PART L COMPLIANCE REPORT

FOR

Unit 2

AT

Browns barn, Citywest, Dublin 24

For

Exeter Ireland Property IV B Limited

Date of Issue: 22/02/21 Revision: 00

Document History

Revision No.	Description	Prepared By	Reviewed By	Date
Rev 0	Planning Issue	EN	EN/CD	22/02/2021
Rev 1	Layout Change & Orientation Change	ZE	CD	04/02/2022

Contents

1. Executive Summary

Exeter Ireland Property IV B Limited intend to apply for permission for development at this 3.93 Ha site at Brownsbarn, Citywest Campus, Dublin 24. The lands are bounded to the south by the N7 Naas Road, to the north and west by the National Distribution Centre and to the east by Brownsbarn Drive and the Royal Garter Stables, a Protected Structure (RPS Ref. 261).

The development will comprise the construction of 2 No. warehouses with ancillary office and staff facilities and associated development as follows: Unit 1 will have a maximum height of 16.45 metres with a gross floor area of 8,156 sq m including a warehouse area (7,397 sq m), ancillary office areas (362 sq m) and staff facilities (397 sq m); and Unit 2 will have a maximum height of 15.45 metres with a gross floor area of 5,730 sq m including a warehouse area (5,138 sq m), ancillary office areas (268 sq m) and staff facilities (324 sq m).

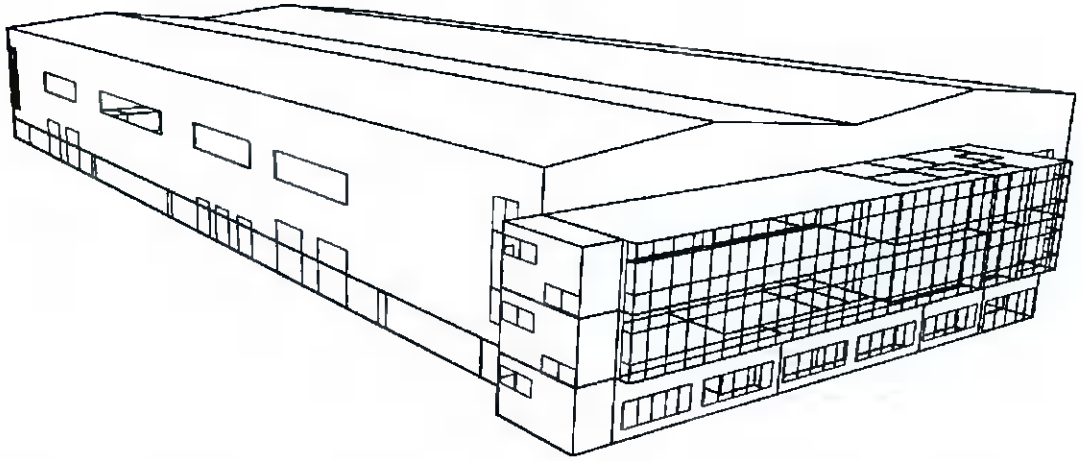
The development will also include: vehicular access/egress routes to the subject site via the existing roundabout and access road; pedestrian access; 111 No. car parking spaces; bicycle parking; HGV Parking; HGV yards; level access goods doors; dock levellers; access gates; signage; hard and soft landscaping; lighting; boundary treatments; ESB substations; sprinkler tanks; pump houses; and all associated site development works above and below ground.

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

The strategy targets a low energy and environmentally friendly building. This report will demonstrate that the design philosophy for the proposed development at Browns Barn, Dublin 24 will employ a holistic approach to the construction and integration of the building, its systems, and its users. This philosophy is supported by the use of sustainable engineering solutions and energy efficient systems.

The design team recognises the need for the building to be designed and operated in a manner that reduces the energy consumption and carbon emission of the building. This objective will be achieved in an economical manner whilst maintaining an internal environment that is comfortable for occupants and visitors.

To meet target set out for proposed development, the energy modelling software, the analysis used IES <VE2020> software which uses the new SBEMie 5.5.h calculation engine has been undertaken to identify the best-fit proposed design in the proposed development. In this report, the design has been proposed, which allowing the proposed development to be in compliant with NZEB under TGD Part L and achieving Building Energy Rating (BER) of A2.



The CO_2 emission rate from the proposed building is less than that of the reference building used in the Part L assessment. The calculated primary energy consumption rate of the proposed building is also less than that of the reference building. The following table demonstrates compliance and indicates the calculation results of the proposed building performance versus the reference building under the part L;

Primary Energy Consumption, CO2 Emissions, and Renewable Energy Ratio

The compliance criteria in the TGD-L have been met

Calculated CO2 emission rate from Reference building	19.3 kgCO2/m2.annum
Calculated CO2 emission rate from Actual building	18.8 kgCO2/m2.annum
Carbon Performance Coefficient (CPC)	**0.97**
Maximum Permitted Carbon Performance Coefficient (MPCPC)	**1.15**
Calculated primary energy consumption rate from Reference building	103.3 kWh/m2.annum
Calculated primary energy consumption rate from Actual building	95.4 kWh/m2.annum
Energy Performance Coefficient (EPC)	**0.92**
Maximum Permitted Energy Performance Coefficient (MPEPC)	**1**
Renewable Energy Ratio (RER)	**0.24**
Minimum Renewable Energy Ratio	**0.2**

The calculated result of energy performance coefficient and carbon performance coefficient of proposed building do not exceed the maximum permitted under the Part L. The energy and carbon emission performance of the proposed building are less than 12% and 9% of reference building under the Part L 2017 respectively.

In order to achieve the overall Nearly Zero Energy Performance criteria, a renewable energy target, 10%-20% of its energy provided must come from onsite or nearby renewables. The renewable primary energy has been assessed showing the calculation with an RER of 0.17 being achieved (17%) under the current proposed design. The energy contribution from the heat pumps is considered to be renewable energy, this equates to 9.11kWh/m²/year of primary energy being provided on site, approximately 17% of total primary energy come from renewable onsite.

The preliminary building energy rating calculation indicates A2 being achieved for the proposed building

Virtual Environment 7.0.13 (SBEMIE v5.5.h.2)

Provisional Building Energy Rating (BER)

Provisional BER for the building detailed below is: **A2**

Address 1
Address 2
Address 3
Co. Carlow
Eircode

The Building Energy Rating (BER) is an indicator of the energy performance of this building. It covers energy use for space heating and cooling, water heating, ventilation and lighting, calculated on the basis of standard operating patterns. It is accompanied by a CO_2 emissions indicator. These indicators are expressed as respective ratios of primary energy use and CO_2 emissions, relative to what would apply for a similar building generally satisfying the Building Regulations 2005. 'A' rated properties are the most energy efficient and will tend to have the lowest energy bills.

BER Number:	voidvoidvoid	**Date of Issue:**	23 Feb 2021
Useful Floor Area (m^2):	5685.7	**Valid Until:**	22 Feb 2023
Main Heating Fuel:	Grid Supplied Electricity	**BER Assessor No.:**	123456
Building Environment:	Air Conditioning	**Assessor Company No.:**	123456
		Assessor Scheme:	SEAI
Building Type:	Storage or Distribution		

Building Energy Rating (Indicator)
MOST EFFICIENT

< 0.17	A1
≥ 0.17	A2
≥ 0.34	A3
≥ 0.50	B1
≥ 0.67	B2
≥ 0.84	B3
≥ 1.00	C1
≥ 1.17	C2
≥ 1.34	C3
≥ 1.50	D1
≥ 1.75	D2
≥ 2.00	E1
≥ 2.25	E2
≥ 2.50	F
≥ 3.00	G

A2
54 kWh/m^2/yr
0.31

LEAST EFFICIENT

Carbon Dioxide (CO_2) Emissions Indicator

BEST
0
1.0
2.0
WORST
>3.0

Calculated annual CO_2 emissions
11 kgCO_2/m^2/yr
0.31

The less CO_2 produced, the less the building contributes to global warming.

IMPORTANT: This provisional BER is calculated on the basis of pre-construction plans and specifications provided to the BER assessor, and using the version of the assessment software quoted above. The BER assigned to this building on completion may be different, in the event of changes to those plans or specifications, or to the assessment software.

2. Introduction

Axiseng were commissioned by Exeter Ireland Property IV B Limited to undertake a Part L – NZEB / BER analysis on the basis of the currently proposed design for use within the proposed development site at Unit 2 Browns barn, Citywest Dublin 24, Co. Dublin.

The scheme consists of the following;

- *Ground Floor – Entrance Lobby, Canteen, Male and Female WC, Disabled WC & Shower, Warehouse;*
- *First Floor – Landing, Male and Female WC, Store, & Offices;*
- *Roof Level – Landing, Male and Female WC, Store, & Offices;*

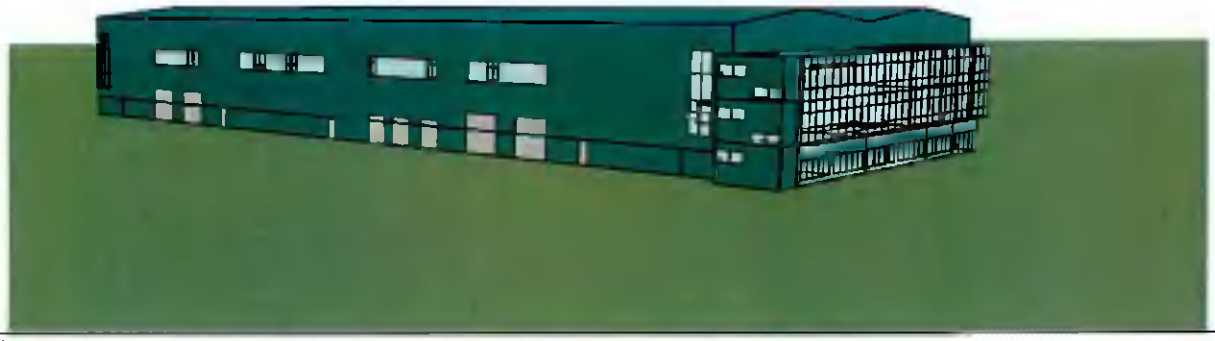
As part of service strategy for the development has been considered that the building includes the following number of energy conservation measure in aiming to achieving best energy performance as possible as following;

- *High-performance construction envelope including low u-value and g-value*
- *Air tightness construction*
- *Heat Recovery HVRF system for heating and cooling*
- *VRF system for hot water system*
- *Heat Recovery Mechanical Ventilation*
- *Low specific fan power installed unit*
- *Low installed lighting power & intelligent lighting control*

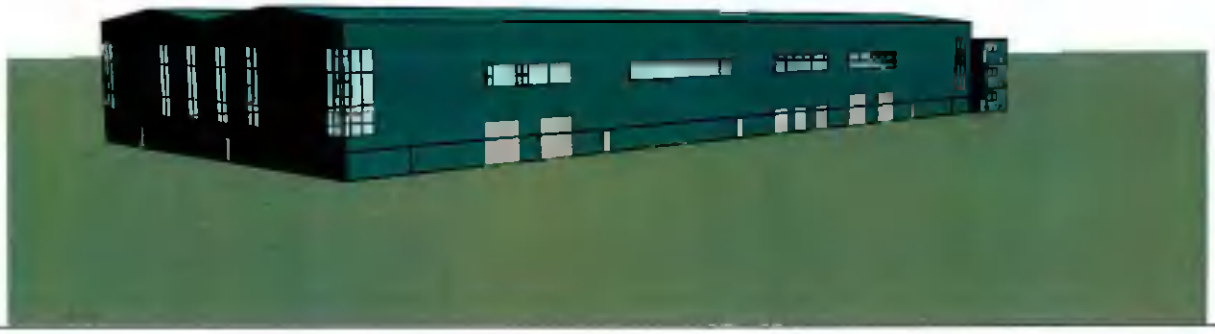
The sustainability design of the proposed development presents an opportunity to ensure the overall building performs efficiently and meets the NZEB challenges. The model inputs where passive and active design elements will be incorporate and are summarised in the following section. This report details the proposed design solution used in the analysis and the calculation of the building performance metrics used to show compliance with the Part L and BER. The report intends to inform the readers in relation to modelling input parameter based on service design identified in the new development building, which are taken into consideration under NZEB assessment.

3. Geometry

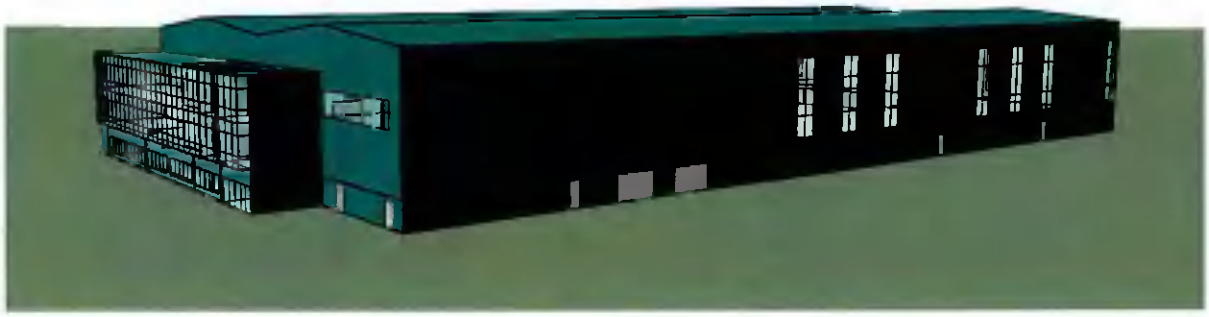
South



West

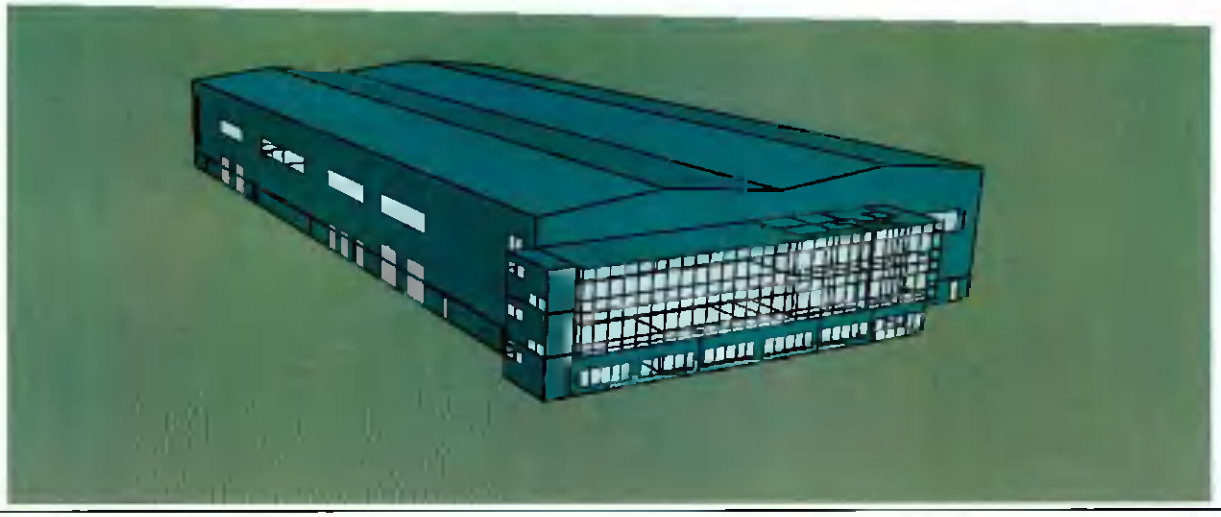


East



North

Perspective view



4. Construction

The following construction information has been created based on the proposed u-value and will aim to meet the target u-value on Table 10, under Building Regulation Part L;

Building Element	Targeted u-value (W/m²K)
Office Block External Wall	0.158
Warehouse Roof	0.47
Warehouse Cladding	0.47
Warehouse Blockwork Wall	0.47
Office Block Floor	0.15
Office Block Roof	0.15
Roller Door (Vehicles)	1.2
Personnel Door	1.6
Warehouse Window_01	1.6 (g-value 0.48)
Office Block Window_02	1.3 (g-value 0.48)
Office Block Window_03	1.3 (g-value 0.35)
Spandrel panel	1.3
Internal Partition (no insulation)	1.77
Insulated Internal Wall (to warehouse)	0.17

The reduction of fabric losses from the proposed development will be achieved by using materials with U-values which are lower than those required where possible by the 2017 Building Regulations, demonstrating the energy efficient approach being adopted for this development.

4.1 Thermal Bridging

The following thermal bridging coefficients were used,

	Junctions involving metal cladding	QA accredited	Junctions NOT involving metal cladding	QA accredited
Type of junction	Psi (W/(m·K))		Psi (W/(m·K))	
Roof-wall	0.420	☐	0.180000	☐
Wall-ground floor	1.730	☐	0.240000	☐
Wall-wall (corner)	0.380	☐	0.140000	☐
Wall-floor (not ground)	0.040	☐	0.110000	☐
Lintel above window/door	1.910	☐	0.450000	☐
Sill below window	1.910	☐	0.080000	☐
Jamb at window/door	1.910	☐	0.090000	☐

The building air permeability was set to the 5 m³/(h.m²) @ 50 pa comply with the Building Regulation Part L in the provision of air tightness. An air tightness target of 5m3/hr per m² is in line with the recognised BSRIA (UK) standard for air tightness (BG 4 / 2006) below 5m3/hr per m² normal practice. Air permeability target of 2 m3/hr per m² is considered for best practice.

5. Lighting & Control

The following proposed on the lighting installed power and control are modelled in the thermal model

Room	Design Illuminance (Lux)	Installed Power Wattage (w/m2)	Control Type				
			Occupancy controls	Parasitic Power (w/m2)	Photoelectric	Sensor type	Parasitic Power (w/m2)
Warehouse	[illegible]	3	-	-	-	-	
[illegible]	500	7	auto on/off	[illegible]	[illegible]	-	-
Circulation/lobby/stairs	[illegible]	7	auto on/off	[illegible]	[illegible]	-	
Toilet / Showers	[illegible]	8	auto on/off	0.10	-	-	-
Storage	[illegible]	3	auto on/off	0.10	-	-	-
Canteen	[illegible]	[illegible]	auto on/off	0.10	-	-	

All spaces except for warehouse are to be fitting with presence detection automatic sensors to switching off the lighting when the room are unoccupied.

6. HVAC

HVAC system design has been considered to ensure minimal energy requirement in the building. The following table is a list of proposed HVAC system design identified in room types within proposed development,

Room	HVAC System	Ventilation Type	Heat Recovery Unit	Specific Fan Power (W/l/s)
Open Plan Office	VRF	Centralised Mech Vent	75% Plate Heat Ex	1.9
Shower / Toilet	Elec Storage heater	Centralised Exhaust	-	0.5
Circulation (lobby, stairs, corridors)	Elec Storage heater	-	-	-

The proposed HVAC system are selected based upon their efficiencies performance, which has been assessed to ascertain their coefficient performance in terms of heating, cooling and hot water generation. All open plan office, Canteen and Entrance Lobby are to be fitted with ceiling mounted cassette unit supplied with heating and cooling from VRF system. Toilet, and all circulation type space will be fitted with storage electric heater unit.

Heating Plant System	Cooling Plant System	Domestic Hot Water
Generator Type 1 – VRF Seasonal Efficiency (SCOP) – 3.8 Fuel Type – Electricity **Pump Type** Variable speed Multiple pressure sensors **Serve zone:** Open plan office, Tea room, Canteen, Entrance lobby	**Generator Type 1 – VRF** EER / SEER – 4 / 5.5 Fuel Type – Electricity **Pump Type** Variable speed Multiple pressure sensors **Serve zone:** Open plan office, Tea room, Canteen	Generator Type 1 – Heat pump (air source) Fuel Type – Electricity Overall Seasonal Efficiency (SCoP) – 3 Storage Volume (litres) – 600 Storage losses (kWh/(l.day)) – 0.0047 Circulation losses (W/m) – 9.81 Loop Length (metres) – 100* Pump Power (kW) – 0.2 Time Switch – Yes *Rules of thumb applied in case of absence of data, where: $(\sqrt{(total floor\ area\ serve\ by\ DHW)}\ x\ 4$
Generator Type 2 – local room heater Seasonal Efficiency (SCOP) – 1 Fuel Type - Electric **Serve zone:** Toilet, Corridor, Storage, Lobby, Stairs		

*It is noted that the absence of data, the above inputs for loop lengths and pump power have been assumed in the analysis.

Hot Water will be generated from dedicated heat pump system. The heat pumps for the generation of domestic hot water are to be selected based upon the seasonal coefficient performance (sCOP) over 300%.

6.1 Controls

The following control types have been applied to all systems;

Generator Type 1 - VRF Provision for Metering – No Metering "Out of range" – No Electric Power Factor - > 0.95	Central Time Control – No Optimum Start / Stop Control – Yes Local Time Control – Yes (FCU in zones) Local Temperature Control – Yes Weather Compensation Control - Yes
Generator Type 2 – Local room heater Provision for Metering – No Metering "Out of range" – No Electric Power Factor - > 0.95	Central Time Control – No Optimum Start / Stop Control – Yes Local Time Control – Yes Local Temperature Control – Yes Weather Compensation Control - No

6.2 Ventilation

The following details have been applied to all systems;

Ductwork Leakage Tested:	Yes
CEN Classification	Class D
AHU CEN Standards	Yes
AHU CEN Classification:	L1

7. Renewables

Renewable technologies have been employed to offset and exceed the requirements of building regulations Part L. The heating and cooling load in the propose development building are to be met by VRF system and is identified as renewable energy technology design in this case. DHW are to be met by dedicated heat pump system and is identified as renewable energy technology.

8. Result

The following NZEB/Part L & BER has been calculated with results highlight in below;

8.1 BRIRL Document

Output from Building Regulation Ireland (BRIRL) Document

BRIRL Output Document

Compliance Assessment with the Building Regulations (Ireland) TGD-Part L 2017

This report demonstrates compliance with specific aspects of Part L of the Building Regulations. Compliance with all aspects of Part L is a legal requirement. Demonstration of how compliance with every aspect is achieved may be sought from the Building Control Authority.

Unit 2

Date: Thu Feb 03 00:37:41 2022

Administrative Information

Building Details

Address: Address 1, Address 2, Address 3, Address 4, Co. Carlow, Eircode

NEAP

Calculation engine: SBEMIE

Calculation engine version: v5.5.h.2

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: 7.0.13

BRIRL compliance check version: v5.5.h.2

Client Details

Name: Name

Telephone number: Phone

Address: Street Address, Co. Carlow, Eircode

Energy Assessor Details

Name: Name

Telephone number: Phone

Email: you@yourISP

Address: Street Address, Co. Carlow, Eircode

Primary Energy Consumption, CO2 Emissions, and Renewable Energy Ratio

The compliance criteria in the TGD-L have been met.

Calculated CO_2 emission rate from Reference building	19.3 kgCO2/m2.annum
Calculated CO_2 emission rate from Actual building	18.8 kgCO2/m2.annum
Carbon Performance Coefficient (CPC)	0.97
Maximum Permitted Carbon Performance Coefficient (MPCPC)	1.15
Calculated primary energy consumption rate from Reference building	103.3 kWh/m2.annum
Calculated primary energy consumption rate from Actual building	95.4 kWh/m2.annum
Energy Performance Coefficient (EPC)	0.92
Maximum Permitted Energy Performance Coefficient (MPEPC)	1
Renewable Energy Ratio (RER)	0.24
Minimum Renewable Energy Ratio	0.2

Heat Transmission through Building Fabric

Element	$U_{e\text{-}Limit}$	$U_{e\text{-}Calc}$	$U_{i\text{-}Limit}$	$U_{i\text{-}Calc}$	Surface with maximum U-value*
Walls**	0.21	0.17	0.6	0.18	L0000003_W1_A0
Floors (ground and exposed)	0.21	0.15	0.6	0.15	L0000003_F
Pitched roofs	0.16	-	0.3	-	"No heat loss pitched roofs"
Flat roofs	0.2	0.16	0.3	0.18	L0000000_C_A0
Windows, roof windows, and rooflights	1.6	1.31	3	1.31	L0000009_W3_O0
Personnel doors	1.6	1.58	3	1.58	L000000C_W2_O0
Vehicle access & similar large doors	1.5	-	3	-	"No ext. vehicle access doors"
High usage entrance doors	3	-	3	-	"No ext. high usage entrance doors"

$U_{e\text{-}Limit}$ = Limiting area weighted average U-values [W/(m2K)] — $U_{i\text{-}Limit}$ = Limiting individual element U values [W/(m2K)]
$U_{e\text{-}Calc}$ = Calculated area weighted average U-values [W/(m2K)] — $U_{i\text{-}Calc}$ = Calculated individual element U values [W/(m2K)]

* There might be more than one surface with the maximum U-value. ** Automatic U-value check by the tool does not apply to curtain walls
Limiting area weighted average and individual limiting standards are 1.6 and 3 W/m2K, respectively

Air Permeability	Upper Limit	This Building's Value
m3/(h.m2) at 50 Pa	5	5

8.2 BER Document

Virtual Environment 7.0.13 (SBEMIE v5.5 h.2)

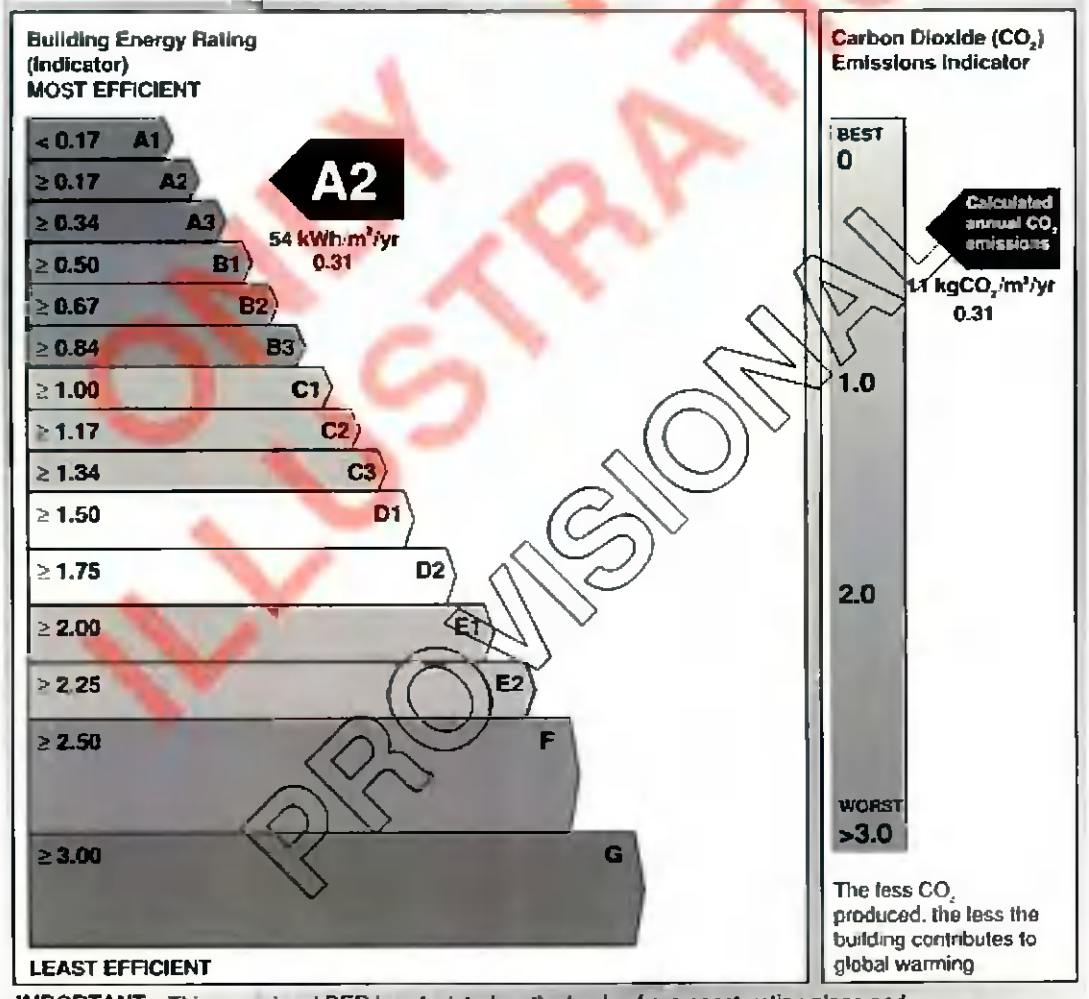
Provisional Building Energy Rating (BER)

Provisional BER for the building detailed below is: **A2**

Address 1
Address 2
Address 3
Co Carlow
Eircode

The Building Energy Rating (BER) is an indicator of the energy performance of this building. It covers energy use for space heating and cooling, water heating, ventilation and lighting, calculated on the basis of standard operating patterns. It is accompanied by a CO_2 emissions indicator. These indicators are expressed as respective ratios of primary energy use and CO_2 emissions, relative to what would apply for a similar building generally satisfying the Building Regulations 2005. 'A' rated properties are the most energy efficient and will tend to have the lowest energy bills.

BER Number:	voidvoidvoid	**Date of Issue:**	23 Feb 2021
Useful Floor Area (m^2):	5685.7	**Valid Until:**	22 Feb 2023
Main Heating Fuel:	Grid Supplied Electricity	**BER Assessor No.:**	123456
Building Environment:	Air Conditioning	**Assessor Company No.:**	123456
		Assessor Scheme:	SEAI
Building Type:	Storage or Distribution		



IMPORTANT: This provisional BER is calculated on the basis of pre-construction plans and specifications provided to the BER assessor, and using the version of the assessment software quoted above. The BER assigned to this building on completion may be different, in the event of changes to those plans or specifications, or to the assessment software.

9. Limiting the Effects of Solar gain in Summer

To assess the solar gain against criteria under section 1.3.5 Limiting the effects of solar gain in summer in Part L for solar gain compliance, a dynamic energy modelling simulation was carried out in IESVE software. The following model inputs for the proposed building were taken into account against the following factor;

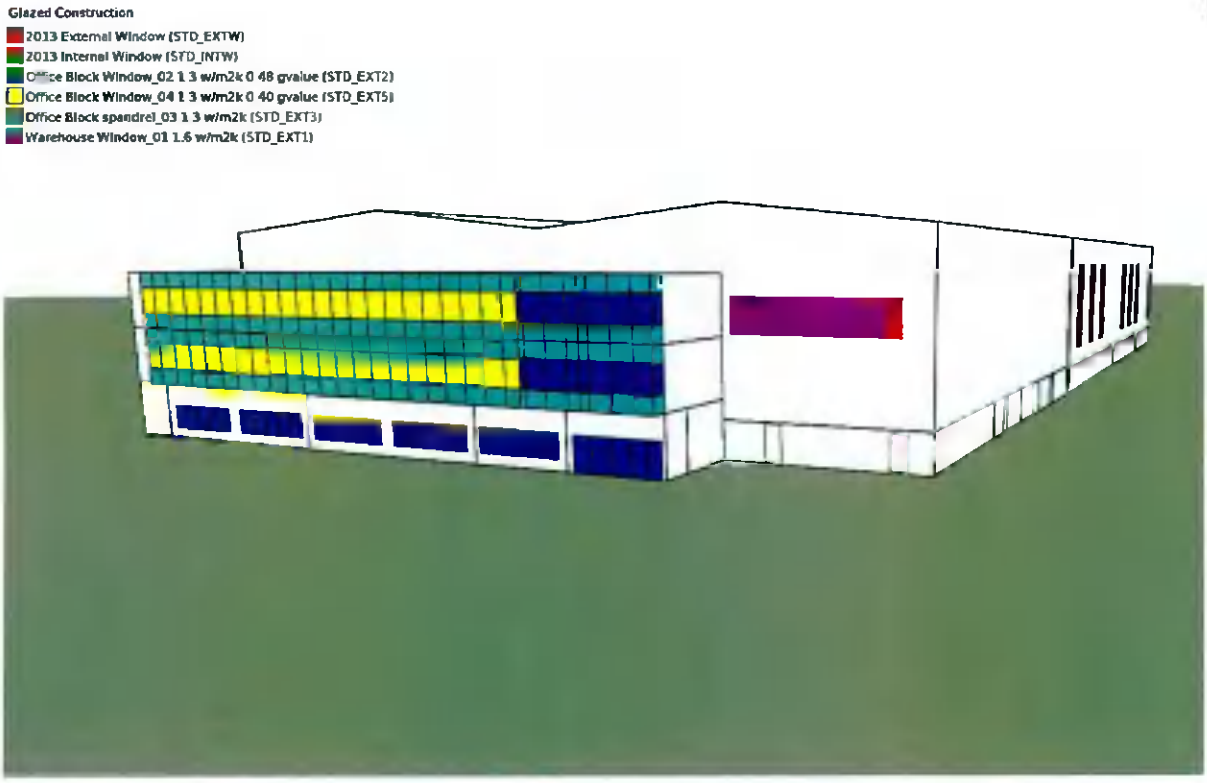
Parameter	Input
Orientation of site/building	According to the site plan
Adjacent building / objects	No adjacent building modelled.
Weather conditions	Dublin IWEC / UK Part L ManchesterTRY05.fwt
Thermal properties of the glazing	Baseline 0.48 g-value Improvement 0.35 g-value (solar control measure – internal blind, reflective etc)
Calculation Methodology	Benchmark Glazing Type 1 – East-facing façade with full width glazing to a height of 1m having a framing factor of 10% and solar energy transmittance (G-value of 0.68.

The solar gains methodology outlined in Part L 2017 (NZEB) follows the UK methodology that has been adopted since 2013. Under SEAI Non-domestic Energy Assessment Procedure (NEAP) modelling guide which was issued in Q2 2019, the methodology outlined in Section "Limiting Solar Gains in Summer" closely follows what is issued in the UK Part L2A. On that basis, UK PartL2A Criteria Solar Gain toolkit in IESVE software has been used in the dynamic energy model simulation calculation against benchmark.

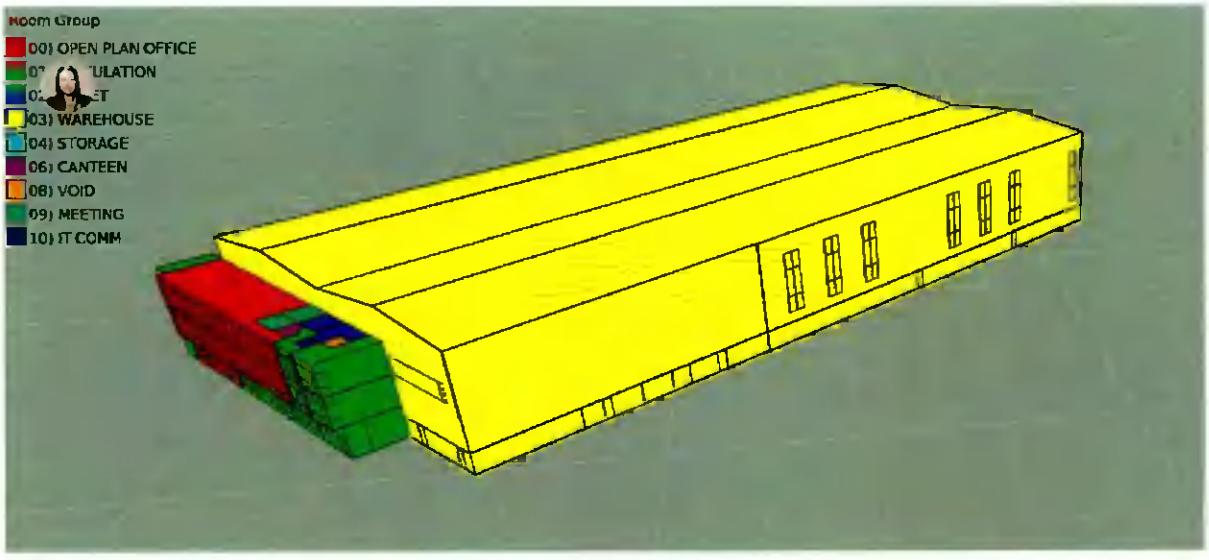
9.1 Glazing option

The selection of the glass type is not yet to be finalised, however, at this stage, there will be some form of solar control measure i.e., internal blind to be installed the glass façade highlighted in the following area.

- *Glass façade without solar control measure – Green*
- *Glass façade with solar control measure - Red*



9.2 Virtual Zoning Legend



9.3 Solar Gain Result

The results of the solar gain analysis are outlined in the following table figure. All perimeter zones are in compliant with Part L 2017 based on the proposed glazing performance including solar control measure behind the Southeast - East façade.

Space ID	Space Name	Criterion 3 Solar Gain Total (kWh)	Criterion 3 Solar Gain Benchmark (kWh)	Part L	Solar control measure required
1	L00_WAREHOUSE	66009.27	232325.86	Pass	No
2	L00_LOBBY ENTRANCE	753.47	1067.07	Pass	No
3	L00_CANTEEN	2183.25	3453.35	Pass	No
4	L01_OFFICE	2382.91	3519.47	Pass	No
5	L01_STAIRS/LOBBY	872.74	1067.07	Pass	Yes
6	L01_OPEN PLAN OFFICE	2748.29	3870.32	Pass	Yes
7	L02_OFFICE	2382.91	3519.47	Pass	No
8	L02_STAIRS/LOBBY	845.03	1067.07	Pass	Yes
9	L02_OPEN PLAN OFFICE	2791.22	3870.32	Pass	Yes

10. Conclusion

The passive measures included in the design, such as minimising solar gain (glazing selection), reducing fabric heat loss through the building envelope and improving the air tightness significantly contribute towards reducing the loads on the active systems within the building. The active measures have been designed to reduce the primary energy consumption through intelligent control and highly efficient plant and equipment.

The results in Part L compliance assessment shows that the proposed office building has an Energy Performance Coefficient (EPC) less than Maximum Permitted EPC (MPEPC) of 1.0. The building also has a Carbon Performance Coefficient (CPC) less than the Maximum Permitted CPC (MPCP) of 1.15. The result shows that the proposed development has a Renewable Energy Ratio of 0.17 (17%) exceed target under Part L. It is concluded that the proposed building achieves the NZEB performance specification for energy and carbon dioxide emissions, therefore is in compliant with performance criteria under section 1.1.2, Building Regulation 2017 Part L for building other than Dwellings.

The result outlined under limiting solar gain assessment shows all zones with façade design complies with performance criteria under section 1.3.5, Limiting the effects of solar gain in summer, Building Regulation 2017 Part L for building other than Dwellings.

The results outlined in this Part L report demonstrate that the proposed design including the building envelope of the development complies with the L5 (a, b, c, e) building regulation requirement outlined in Part L 2017.