R.M. BREEN ASSOCIATES
Sustainable Building Services Design. Project Management

SUSTAINABILITY & ENERGY REPORT
MECHANICAL AND ELECTRICAL SERVICES

PROPOSED RESIDENTIAL DEVELPOEMENT

@ RATHMULLAN, DROGHEDA

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TABLE OF CONTENTS

1. Introduction

R.M. Breen Associates have been appointed as Mechanical and Electrical Building Services consultants for the Proposed Residential Development at Rathmullan Road, Rathmullan, Drogheda, Co. Meath. The proposed Housing Development comprises the construction of 509 no. dwellings and 152 no. apartments/duplex units.

To support the scheme design process this report will outline the energy strategy in terms of building fabric, mechanical and electrical services with a view to achieve compliance with Part L of the building regulations. Since the proposed development is likely to fall under the new regulations pertaining to "Nearly Zero Energy Buildings" that are due to take effect shortly; the following measures have been adopted with a view of meeting these future requirements.

2. Proposed Building Fabric

This section outlines the proposed buildings energy efficient measures in relation to building fabric taken in order to minimise the building's energy demand and therefore reduce energy use and CO2 emissions.

Insulation/U-Values

By providing good levels of insulation throughout the fabric of the building envelope the heating energy demand will be reduced. The minimum U-values as per Part L building regulations given in the table below should be exceeded in order to minimise heat losses:

	Part L 2011 min. required values	Proposed U- values
Wall U value W/m^{2}K	0.21	0.13
Roof U value W/m^{2}K	0.16	0.11
Floor U value W/m^{2}K	0.21	0.14
Window U value W/m^{2}K	1.6	1.3

Thermal Bridging

Further, another element that should be adhered to from the building regulations is the details for eliminating thermal bridging. The requirement under Part L 2011 is to achieve a thermal bridging factor of 0.08W/m^{2}K. A minimum thermal bridging factor (Y) of 0.08W/m^{2}K can be achieved if the details given in the Part L guidance documents are followed and the aim should be to meet or exceed these.

Building Air Tightness

The current minimum air permeability of a building structure under Part L 2011 is $7m^3/hr.m^2$ @ 50 Pa, with an expected new level of $5m^3/hr.m^2$ @ 50 Pa. The building should be utilise air tightness measures like sealing service opes to outside and taping around building openings like windows and doors to minimise the air leakage from the building. An air permeability of $3m^3/hr.m^2$ @ 50 Pa or lower should be achievable with adequate attention to these areas. This would result in an infiltration rate of 0.15 ACH (air changes per hour) or better and thus reduce the energy heat demand, carbon dioxide emissions and increase the thermal comfort of the building.

3. Energy Strategy – Mechanical (Houses)

The following mechanical systems shall be employed to comply primarily with Parts F,J and L of the building regulations demonstrated through the DEAP software and ensure a nearly zero or very low amount of energy requirement for the house dwellings.

Ventilation

The houses in the development shall utilise a central mechanical extract ventilation (MEV) system with boost facility via demand controlled ventilation (DCV). The system will continuously extract air from the wet rooms off the dwelling at a low rate and boost ventilation air changes under measurement of humidity.

The system contains a central extract fan typically located in the roof space and ducted to numerous wet rooms. The fan shall be energy efficient and have a SFP of less than 0.22 W/l/s and ensure it meets targets of the energy performance directive.

Heating & Hot Water

The proposed heat source for the houses are air source heat pumps (ASHP). ASHP are highly efficient and will also meet the full renewable energy contribution requirements as laid down in Part L of the building regulations and demonstrated via DEAP.

The ASHP has an outdoor unit which is small in size and proposed to be located discreetly in the rear gardens of the dwellings. Typically an ASHP is installed with a specific hot water cylinder tied into the ASHP control system to provide amble domestic hot water efficiently and stored in a highly insulated unvented cylinder.

The space heating shall be provided using radiators sized correctly for the ASHP flow and return water temperatures of 45°C and 35°C respectively thus ensuring a high seasonal operating COP (Coefficient of performance) for the ASHP. The space heating shall be controlled in two zones i.e. living areas downstairs and bedrooms upstairs. The zones will be controlled with thermostats and programmable timeclock independently. The hot water will also be zoned and will be time and temperature controlled from the ASHP central control unit.

4. Energy Strategy – Mechanical (Apartments)

The following mechanical systems shall be employed to comply primarily with Parts F,J and L of the building regulations demonstrated through the DEAP software and ensure a nearly zero or very low amount of energy requirement for the apartment dwellings.

Ventilation

The apartments in the development shall utilise a central mechanical extract ventilation system with boost facility provided for by an Exhaust Air Heat Pump (EAHP). The system will continuously extract air from the unoccupied rooms and wet rooms off the dwelling at a low rate and boost ventilation when required. The habitable rooms shall have external passive wall vents installed.

The system contains a central extract fan located on the top of the EAHP typically located in an internal store room of Hot Press and ducted to numerous rooms. The fan shall be energy efficient and have a SFP ensuring it meets targets of the energy performance directive.

Heating & Hot Water

The proposed heat source for the apartments are exhaust air heat pumps (EAHP). EAHP are highly efficient and will also meet the full renewable energy contribution requirements as laid down in Part L of the building regulations and demonstrated via DEAP.

The EAHP is a combined unit installed internally and incorporates both stored hot water heating and mechanical extract ventilation. It is the exhaust air from the continuous ventilation that provides a renewable source of energy to run the heat pump for space heating and hot water heating.

The space heating shall be provided using radiators sized correctly for the EAHP flow and return water temperatures of 45°C and 35°C respectively thus ensuring a high seasonal operating COP (Coefficient of performance) for the EAHP. The space heating shall be controlled in two zones i.e. living areas downstairs and bedrooms upstairs. The zones will be controlled with thermostats and programmable timeclock independently. The hot water is also zoned and will be time and temperature controlled from the EAHP central control unit.

5. Electrical Services

Lighting

Compact Fluorescent Lamps (CFLs) use 20% of the energy used by typical incandescent bulbs to give the same amount of light. A 22 Watt CFL has the same light output as a 100 Watt incandescent. LED (Light-emitting diode) lights use less than 10% of the energy required for corresponding tungsten lights.

Low energy light LED fittings shall be installed in the dwellings to reduce the total energy demand and reduce carbon dioxide emissions.

Electrical Distribution

A new ESB electrical supply will be brought to each house & apartment in accordance with ETCI and ESB standards. A centrally located meter enclosure shall be provided with direct access from the public road

Electric Vehicle (EV)

With the growing demand for alternative sources of fuel, the need for EV charging is increasing. The following allowance will be included in the development for EV charging.

Each house shall be ducted and pre-wired for EV to allow the home owner to install a car charging point to the front or side of their house easily. The 6.0 mm^2 cable and location shall be suitably selected and positioned relevant to their private car parking spaces.

A selected amount of wired public access EV points shall allow the visitors of the apartments charge their electric cars. The supplies will be located around the development in the dedicated visitor's spaces and ducted to ESB mini-pillars for installation.