Public Open Space and communal open space is proposed to serve the apartments, car parking spaces and Childcare and community facility.

2. Executive Summary

The purpose of this document is to detail in broad terms how the developments incorporates sustainability and energy efficiency into the development with the focus being on TGD L.

The initial design proposals as set out in this document has considered the EU energy performance of Buildings Directive (EPBD), the Building Regulations Technical Guidance Document, Part L (NZEB), and the Local Authorities strategy for sustainable design and reductions in energy and carbon emissions.

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.

On this basis the building services design strategy in the proposed development is to utilise sustainable design options and energy efficient systems that are technically, environmentally, and economically feasible for a project of this kind.

To demonstrate the energy efficiency, Part L and NZEB compliance the current Dwelling Energy Assessment Procedure (DEAP) software preliminary calculation software and Part L of the Building regulation has been used as the basis of this exercise.

The report demonstrates the proposed strategy will meet the energy and sustainability targets for this development

3. Introduction

Axiseng were commissioned by The Land Development Agency to carry out Nearly Zero Energy Building (NZEB) assessment on proposed residential houses and apartment units at Hackettstown, Skerries, Co. Dublin.

This purpose of this report is to detail the energy efficient elements incorporated onto the design of the new residential units and demonstrate compliance with TGD Part L, Conservative of Fuel and Energy – Dwellings.

4. Strategy - Part L Conservation of Fuel & Energy - Dwellings

The strategy and approach to design is to for the firstly address the passive measures through building fabric, then active measures through efficient services and finally once energy use is minimised implement renewables to supply the energy.

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

- Passive
    - High-performance construction envelope including low u-value and g-value
    - Air tightness in construction
    - Minimise Thermal Bridging
- Active
    - Mechanical ventilation with Heat Recovery
    - Low Energy LED Lighting
    - Efficient Controls
- Renewable
    - Air Source heat Pumps
    - Exhaust Air Heat Pumps

The initial design has been developed on the basis of the above together the new Part L document where the renewable energy ratio (RER) has been revised to 0.2, which means 20% of the primary energy delivered to the proposed residential development must be contributed by renewable energy technologies. The design has been developed and the analysis carried out using the current Part L version of the Dwelling Energy Assessment Procedure (DEAP) software v4.

The inputs used to perform the analysis are summarised in the following section together an overview of 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.

5. Design Inputs

The sustainable design of the proposed development presents an opportunity for each dwelling unit to performs energy efficiently and meets the NZEB challenges.

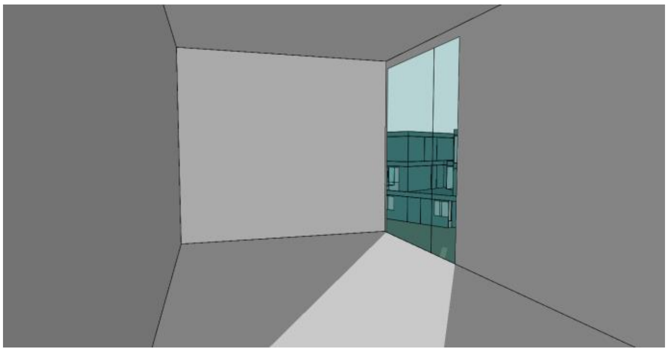
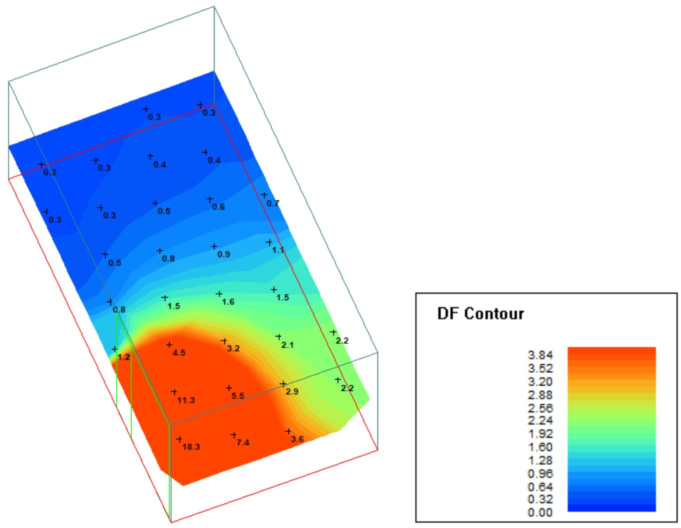
The following table outline a list of different elements taken through passive and active measures, which has been designed to reduce energy, carbon emission, and cost through buildings lifecycle.

Different apartment and housing unit types within the proposed development have been chosen as a representative sample of the proposed development in Part L. For the purpose of this exercise, more than 15 units identified is taken best-worst case sample used in the Part L assessment to demonstrate the compliant against TGD Part L.

The following table highlights the proposed inputs utilised in the DEAP assessment for apartment units in development building;

<table>
<tr><th>Measures</th><th>Description</th><th>Outcome</th></tr>
<tr><td>Sample Apt Unit tested</td><td>A Type Triplex
B1 Type Mid-Terrace
E Type ground, 1st floor and Top floor
D2 Type Duplex
C1 Type Mid-Terrace, ground, top floor
D1 Type Semi Detached Duplex
A Type Semi Detached Duplex
B Type Terrace
C House
C Type Wide House</td><td>A representative sample of apartment unit selected on poor-performing basis compared to other units.</td></tr>
<tr><td>High Performance Construction Fabric</td><td>The construction u-values set out for dwelling building is lower than u-values requirement set out in the building regulation.
<table>
<tr><th>Element</th><th>U-value (W/m2k)</th></tr>
<tr><td>Window</td><td>1.2 (g-value 0.5)</td></tr>
<tr><td>Door</td><td>1.2</td></tr>
<tr><td>External Wall</td><td>0.18</td></tr>
<tr><td>Roof</td><td>0.12</td></tr>
<tr><td>Floor</td><td>0.12</td></tr>
</table>
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. 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.</td><td>Minimise heat loss and gain impact on heating requirement all-time during year, thus lowering energy and carbon footprint impact.</td></tr>
<tr><td>Air Tightness Construction</td><td>The building will be designed to ensure it is in compliant with the building regulation and achieving air tightness between 2 - 3 m3/(h.m2) or 0.10 - 0.15 ach infiltration.</td><td>Minimise heat losses through the building fabric thus lowering heating load.</td></tr>
<tr><td>Thermal Bridging</td><td>The limitation of thermal bridging will be achieved in according with guidance under section 1.3.3 within technical guidance Part L regulation, where provision for thermal bridging is made in accordance with guideline. To account for thermal bridging allowances for additional heat loss, it is</td><td>Minimise heat losses at junctions between construction element, thus lowering energy</td></tr>
</table>

	assumed construction elements between the junction will be designed to achieve allowance less than 0.08 (W/m2k) factor. To achieve 0.08 w/m2k. acceptable construction details (ACD) checklist must be completed for all junctions otherwise use certified details by thermal modeller or BRE database must be carried out to achieve the target of 0.08 w/m2k for thermal bridging	consumption and carbon emission. Air permeability and thermal bridging inputs should be reviewed to allow a reduction in thermal qualities of the façade elements.
Daylight & Lighting	Provision of natural daylight in buildings creates a positive environment by providing connectivity with the outside world, and assisting in the well-being of the building inhabitants. Daylight also represents an energy source - reducing the reliance on artificial lighting. The provision of full-height glazing on the elevations maximise the use of natural daylight to enhance visual comfort, without compromising thermal performance.   *Figure: An example of Daylight modelling & daylight factor result in typical bedroom on top floor apartment unit with ADF result of 2.75% taken from radiance toolkit, IESVE software* Majority of lamps selection will be based LED type (A+ Rated bulb) located externally, and internally in circulation spaces, bedroom, lobby, living/dining etc in 30-35% reduction in electrical energy usage. It is assumed the total wattage power for each apartment compartment ranging between 300 - 600 watts. It is assumed each LED type lamp will achieve minimum efficiency value of 66.9 lumen/watt per bulb.	Reducing lighting electricity energy consumption, thus reducing carbon emission footprint overall. Enhance healthier residence environment the use of natural daylight. Minimise the time in controlling the lighting system, thus reducing cost. Free heating from solar load, reducing heating load.
	Different HVAC system have been identified and selected for dwelling house and Apartment units;	Heat recovery via warm air from wet room and

HVAC system

Dwelling type	HVAC solution
A Type Kink Triplex	Mix – 1&2 bed single level EAHP & upper level 2 storey Air to water HP / MEV
A Type Triplex	Mix – 1&2 bed single level EAHP & upper level 2 storey Air to water HP / MEV
B1 Type Mid-Terrace Duplex	Air to water HP / MEV
B2 Type Semi-D Duplex 2	Air to water HP / MEV
C1 Type Mid-Terrace Duplex	Air to water HP / MEV
C2 Type Mid-Terrace Duplex	Air to water HP / MEV
D1 Type Duplex Semi D	Air to water HP / MEV
D2 Type Duplex Semi D	Air to water HP / MEV
D2 Type Duplex Detached	Air to water HP / MEV
E & F Type Apartments	Single level EAHP
House Type A Semi D	Air to water HP / MEV
House Type B Terrace	Air to water HP / MEV
House Type C Wide	Air to water HP / MEV

1. Ventilation System
Each Duplex apartment compartment is to be fitted with balanced mechanical ventilation with plate heat exchanger recovery. The plate heat exchanger efficiency is 92%.

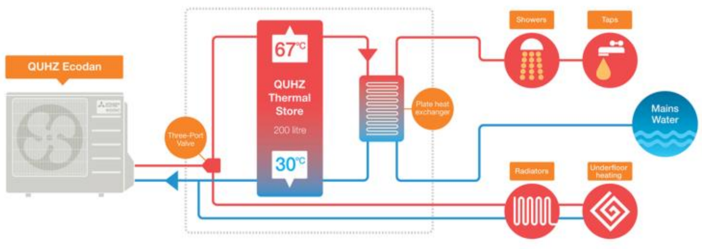
The specific fan power of mechanical ventilation box is to be selection upon based on rating of less than 0.50 (w/(l/s)).

2. Ventilation System
An exhaust ventilation as part of Exhaust Air Heat Pump system (EAHP) will extracts air via ventilation ducts in the wet rooms of the units. Extracted air are passed through ducting into the heat pump. Fresh air will be drawn through passive vent into bedroom and living room.

The specific fan power of mechanical ventilation box is to be selection upon based on rating of less than 0.29 (w/(l/s)).

kitchen to allow for heat transfer to incoming air thus reduce the heating load requirement in the apartment compartment, thus increasing heating plant operating performance overall.

1. Heating system
In Duplex apartment proposed to have air to water pump for hot water load and radiators (ASHP). These units will sit locally external to the outside Duplex apartment, with an indoor cylinder & radiator.

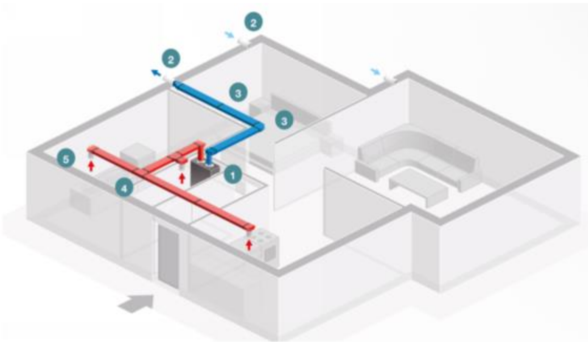


The overall efficiencies of ASHP system is to be selection upon based on rating between 620-735%

2. Heating System

ASHP will perform efficiently with low temperature radiator, as it can distribute the heat over a large surface area at a temperature as low as 35oC thus increasing seasonal coefficient performance throughout the year and lowering running cost. Overall higher COP comparing to other heating plant system option.

The system does not require the same plant and riser space associated with a district

	Exhaust Air Source Heat Pump (EAHP) will be used for heating and hot water generation for all Simplex residential unit. This system also provides the ventilation required within the unit. An example of EAHP system built in;  An example of Joule Victorium A4 system built-in The overall efficiencies of EAHP system is to be selection upon based on rating between 439-473%	heating scheme however it does require an area within the utility space to be installed. The use of a heat pump solution means that the end user can control who they purchase their energy from. Within the scheme there will be a requirement to access each apartment to carry out periodic routine maintenance.
	Hot Water System & Appliances 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 8 litres per minute, to allow for the conservation of water usage as well as energy used to heat hot water. The water use target for hot and cold will be less than 125 litres per day. This can be achieved by a combination of low water usage devices in apartment unit. The overall efficiency of the main hot water system in EAHP and ASHP design should be at least over 290%	Minimise hot water usage, thus reducing heating energy load and increasing heating plant operating performance and reducing the cost.
Building Energy Management System	No central control will be provided, however local time clocks, with remote accessing and temperature stats will regulate temperature and demand within the space.	Continuously energy monitoring allows for further energy saving quantified through building lifecycle thus lowering overall cost and carbon footprint.
Result	Energy Performance Coefficient (EPC) = 0.257 – 0.297 Carbon Performance Coefficient (CPC) = 0.253 – 0.288 Renewable Energy Ratio (RER) = 0.27 – 0.47 (47% - 51%) Building Energy Rating = A2	Part L/NZEB compliant

5.1 Design Forecasting

While the current design model is based on heat pump system 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. Adhering to planning conditions & building regulations, alternate M&E systems may be explored for the scheme.

6. Results

In conclusion, based on the passive, active and renewable elements incorporated the development complies with the Part L and NZEB requirements and is achieving an A2 / A3 BER.

The results show that the number of proposed apartment units analysed has an Energy Performance Coefficient (EPC) between 0.257 and 0.297 which is less than the maximum permitted energy performance coefficient (MPEPC) of 0.3.

The results show that the number of proposed apartment units analysed has a Carbon Performance Coefficient (EPC) between 0.253 and 0.288 which is less than the maximum permitted energy performance coefficient (MPEPC) of 0.35.

The result shows renewable energy ratio target is achieved with results ranging between 0.47 to 0.51 (47% - 51%) in the dwelling units analyised.