

PART L COMPLIANCE REPORT  
FOR  
UNIPHAR WAREHOUSE  
AT  
SITE C, COLLEGE LANE, GREENOGUE,  
RATHCOOLE, CO. DUBLIN  
FOR  
JORDANSTOWN PROPERTIES LTD

Date of Issue: 27/10/2021

Version: 0.2



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## Document History

Version No.	Description	Prepared By	Reviewed By	Date
0.0	Part L Compliance assessment	DN	EN	05/07/2021
0.1	Revised lighting and heating	DN		29/09/2021
0.2	Revised Layout removal of office block	DN		27/10/2021

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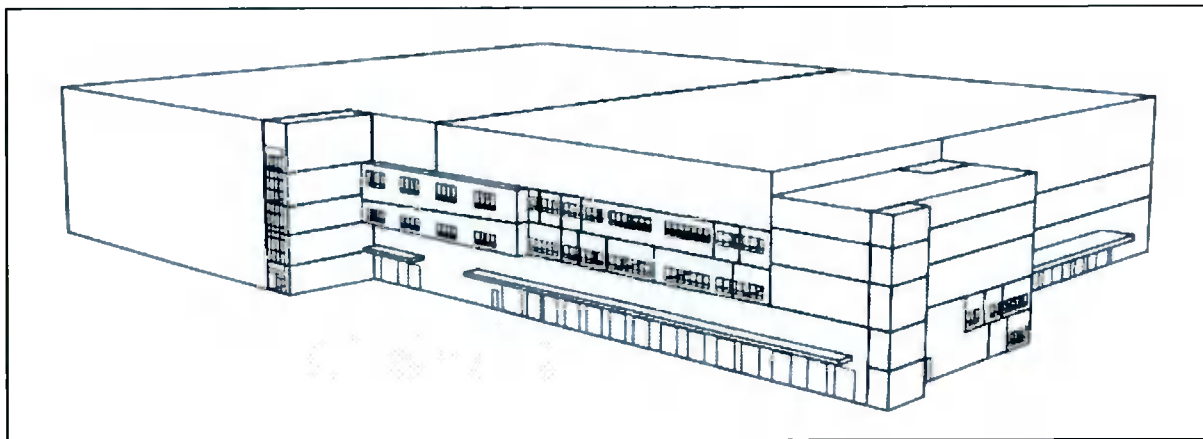
## 1. Executive Summary

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 this development utilises 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 will employ a holistic approach to the construction and integration of the building, its systems and its users.

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 functional as a warehouse and comfortable for occupants.

To meet the target set out for the proposed development, the energy modelling software used in the analysis is IES <VE2019> which utilises the new SBEMie 5.5.h calculation engine. The analysis was undertaken to identify the most suitable design for the proposed development in terms of energy efficiency, reduced carbon output and the application of renewable technologies. The proposed design outlined in this report demonstrates that the development will be compliant with Part L of the Building Regulations (Nearly Zero Energy Buildings) and will achieve a Building Energy Rating (BER) of A2.



The CO<sub>2</sub> 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 calculated results of the proposed building versus the reference building under Part L Technical guidance document;

### 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	26.1 kgCO2/m2.annum
Calculated CO2 emission rate from Actual building	16.4 kgCO2/m2.annum
<b>Carbon Performance Coefficient (CPC)</b>	<b>0.63</b>
<b>Maximum Permitted Carbon Performance Coefficient (MPCPC)</b>	<b>1.15</b>
Calculated primary energy consumption rate from Reference building	136.5 kWh/m2.annum
Calculated primary energy consumption rate from Actual building	83.2 kWh/m2.annum
<b>Energy Performance Coefficient (EPC)</b>	<b>0.61</b>
<b>Maximum Permitted Energy Performance Coefficient (MPEPC)</b>	<b>1</b>
<b>Renewable Energy Ratio (RER)</b>	<b>0.12</b>
<b>Minimum Renewable Energy Ratio</b>	<b>0.1</b>

The calculated energy performance coefficient and carbon performance coefficient of the 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 39% and 37% of reference building under the Part L 2021 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 0.12 being achieved under the current proposed design. The energy contribution from the heat pumps is considered to be renewable energy, this equates to 9.98 kWh/m<sup>2</sup>/year of primary energy being provided on site, approximately 12% of total primary energy come from renewable onsite. The building may also employ PV technology in the future at roof level to increase the renewable energy ratio.

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

## 2. Planning Description

Jordanstown Properties intend to apply for permission for development of lands (2.7 hectares) at a site known as 'Site C' College Lane, Greenogue, Rathcoole, Co. Dublin. The development will consist of modifications to a permitted warehouse development (as granted under SDCC Reg. Ref SD19A/0407).

The amendments principally comprise: an overall increase in the commercial floor area by 13,724 sq m from the permitted 13,959 sq m to 27,683 sq m. The permitted scheme has 3 No. internal ancillary office floor levels, and the proposed alterations provide 2 No. mezzanine levels in the warehouse area (i.e a total of 5 No. internal floor levels). The permitted maximum height of the development at 23.7 metres will remain unchanged.

The additional 13,724 sq m development proposed will comprise an increase in the warehouse floor area from 12,369 sq m to 14,225 sq m, staff facilities from 548 sq m to 1,616 sq m and a reduction in ancillary office area from 1,042 sq m to 776 sq m. In addition to the provision of a 2 No. storey mezzanine warehouse area (9,703 sq m), the proposed development will comprise an integrated plant room (434 sq m) and plant area on 2 No. floors (929 sq m).

The development will also comprise a reduction in the previously permitted 119 No. ancillary car parking spaces to 87 No. car parking spaces; 12 No. designated van parking spaces (no dedicated van spaces previously proposed); 124 No. permitted cycle parking spaces; reconfiguration of the HGV yard and an increase in the number of HGV dock levellers from 12 No. to 14 No. and the provision of 16 No. van loading level entry doors; the provision of an additional egress on the eastern boundary to facilitate vans exiting the site; sprinkler tank and associated underground pumps; repositioned ESB substation (42.6 sq m and 3 m height); bin storage (45 sq m and 2.9 m height); amended lighting layout; modifications to hard and soft landscaping and boundary treatments; and associated site development works above and below ground.

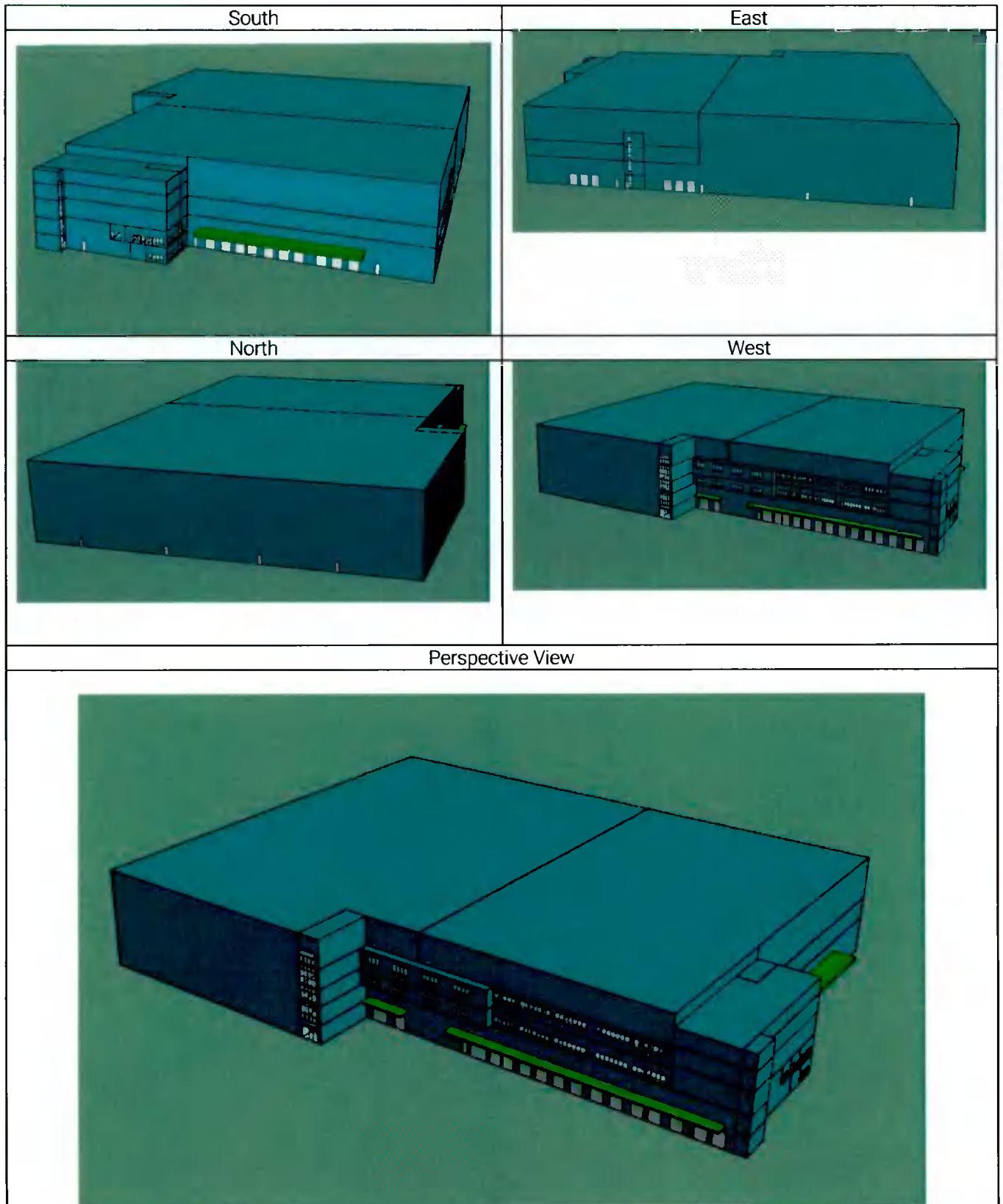
### 3. Introduction

Axiseng was commissioned by Jordanstown Properties Ltd. to undertake a Part L – NZEB / BER analysis on the Industrial temperature-controlled Warehouse for Site C at College Lane, Greenogue, Rathcoole, Co. Dublin. The new building is a large warehouse and multiple storey administration block. The building services strategy for the development has been considered in terms of Part L Compliance (NZEB). The building includes the following energy conservation measures to achieve the most energy effective performance possible;

- High-performance construction envelope including low u-value and solar g-value
- Airtightness construction
- High energy-efficient Variable Refrigerant Flow for heating and cooling system
- High energy-efficiency induction system for heating and cooling system
- Air source heat pump for hot water system
- Heat Recovery in Mechanical Ventilation System
- Low specific fan power installed unit;
- Low installed lighting power & intelligent lighting control including daylight sensors

The sustainable 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 incorporated and are summarised in the following sections. This report details the proposed design solution used in the analysis and the calculation of the building performance metrics used to show compliance with Part L and BER.

### 4. Geometry





## 5. Construction

The following construction has been created based on the proposed u-value which exceed the target u-values set out in Table 1, of the Building Regulation Part L;

Building Element	Targeted u-value (w/m²K)
Exposed Floor	0.16
External Wall	0.19
Internal Wall to unheated area	0.21
Roof	0.15
Door	1.43
Vehicle Access	1/6
Spandrel/Solid panel	1.6
Window_00	1.3

The details of construction assigned are illustrated in visualisation image under *Appendices, Assigned construction details* in this report.

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

### 5.1 Thermal Bridging

The following default thermal bridging coefficients input 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	<input type="checkbox"/>	0.180000	<input type="checkbox"/>
Wall-ground floor	1.730	<input type="checkbox"/>	0.240000	<input type="checkbox"/>
Wall-wall (corner)	0.380	<input type="checkbox"/>	0.140000	<input type="checkbox"/>
Wall-floor (not ground)	0.040	<input type="checkbox"/>	0.110000	<input type="checkbox"/>
Lintel above window/door	1.910	<input type="checkbox"/>	0.450000	<input type="checkbox"/>
Sill below window	1.910	<input type="checkbox"/>	0.080000	<input type="checkbox"/>
Jamb at window/door	1.910	<input type="checkbox"/>	0.090000	<input type="checkbox"/>

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..

## 6. Lighting & Control

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

Room	Design Illuminance (Lux)	Installed Power Wattage (w/m <sup>2</sup> )	Control Type				
			Occupancy controls	Parasitic Power (w/m <sup>2</sup> )	Photoelectric	Sensor type	Parasitic Power (w/m <sup>2</sup> )
Warehouse – Mezzanine	200	2.5	AUTO-ON-OFF	0.07	-	-	-
Large Warehouse	200	2.5	AUTO-ON-OFF	0.07	-	-	-
Lobby / Corridor	200	7	AUTO-ON-OFF	0.07	-	-	-
Manager Office	500	7	AUTO-ON-DIMMED	0.07	DIMMING	Standalone	0.07
Open Plan Office	500	7	AUTO-ON-DIMMED	0.07	DIMMING	Standalone	0.07
Meeting	400	7	AUTO-ON-DIMMED	0.07	DIMMING	Standalone	0.07
Lobby / Corridor	200	7	AUTO-ON-OFF	0.07	-	-	-
Kitchen	300	7	AUTO-ON-OFF	0.07	-	-	-
Reception	400	10	AUTO-ON-OFF	0.07	DIMMING	Standalone	0.10
Toilet	200	7	AUTO-ON-OFF	0.07	-	-	-
Changing Facilities	200	7	AUTO-ON-OFF	0.07	-	-	-
Storage	200	7	AUTO-ON-OFF	0.07	-	-	-
Canteen	300	7	AUTO-ON-OFF	0.07	DIMMING	Standalone	0.10
Plant Room	200	10	AUTO-ON-OFF	0.07	-	-	-
Facility Workshop	400	7	AUTO-ON-OFF	0.07	-	-	-

Automatic daylight control (automatic dimming) in the open plan offices, office, meeting, staff canteen, and reception allows for electrical energy savings as well as increasing the occupant exposure to natural daylight. Other rooms other than open plan office and reception/cafe are to be fitted with presence detection automatic sensors to switching off the lighting when the room are unoccupied.

## 7. HVAC

HVAC system design has been considered to ensure minimal energy requirements 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)
Warehouse	Induction system	Centralised mech Vent	80% Thermal wheel Variable	1.90
Office, Meeting, Lounge, , Reception, staff canteen, stairs	VRF	Centralised Mech Vent	80% Thermal wheel	1.90
Showers	Electric Rads	Centralised Mech Vent	-	1.90
Showers, Toilet,	Electric Rads	Localised exhaust mech Vent	-	0.5
Stairs, Corridor Lobby,	Electric Rads	Room air circulation	-	-

The proposed HVAC system are selected based upon their efficiency performance, which has been assessed to ascertain their coefficient performance in terms of heating, cooling, and hot water generation. All open plan office, office, meeting room, Reception, Kitchen and Cafe are to be installed with a mechanically ventilated heat recovery unit served by heating and chilled water from the Variable Refrigerant Flow System. The IT Data Comms is to be fitted with localised wall-mounted split unit system.

Heating Plant System	Cooling Plant System	Domestic Hot Water
<p><b>Generator Type 1</b> – Induction Heat Source – Heat Pump Air Source Seasonal Efficiency – 3.74 Fuel Type – Electricity Pump Type – NA</p> <p><b>Generator Type 2</b> – Split Unit (VRF) Heat Source – Heat Pump Air Source Seasonal Efficiency – 3.25 Fuel Type – Electricity Pump Type – NA</p> <p><b>Generator Type 3</b> – Split Unit Heat Source – Heat Pump Air Source Seasonal Efficiency – 4.40 Fuel Type – Electricity Pump Type – NA</p> <p><b>Generator Type 4</b> – Radiator Seasonal Efficiency – 1 Fuel Type – Electricity Pump Type – NA</p>	<p><b>Generator Type 1</b> – Induction system Heat Source – Heat Pump Air Source EER / SEER – 4.65 / 3.2 Fuel Type – Electricity</p> <p><b>Generator Type 2</b> – Split Unit (VRF) Heat Source – Heat Pump Air Source EER / SEER – 5.4 / 4.50 Fuel Type – Electricity</p> <p><b>Generator Type 3</b> – Split Unit Heat Source – Heat Pump Air Source EER / SEER – 5 / 6.4 Fuel Type – Electricity</p>	<p><b>Generator Type 1</b> – Heat pump (air source) Seasonal Efficiency – 3.80 Fuel Type – Electricity Overall Seasonal Efficiency (SCoP) – 3.25 Storage Volume (litres) – 2000 Storage losses (KWh/(l.day)) – 0.00470 Circulation losses (W/m) – 10 Loop Length (metres) – 691 Pump Power (kW) – 0.2 Time Switch – Yes</p> <p>*Rules of thumb applied in case of absence of data, where:</p>

The heating will be fed from a variable refrigerant flow system (VRF) with a seasonal coefficient performance (sCOP) over 325%. The generation of high temperature hot water will be utilised through dedicated heat pump system. The heating and cooling system in induction system will be utilised through multi-function heat pumps.

The following control types have been applied to all systems;

Metering Provision	System Controls
<p>Provision for Metering – Yes Metering "Out of range" – Yes Electric Power Factor - &gt; 0.95</p>	<p>Central Time Control – Yes Optimum Start / Stop Control – Yes Local Time Control – Yes Local Temperature Control – Yes Weather Compensation Control - Yes</p>

Central BMS will be designed to check metering to monitor & optimise energy usage. The energy management system is expected to review and adjust the operating efficiencies and strategy for the various building services to minimise overall energy use carbon emission thus saving the cost.

## 8. Renewables

Renewable technologies have been employed to offset and exceed the requirements of building regulations Part L. The heating and cooling in the administration center are to be met by the variable refrigerant volume technology with a designed sCOP over 325% which is a form of renewable energy technology in this case. Domestic Hot Water is met by a dedicated heat pump system, therefore, is identified as renewable energy technology as well. The induction system in the temperature-controlled warehouse will be met by the multi-function heat pumps.

## 9. Result

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

### 9.1 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.

## 21025 Uniphar Warehouse B

Date: Tue Oct 19 12:04:45 2021

### 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: 7.0.12

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 CO2 emission rate from Reference building	26.1 kgCO2/m2 annum
Calculated CO2 emission rate from Actual building	16.4 kgCO2/m2 annum
<b>Carbon Performance Coefficient (CPC)</b>	<b>0.63</b>
<b>Maximum Permitted Carbon Performance Coefficient (MPCPC)</b>	<b>1.15</b>
Calculated primary energy consumption rate from Reference building	136.5 kWh/m2 annum
Calculated primary energy consumption rate from Actual building	83.2 kWh/m2 annum
<b>Energy Performance Coefficient (EPC)</b>	<b>0.61</b>
<b>Maximum Permitted Energy Performance Coefficient (MPEPC)</b>	<b>1</b>
<b>Renewable Energy Ratio (RER)</b>	<b>0.12</b>
<b>Minimum Renewable Energy Ratio</b>	<b>0.1</b>

### Heat Transmission through Building Fabric

Element	U <sub>Limit</sub>	U <sub>Calc</sub>	U <sub>Limit</sub>	U <sub>Calc</sub>	Surface with maximum U-value*
Walls**	0.21	0.19	0.6	0.24	MT00000F_W2_A0
Floors (ground and exposed)	0.21	0.16	0.6	0.16	SP000003_F
Pitched roofs	0.16	-	0.3	-	"No heat loss pitched roofs"
Flat roofs	0.2	0.15	0.3	0.22	ST000004_C_A1
Windows, roof windows, and rooflights	1.6	1.31	3	1.6	PN000001_W-1_O4
Personnel doors	1.6	1.57	3	1.58	SP00000A_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<sub>Limit</sub> = Limiting area-weighted average U-values [W/m<sup>2</sup>K]  
 U<sub>Calc</sub> = Calculated area-weighted average U-values [W/m<sup>2</sup>K]  
 U<sub>Limit</sub> = Limiting individual element U-values [W/m<sup>2</sup>K]  
 U<sub>Calc</sub> = Calculated individual element U-values [W/m<sup>2</sup>K]  
 \* 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 where area-weighted average and individual limiting standards are 1.6 and 3 W/m<sup>2</sup>K, respectively.

Air Permeability	Upper Limit	This Building's Value
m <sup>3</sup> /(h.m <sup>2</sup> ) at 50 Pa	5	5

9.2 BER document

Virtual Environment 7.0.12 (SBEMIE v5.5.h.2)

# Provisional Building Energy Rating (BER)

Provisional BER for the building detailed below is:

**A2**

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<sub>2</sub> emissions indicator. These indicators are expressed as respective ratios of primary energy use and CO<sub>2</sub> 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.

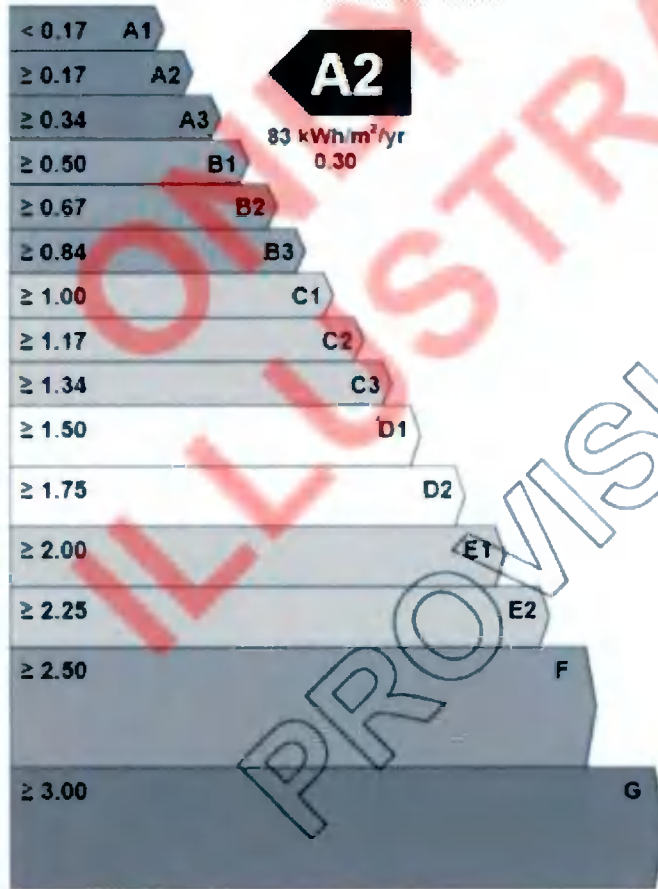
Address 1  
Address 2  
Address 3  
Co. Carlow  
Eircode

BER Number: voidvoidvoid  
Useful Floor Area (m<sup>2</sup>): 28244.5  
Main Heating Fuel: Grid Supplied Electricity  
Building Environment: Air Conditioning

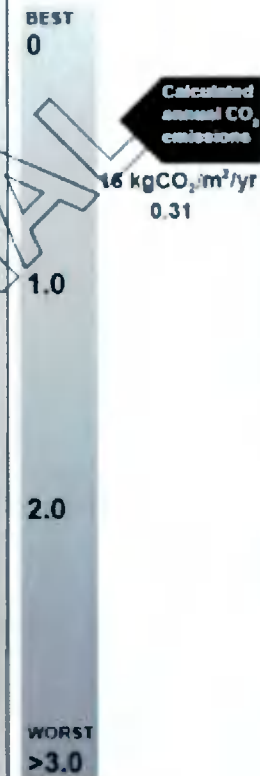
Date of Issue: 18 Oct 2021  
Valid Until: 18 Oct 2023  
BER Assessor No.: 123456  
Assessor Company No.: 123456  
Assessor Scheme: SEAI

Building Type: Storage or Distribution

Building Energy Rating (Indicator)  
MOST EFFICIENT



Carbon Dioxide (CO<sub>2</sub>) Emissions Indicator



The less CO<sub>2</sub> 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.

## 10. Limiting the Effects of Solar gain in Summer

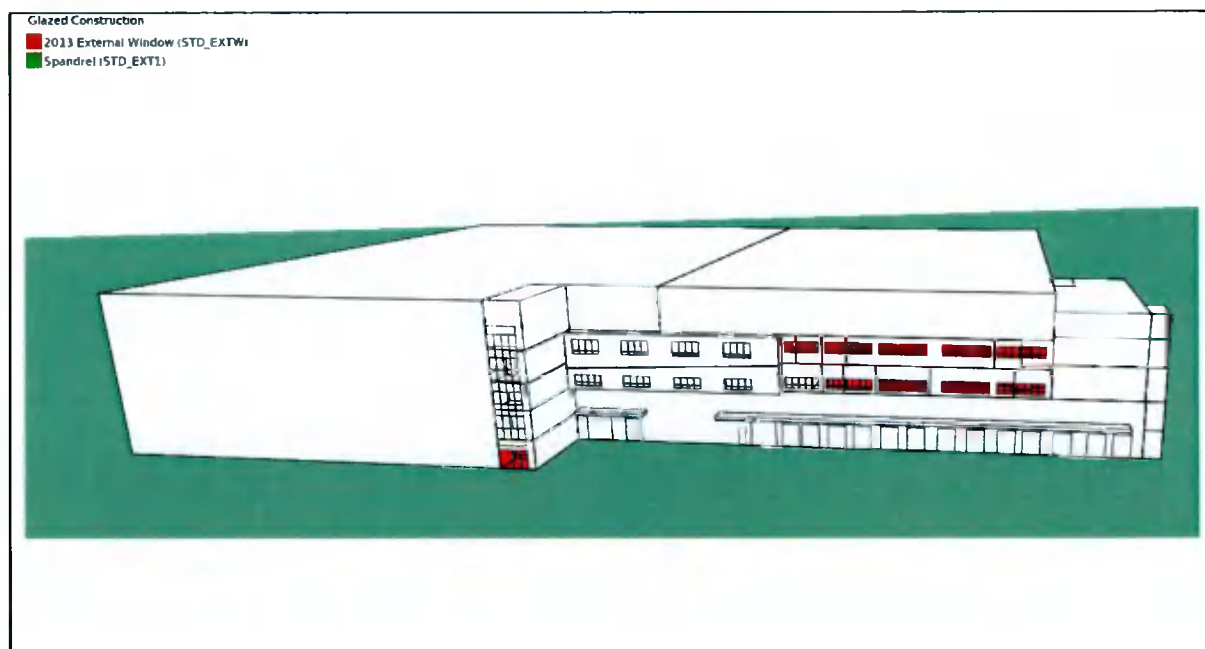
To assess the solar gain against criteria under section 1.3.5 *Limiting the effects of solar gain in summer* in Part L for solar gain compliance, a dynamic energy modelling simulation was carried out in IESVE software. The following model inputs for the proposed building were taken into account against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

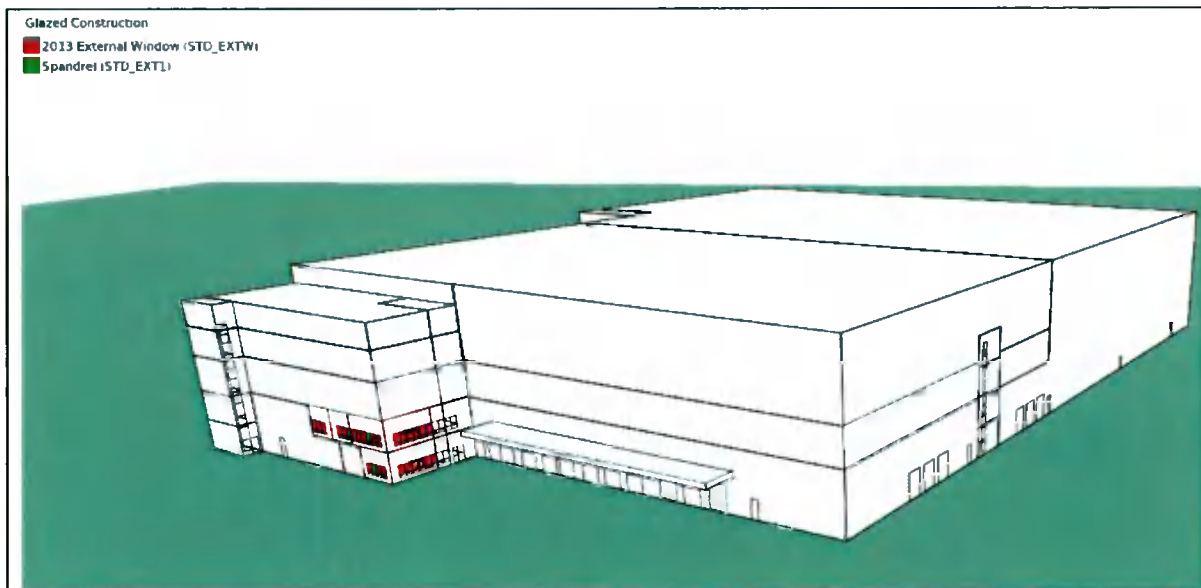
Parameter	Input
Orientation of site/building	According to the site plan
Adjacent building	Adjacent block (existing building behind site application) is taken into account.
Weather conditions	Dublin IWEC / UK Part L ManchesterTRY05.fwt
Thermal properties of the glazing	Side lit window - 0.48 g-value
Shading devices	None
Perimeter Zones	6m depth including surrounding area less than 3m depth
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.

### 10.1 Internal Blind

The following figures show the locations of glazed including glass and solid panel modelled.





### 10.2 Solar Gain Results

The results of the solar gain analysis are outlined in the following table figure. All perimeter zones with external glazing are in compliant with Part L 2017 based on the proposed glazing performance;

Space Name (Zones)	Solar gain (MWh)	Reference Case Solar gain (MWh)	Part L 2017 Compliance	Internal Blind Required
Canteen	2326.58	2799.67	Pass	No
Kitchen	1096.32	1233.44	Pass	No
Manager Office	559.2	939.38	Pass	No
Manager Office	813.85	981.22	Pass	No
Manager Office	871.12	1027.7	Pass	No
Manager Office	835.44	871.25	Pass	No
Manager Office	644.01	718.92	Pass	No
Manager Office	1048	1112.19	Pass	No
Manager Office	375.58	496.97	Pass	No
Manager Office	748.26	813.85	Pass	No
Manager Office	808.81	901.18	Pass	No
Open Plan Office	1904.52	2881.31	Pass	No
Open Plan Office	2504.75	3232.19	Pass	No
Open Plan Office	1709.79	1814.91	Pass	No
Open Plan Office	2504.75	3232.19	Pass	No
Open Plan Office	4378.13	4956.42	Pass	No
L00: Reception	1799.21	4679.62	Pass	No

## 11. Conclusion

The passive measures included in the design, such as minimising solar gain (glazing selection and external shading), reducing fabric heat loss through the building envelope and improving the airtightness 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 development 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 0.12 (12%) exceeds 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 results outlined in this Part L report demonstrate that the proposed design including the building envelope of the Library Centre with the L5 (a, b, c, e) building regulation requirement outlined in Part L 2017



## 12. Appendices

### 12.1 Assigned Construction Details

