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CONSULTING ENGINEERS

Proposed development at

Farganstown

FOR MEATH CO. CO.

Compliance Report on Part L, HC 12 Building Energy Rating Assignment incorporating Energy Efficiency and Climate Change Adaptation Design Statement

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Document History

Version	Issued	Comments
A	2nd October 2020	Draft For Planning

Contents

1 EXECUTIVE SUMMARY

This document provides an overview of the developments energy strategy and relates to the sustainability and energy targets set by nZEB and also the resulting Building Energy Rating (BER) A2 Target.

By targeting the above criteria the development shall approach the energy design in an efficient manner that reduces energy demand initially through passive strategies such as an efficient envelope which in turn reduces the energy demands relating to the operation of the buildings. This initial approach in reducing the energy demand significantly which shall result in the scheme project achieving the required energy goals. Performance criteria relating to the development is set out in the following 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 the related energy cost. Specifications relating to efficient heating, hot water, lighting and auxiliary equipment are set out in the document.

2 INTRODUCTION

This report is to identify the energy efficient measures associated with the design, construction, operation and maintenance of the proposed development.

As part of the design consideration to reduce energy consumption, a number of sustainable design features shall be included.

The EU Directive on the Energy Performance of Buildings (EPBD) contains a range of provisions aimed at improving energy performance of residential and non-residential buildings, both new-build and existing. This Directive was adopted into Irish law as Regulation in 2006.

The EPBD obliges specific forms of information and advice on energy performance to be provided to building purchasers, tenants and users. This information and advice provide consumers with information regarding the energy performance of a building and enables them to take this into consideration in any decisions on property transactions.

As part of the Directive, a Building Energy Rating (BER) certificate, which is effectively an energy label, will be required at the point of sale or rental of a building, or on completion of a new building. As such the Dwellings Energy Assessment Procedure (DEAP) was created a base procedure in which the BER can be calculated. The Dwelling Energy Assessment Procedure (DEAP), which is the Irish official procedure for calculating and assessing the energy performance of dwellings. The procedure takes account of the energy required for space heating, ventilation, water heating and lighting, less savings from energy generation technologies. For standardized occupancy, it calculates annual values of delivered energy consumption, primary energy consumption, carbon dioxide emissions and costs, both totals and per square meter of total floor area of the dwelling.

The report sets out to discuss options of methodologies in Energy Efficiency, Conservation and Renewable Technologies that will be employed in part or in combination with each other.

The report also considers all the options available to comply with the proposed NZEB regulations:

The NZEB regulation would dictate that a typical single unit dwelling would be in the order of: 15-30 kWh/(m2.y) of net primary energy with, typically, 50-65 kWh/(m2.y) of primary energy use covered by 35 kWh/(m2.y) of on-site renewable sources;

To comply with the European NZEB requirements, in January 2017 the Irish Government has amended the Building Regulations Part L – Conservation of Fuel and Energy – Dwellings (and the accompanying Technical Guidance). The revised Part L regulations require domestic buildings to meet the below NZEB amendments:

0.7.1: In accordance with Directive 2010/31/EU of the European Parliament and the Council of 19 May 2010 on the energy performance of buildings (recast), all new dwellings will be nearly zero energy dwellings by 31 December 2020.

0.7.2: Nearly Zero Energy Building means a building that has a very high energy performance, as determined in accordance with Annex I to Directive 2010/31/EU of the European Parliament and the Council of 19 May 2010 on the energy performance of buildings (recast)(O.J. No. L 153, 18.6.2010, page 13). 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.

0.7.3: 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.

0.7.4: 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."

We are currently waiting for SEAI and the Department of Housing to release the updated part L & Part F. Of which compliance and energy figures can be clarified as compliance is based on the preliminary material provided by SEAI to date.

3 THE DEVELOPMENT

This energy report has been prepared in support of a planning application on behalf of Meath County Council Housing Department.

The application is seeking permission for the development known as Farganstown Social Housing Development, Co. Meath. The development shall range in height from 2 to 4 storeys and will incorporate a mixture of main apartment buildings and a small selection of semi-detached houses to the rear of the site. The total site area will be in the order of 1.7Ha. Access to the site shall be via a proposed access road and associated site road network.

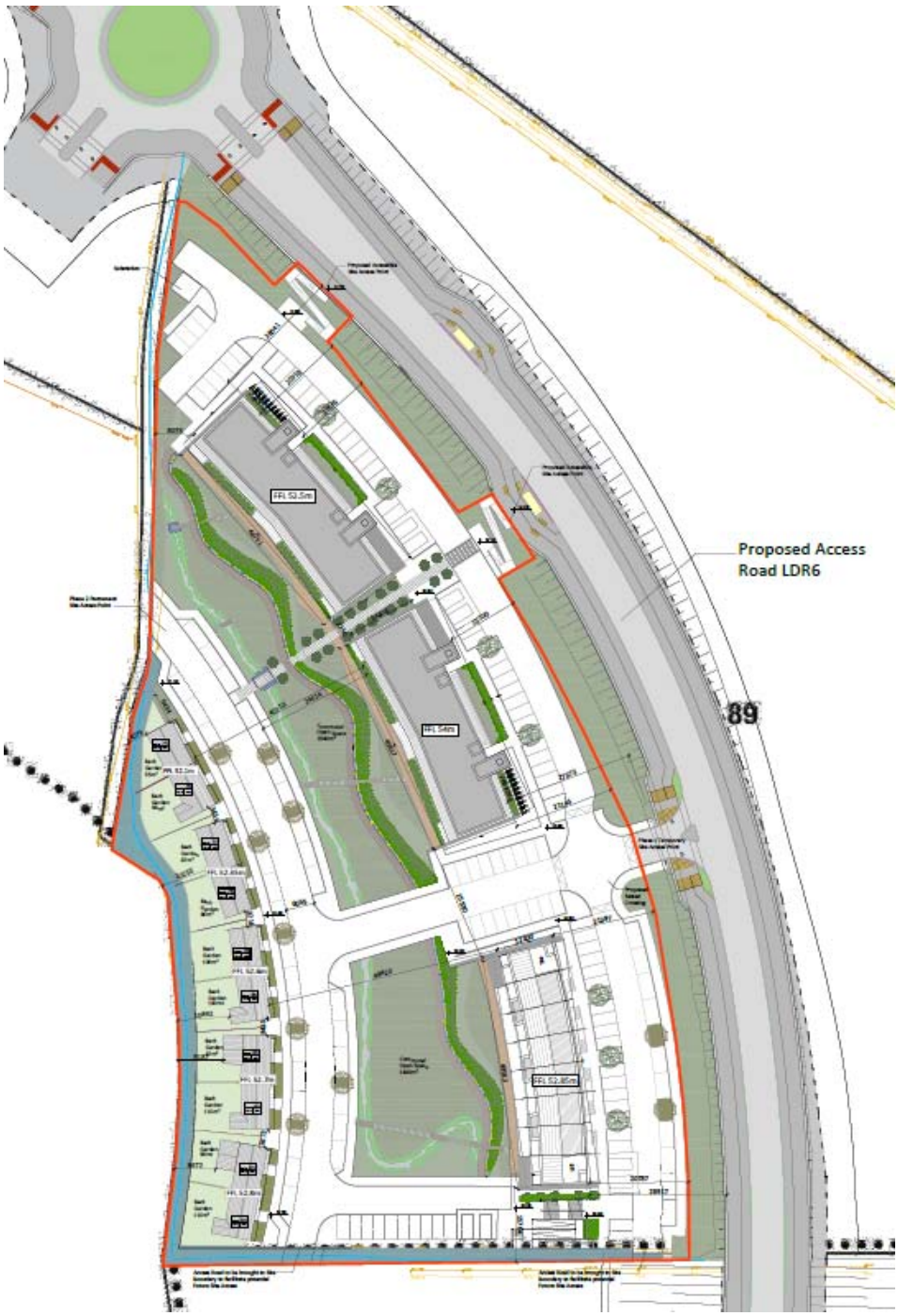


Fig 3.1: Proposed Site Plan

4 STRUCTURE AND BUILDING ELEMENTS

While the construction works will incur an initial investment, the lifetime running cost of the units must be considered to reduce water, fuel and electrical energy consumption. To that end methods will be explored to further improve the building's energy rating and reduce the carbon emissions. This includes decreasing the thermal conductivity (heat losses) of the building fabric, take advantage of passive solar gain to reduce the heating demand in the space and increase day-lighting to reduce artificial lighting.

4.1 FABRIC 'U' VALUES EMPLOYED FOR EXEMPLAR STUDY

- Walls - 0.13 W/m2.K
- Window - 0.9 W/m2.K (solar fraction (g factor) of 0.65 or greater, Frame factor of 0.7 or better)
- Roof - 0.11 W/m2.K
- Doors - 1.5 W/m2.K (This is to include frame)
- Ground Floor slab - 0.14 W/m2.K

4.2 THERMAL BRIDGING

A thermal bridging factor of 0.08 is utilized at this early stage in the design process, in line with TGD "Acceptable Construction Details".
It is proposed that the Project Architects shall employ a separate third party to carryout thermal analysis of each building junction. This process will be iterative and shall be developed during the design process with a view to developing an overall energy strategy.

4.3 AIR PERMEABILITY (AIR TIGHTNESS AGAINST INFILTRATION)

One of the most significant heat loss factors in any building is through controlled and uncontrolled ventilation through the introduction of ambient/outside air into the heated space. The dwellings are to be constructed with a high degree of air tightness to a possible value of 3 m3/m2/hr. with a permeability test conducted post construction to demonstrate this level.

5 MECHANICAL & ELECTRICAL SYSTEMS

With a view to reducing the amount of primary energy this development uses, all plant will be selected on the basis of performance and energy efficiency.

5.1.1 Heating System

We have considered many options during the initial scheme design for this development, all of which were considered with the design team:

- Air sourced heat pumps for heating and hot water.
- Natural Gas boiler and solar PV
- Dimplex smart storage heating with hot water heat pump and heat recovery ventilation – (apartments only)

Taking in site plant space factors, building arrangement and we have agreed that the most suitable system for this project is Heat Pumps for the housing and Dimplex smart storage and hot water heating for the apartments , which shall meet the total nZEB requirements.

The reason for the different approach on apartments is based on three reasons:

1. The apartments have minimal heat loss due to limited external wall, floor and roof heat loss therefore the energy required for heating is minimal for fabric, the ventilation losses are recovered through heat recovery ventilation system.
2. The hot water demand is the largest energy user, therefore a hot water heat pumps targets this COP of 3.5 to provide hot water.
3. The location for the external unit for the ASHP system is an issue on apartments either creating issues on the balconies on being remote on the roof.

5.1.2 Hot Water System

Housing

Hot water is generated via the ASHP and stored within the internal hot water tank as part of the packaged system and generally located in the store within each house, which reduces the amount of energy due to standing losses.

Apartments

Hot water is generated through the hot water heat pump which also has storage with supply and exhaust air located on the hot press within each apartment which also reduces the amount of energy due to standing losses.

5.1.3 Ventilation

The ventilation system to be used in the development will be a high efficiency Mechanical Ventilation Heat Recovery (MVHR) unit, with heat recovery incorporated and a summer bypass to allow for free cooling during summer. The mechanical ventilation would be provided on a unit by unit basis to allow for individual control in each apartment.

5.1.4 Control System

Stand-alone proprietary controllers shall be supplied with each unit to allow for complete control over the following elements:

- Space heating and hot water
- Water consumption
- Plant status / Fault Monitoring
- Energy Monitoring

5.1.5 Lighting

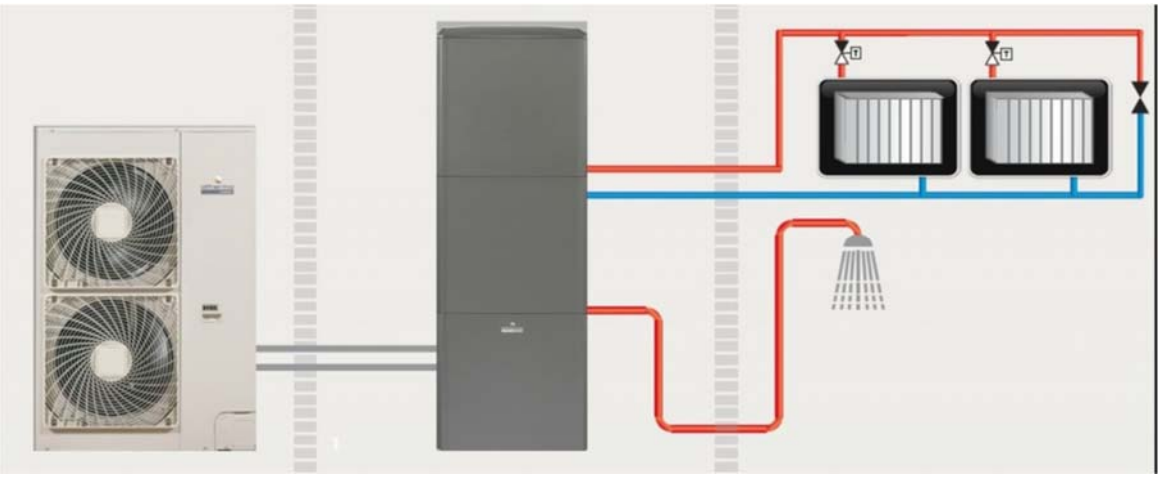
The design intent for internal lighting design is to introduce artificial lighting in all areas applicable. As part of this lighting design, all fittings will be of LED type with high Lumen/Circuit Watt output.

All lighting to be energy efficient with provision made for low energy lamps such as LED which use 80% less electricity and last up to 10 times longer than ordinary light-bulbs in the dwellings.

6 RENEWABLE ENERGIES

Housing

The renewable energies solution which we are proposing for this project comprises of individual Air Source Heat Pumps for housing units.



Apartments

The renewable energy for apartments is the hot water heat pump with a COP of 3.2 to 3.4 form the production of hot water.

7 CONCLUSION

Through effective design and specification, we are proposing for Farganstown Social Housing Development, Co. Meath, the following means of heating, lighting and renewable energy.

The façade performance specification has been optimised to limit heat loss and maximise natural daylight

1. U-Values as stated in section 2.1
2. Individual ASHP and PV systems to meet nZEB complete with proprietary control.
3. Mechanical Ventilation Heat Recovery within each apartment.
4. LED lighting throughout.

Attached is a DEAP report for Typical apartment showing compliance for the scheme.

8 ENERGY EFFICIENCY AND CLIMATE CHANGE ADAPTATION DESIGN STATEMENT

We have reviewed the "Energy Efficiency and Climate Change Adaptation Design Statement" and have addressed the relevant objectives as follows:

8.1 E4 OBJECTIVE 1: TO ENSURE THAT MEDIUM TO LARGE SCALE RESIDENTIAL AND COMMERCIAL DEVELOPMENTS ARE DESIGNED TO TAKE ACCOUNT OF THE IMPACTS OF CLIMATE CHANGE, INCLUDING THE INSTALLATION OF RAINWATER HARVESTING SYSTEMS.

In this residential development significant design elements have been incorporated to take account of climate change. These elements form part of the civil engineers' drawings and reports included in this application. We anticipate that rainwater harvesting will be employed by individual tenants for use around the house and garden. There will be active encouragement for the tenants to use recycled rainwater.

8.2 E4 OBJECTIVE 2: TO SUPPORT THE PASSIVE HOUSE STANDARD OR EQUIVALENT FOR ALL NEW BUILD IN THE COUNTY.

We have sought to support passive House standard in a number of measures specifically the proposed fabric U-Values, air tightness levels and thermal bridging. We will also be employing renewable technologies on this scheme such as Heat pumps and hot water heat pumps in order to reduce the energy use of the development. It is proposed that energy provided from a fossil fuel source will be partially offset by renewable energy generated on site.