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Sustainable Building Services Design. Project Management

Proposed New Site

A new multi-unit development on the corner of Pa Healy and Park Road, Co. Limerick

Building Lifecycle Report

RM Breen Associates Consulting mechanical and Electrical Engineers

January 2021

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Introduction

This report was prepared by:

RM Breen Associates

Mechanical and Electrical Consulting Engineers

Nesta Business Centre

Old Airport Road

Santry, Dublin 9

A description of proposed energy saving systems to be used in the Development of the multi-unit site on the corner of Pa Healy Road and Park Road in Co. Limerick

Front aerial view of entire site

Energy and Carbon Emissions

The following are an illustration of the energy measures that are planned for the units to assist in reducing costs for the occupants.

Measure	Description	Benefit
BER Certification	A Building Energy Rating (BER) certificate will be provided for the development which will detail the energy performance of the building. A BER is calculated through energy use for space heating, water heating, ventilation, air conditioning, lighting and occupancy. It is Proposed to target a high rating for the development to comply with non-domestic NZEB requirements as laid out in Part L of the building regulations. This will equate to an energy indicator of less than 0.5 and a CO2 emissions indicator of less than 0.5.	Higher BER rating grades reduce energy consumption and running costs but also lead to reduced carbon emissions.
Fabric Energy Efficiency	The U-values being assessed will be in line with the requirements set out by the current regulatory requirements Technical Guidance Document Part L – Conservation of Fuel and Energy. Table 1 Maximum elemental U-value (W/m^2K)[1,2] Column 1 Fabric Elements / Column 2 Area-weighted Average Elemental U-Value (UM) / Column 3 Average Elemental U-value – individual element or section of element Roofs Pitched roof – Insulation at ceiling: 0.16 Pitched roof – Insulation on slope: 0.16 / 0.3 Flat roof: 0.20 Walls: 0.21 / 0.6 Ground floors[3]: 0.21 / 0.6 Other exposed floors: 0.21 / 0.6 External doors, windows and rooflights: 1.6[4] / 3.0 The proposed minimum air permeability of the building structure is 5m3/hr.m2 @ 50 Pa which would result in an infiltration rate of 0.15 ACH (air changes per hour) or better. Thermal bridging at junctions between construction elements and at other locations will be minimised in accordance with Part L thermal bridging details of the building regulations to achieve a thermal bridging factor of 0.08 W/m2.K or better.	By providing good levels of insulation, air tightness and thermal bridging detailing throughout the fabric of the building envelope will minimise the heat losses of the building, lower energy consumption and thus reduce carbon emissions to the environment whilst reducing the cost to run the building.
External Lighting	The proposed lighting scheme will comply with the latest standards and technologies to achieve the following: Low Level Lighting Minimal Upward Lighting Low voltage LED lights Pre-Approved by Local Authority	The site lighting will be designed to provide a safe environment for pedestrians, cyclists and moving vehicles, to deter anti-social behaviour and limit the environmental impact of artificial lighting on the area.

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	Each light fitting shall be controlled via photoelectric control units (PECU). The operation of the lighting shall be on a dusk to dawn profile.	
Internal Lighting	The internal lighting of the development shall be low energy LED lighting controlled via occupancy PIRs and daylight lux level sensing. The lighting shall comply with Part L non-domestic energy usage requirements and shall not exceed 8W/m2 or 65 lumens/circuit Watt.	The provision of low energy consuming lighting fixtures in combination with daylight sensing and occupancy controls significantly minimise running cost whilst reducing carbon emissions.

The following Low Energy Technologies are being considered for the development. During the design stage a combination of the below systems will be specified in order to achieve compliance with the building regulations and to achieve a non-domestic NZEB building.

Measure	Description	Benefit
Heat Pump Heat Recovery Mechanical Ventilation	The office building will be mechanically ventilated to meeting part F of the building regulation to provide fresh air to the working environment via and air handling unit with heat recovery and heat pump renewable energy and VSD on the fan motors.	The benefits associated with heat recovery is the recuperation of existing energy within the building. The heat pump element of the AHU allows for the use of renewable energy to supplement the energy required to temper the fresh air entering the building. AHUs typically require large amounts to provide fresh air for occupants in office environments therefore by utilising the best technology for AHUs the energy usage of the ventilation system will be significantly reduced and minimise environmental impact over life cycle.
Central Extract Ventilation (Demand controlled)	For "wet" rooms like toilets etc. a central extract ventilation system on demand control will be considered to provide adequate ventilation to eliminate odours and eliminate condensation with low energy use.	Central extract ventilation provides continuous ventilation from multiple zones with low energy use. It operates at a low speed continuously using low amounts of energy. By using demand control the system can be boosted during periods

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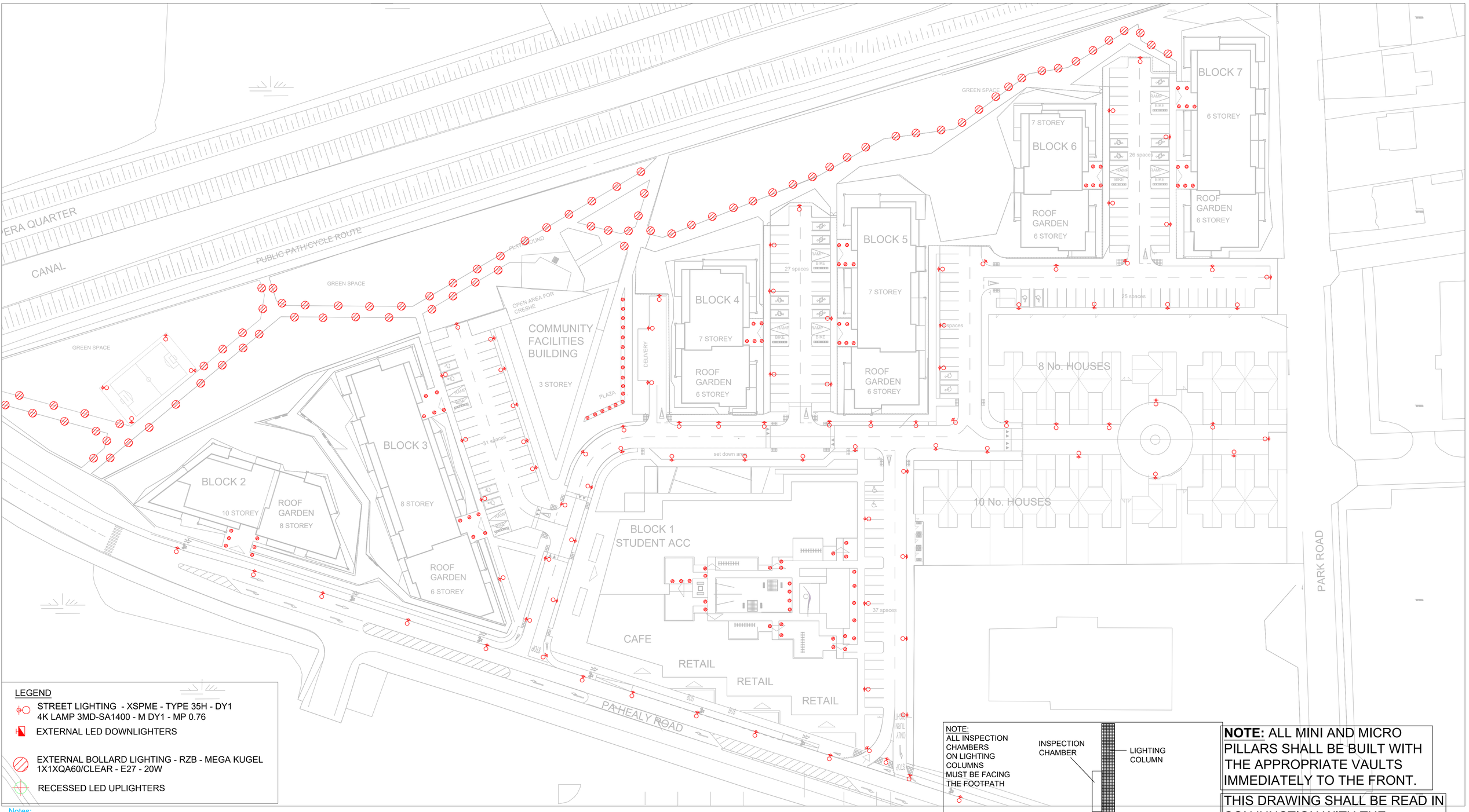
		of high humidity thus reducing overall energy use.
Heating via Condensing Boilers	Condensing boiler are being considered to provide a central heating scheme to the development. The typical efficiency of these types of boilers is over 92%. The central approach allows for the boilers be cascaded and fully modulating and provide heating and hot water and zoned via a BMS therefore only providing heating to the area when required.	By centralising the boilers in cascade the system can achieve full modulation and adequate provision of heating whilst minimising the requirement for individual boilers to each unit and therefore reducing the environmental impact of plant disposal over life cycle. The use of the BMS allows for full heat zoning of the building therefore reducing the energy requirements. The Boilers are more efficient than standard central plant boilers and therefore will use less fuel and reduce carbon emissions.
Gas Absorption Heat Pumps	Gas absorption heat pumps are being considered to supplement the traditional heating system and are renewable energy devices that use natural gas technology with air source heat pump technology to provide high efficiency heating at normal heat emitter temperature s that suit both traditional systems and hot water heating.	These units can be used to provide the bulk of the heat requirements annually in a bivalent system at higher efficiencies than a traditional gas condensing boiler thus reducing fuel requirements and carbon emissions. The units are also contributing as a renewable source of energy and can be centralised thus negating the requirement for individual heat pumps to be used for each cluster of occupants.
PV Solar Panels	PV (Photovoltaic) Solar Panels are being looked at for the development. These solar panels provide convert renewable solar energy into DC Electricity then into AC electricity. Typically the panels are mounted at roof level at a orientation to gain the maximum solar irradiation. The electricity provided from the system can be used directly by the development or can be exported to the Electrical Grid.	The free energy/electricity produced by this system can offset the electrical energy that the development would have needed or directly offset a portion of the electricity the Electrical Grid would have needed to produce with other carbon based fuels. Therefore reducing the building running cost whilst reducing carbon emissions.
CHP – Combined Heat and Power	CHP is a technology being considered. This type of system generates electricity and utilises the waste heat as a by-product of generating the electricity. The heat can then be used throughout the development for space heating and/or hot water heating whilst the	CHP can achieve energy efficiencies by using the waste heat from the unit that is providing electricity to the development it would have
	electricity generated can be used by the development.	need from the Electrical Grid. As the unit is providing electricity on-site it also saves and transmission losses/inefficiencies in the Electrical Grid.
ECAR Charging Points	ECAR charging points are being considered for the development. The space for this system in the local distribution board and infrastructure of ducting to allow for future installation of ECAR charging points within the car park to cater for E-car demand of occupants. This system operates on a single charge point access card. A full recharge can take up to 8 hours using a standard charge point.	Providing the option of E-car charging points will allow occupants to avail of ever-improving efficient electric car technologies.



LEGEND

STREET LIGHTING - XSPME - TYPE 35H - DY1
4K LAMP 3MD-SA1400 - M DY1 - MP 0.76

EXTERNAL LED DOWNLIGHTERS

EXTERNAL BOLLARD LIGHTING - RZB - MEGA KUGEL
1X1XQA60/CLEAR - E27 - 20W

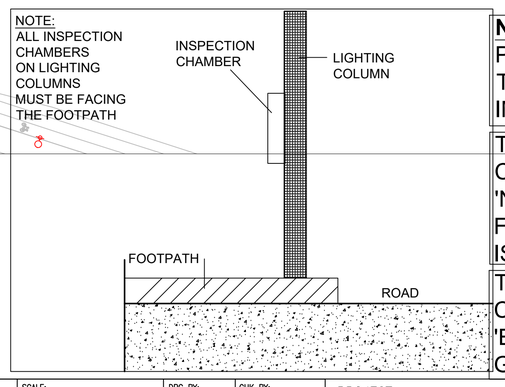
RECESSED LED UPLIGHTERS

Notes:

1. All external lighting to be controlled by external photocell and time clock
2. The electrical services specialist shall be fully responsible for all on-site co-ordination of their services with all other services.
3. Exact position of all luminaires/switches etc. shall be finally positioned in accordance with the final & agreed room layouts from the Architect & Engineer prior to first fix installation.
4. Lamp colour temperatures are to be agreed with engineer prior to installation on site.
5. All luminaires shall be suitably labeled with their circuit reference.
6. All emergency luminaires shall be suitably labeled with unique reference.
7. Contractor to note that the distribution board reference & subsequent circuit references are for information only. Exact identification of dist board shall be agreed on site with the engineer.
8. Emergency lighting to be in full accordance with IS3217 : 2013.
9. External lighting to be switched using time clock & hand,off,auto manual switch located at reception. External lighting to be 24hr operation with photocell over-ride.
10. All PIRS to be installed c/w isolation switches.
11. All lighting circuits shall be supplied from the local sub-distribution centre.
12. The General Lighting scheme shall comply wiuth ISEN 12464-1(2011).
13. Final positions of light control points, PIRS, photocells to be designed by M&E engineers in conjunction with the architects drawings.
14. This drawing shall be read in conjunction with the specification, luminaire schedule & all other drawings.
15. All lighting circuits, unless stated otherwise, shall be installed utilising 10A MCB 2.5mm LSF cables enclosed in trunking/conduit & generally concealed surface mounted Car Park in Plant areas. All surface mounted conduits shall run parallel & at 90° only to the building lines & shall be agreed with the engineer prior to installation.

NOTE: THIS DRAWING IS INDICATIVE ONLY AND SHOULD **NOT BE USED** FOR CONSTRUCTION. ESB WILL PROVIDE SITE DESIGN LAYOUT.

NOTE:
ALL INSPECTION CHAMBERS ON LIGHTING COLUMNS MUST BE FACING THE FOOTPATH



NOTE: ALL MINI AND MICRO PILLARS SHALL BE BUILT WITH THE APPROPRIATE VAULTS IMMEDIATELY TO THE FRONT.

THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE 'NATIONAL CODE OF PRACTICE FOR CUSTOMER INTERFACE' ISSUED BY ESB

THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE 'ELECTRICAL SERVICES GUIDEBOOK' ISSUED BY ESB.

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND STRUCTURAL ENGINEERS CONSTRUCTION ISSUE DRAWINGS AND MECHANICAL & ELECTRICAL SPECIFICATIONS.
2. DO NOT SCALE. THIS DRAWING IS REPRESENTATIVE ONLY.
3. ALL DIMENSIONS ARE IN MILLIMETERS (mm), UNLESS OTHERWISE STATED.
4. THE EXACT LOCATION OF SERVICES AND FITTINGS TO BE AGREED ON SITE WITH THE ARCHITECT AND STRUCTURAL ENGINEER PRIOR TO INSTALLATION.
5. MECHANICAL & ELECTRICAL SERVICES TO BE CO-ORDINATED WITH ALL OTHER TRADES, AND TO BE AGREED ON SITE PRIOR TO INSTALLATION. ADDITIONAL COSTS INCURRED BY THE CONTRACTOR DUE TO THE LACK OF CO-ORDINATION, WILL NOT BE ENTERTAINED.

REVISION	DATE	DESCRIPTION	DRG.	CHK.
P	16.12.19	ISSUED FOR PLANNING	N.K.	R.B.

DATE:	SCALE:	DRG BY:	CHK BY:
16.12.19	1:100 @ A1	N.K.	R.B.

CLIENT:

ARCHITECT: OCA ARCHITECTS

PROJECT MGR:

DESCRIPTION: PLANNING

PROJECT:
PROPOSED RESIDENTIAL SITE, PA HEALY ROAD, CANAL BANK, CO. LIMERICK

TITLE:
EXTERNAL LIGHTING

JOB No.:	DRAWING No.:	REV:
20-104	60-00	P

R.M.BREEN ASSOCIATES
Sustainable Building Services Design. Project Management
301 Nesta Business Centre,
Old Airport Road,
Santry, Dublin 9,
Co. Dublin,Ireland
T: 00353 1 846 8920
F: 00353 1 443 0794
E: info@rmbreen.ie
w: www.rmbreen.ie