Part L Compliance Report

For the

Activities and Administration Building

At

St Thomas Fields, Rathfarnham, Dublin 16

For

DLRCC

Date of Issue: 22/02/2024 Version: 0.0

Document History

Version No.	Description	Prepared By	Reviewed By	Date
0.0	Issued for Part 8 Submission	KT	RMcK	22/02/2024

Contents

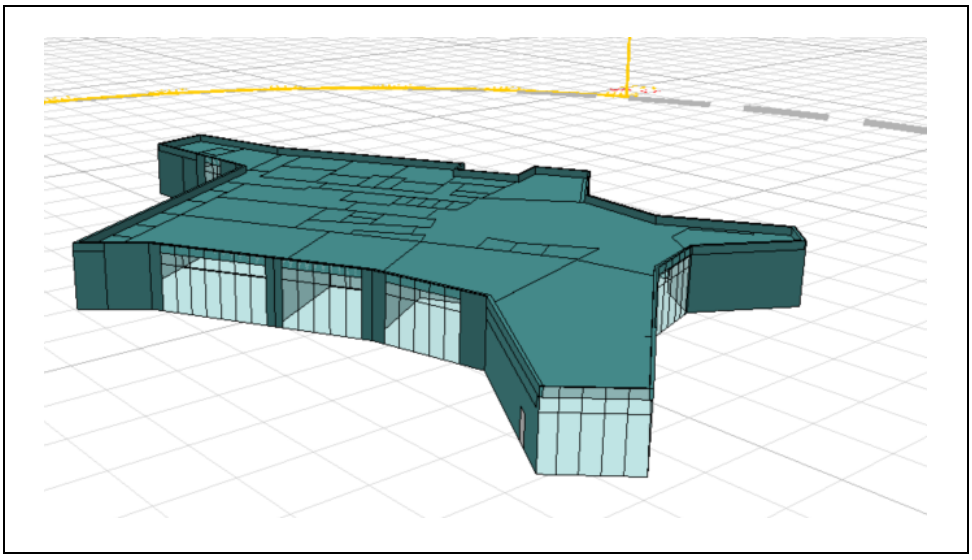
1. Executive Summary

With consideration to the EU energy performance of Buildings Directive (EPBD) and the Building Regulations Technical Guidance Document, Part L (NZEB) 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 of the building.

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 the target set out for the proposed development, the energy modelling software used in the analysis is IES Virtual Environment 2023 which utilises the SBEMie 5.6.a.0 calculation engine. The analysis was undertaken to identify the most suitable design in terms of energy efficiency and reduced carbon output. 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_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	97.3 kgCO2/m2.annum
Calculated CO2 emission rate from Actual building	31.8 kgCO2/m2.annum
Carbon Performance Coefficient (CPC)	**0.33**
Maximum Permitted Carbon Performance Coefficient (MPCPC)	**1.15**
Calculated primary energy consumption rate from Reference building	509.8 kWh/m2.annum
Calculated primary energy consumption rate from Actual building	248.1 kWh/m2.annum
Energy Performance Coefficient (EPC)	**0.49**
Maximum Permitted Energy Performance Coefficient (MPEPC)	**1**
Renewable Energy Ratio (RER)	**0.56**
Minimum Renewable Energy Ratio	**0.1**

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 51% and 71% of reference building under the Part L 2022 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 0.56 being achieved (56%) under the current proposed design. The energy contribution from the heat pumps is considered to be renewable energy, this equates to 271.835 kWh/m²/year of primary energy being provided on site, approximately 56% of total primary energy come from renewable onsite.

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

2. Introduction

Axiseng was commissioned by DLRCC to undertake a Part L – NZEB / BER analysis on the proposed development at St Thomas Estate, Tibradden Road, Rathfarnham, Dublin 16.

DLRCC intend to apply for planning permission for development at St Thomas Estate, Tibradden Road, Rathfarnham, Dublin 16.

The new Regional Sports Centre at St. Thomas Estate for DLRCC is a mixed used space of approximately 1,500m2. The space will be a mix of studios, training rooms, café/lounge areas including offices & changing facilities. External plant space within dedicated compounds will be provided. An adjacent standalone unconditioned & enclosed sprint track will also serve the site.

The building includes the following energy conservation measures to achieve the most energy efficient performance possible;

- High-performance construction envelope including low u-values, and g-values
- Low air permeability/ air infiltration rates limited to 2 m^3/ hr/ m^2
- Energy-efficient air source heat pumps providing LPHW for radiators and underfloor heating in occupied zones
- Air source heat pump for generating hot water
- Natural ventilation solutions incorporating windcatchers complete with heat recovery in larger, perimeter zones
- Mechanical ventilation with high efficiency heat recovery to WCs & internal occupied zones
- Low specific fan power values on HRUs and exhaust fans
- Low installed lighting power & intelligent lighting control including photoelectric sensors.

The sustainable design of the proposed development ensures the overall building performs efficiently and meets the NZEB challenges. This report details the proposed design solutions used in the analysis to show compliance with Technical Guidance Document TGD Part L and NZEB regulations.

3. Construction

The following constructions have been created based on Architectural proposals and the elemental u-values set out in Table 1, of the Building Regulation Part L. Where internal, perimeter zones are unheated, internal walls to heated spaces shall require u-values as noted in the table below.

Building Element	Targeted u-value (w/m²K)
Exposed Floor	0.18
External Wall	0.15
Internal Wall to unheated space (heated space to unheated)	0.2
Roof	0.16
Door	1.6
Glazing	1.4 (0.40 g-value)*
Glazing (with frit)	1.4 (0.20 g-value)

*Blinds have been assigned to some spaces to comply with overheating requirements. Refer to section 8 for further details on assigned glazing and refer to Axiseng report *"Overheating Analysis"* for full details on type of blind assumed for thermal modelling.

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

3.1 Thermal Bridging

The following thermal bridging coefficients have been used in the energy modelling. The Architects shall ensure that the building complies with minimum requirements in line with Part L 2022;

Type of junction	Junctions involving metal cladding Psi (W/(m·K))	QA accredited	Junctions NOT involving metal cladding Psi (W/(m·K))	QA accredited
Roof-wall	0.280	☐	0.120000	☐
Wall-ground floor	1.000	☐	0.160000	☐
Wall-wall (corner)	0.200	☐	0.090000	☐
Wall-floor (not ground)	0.000	☐	0.070000	☐
Lintel above window/door	1.000	☐	0.300000	☐
Sill below window	0.950	☐	0.040000	☐
Jamb at window/door	0.950	☐	0.050000	☐

The building air permeability was set to 2 m³/(h.m²) @ 50 pa to comply with Section 1.3.4 of the Building Regulations TGD Part L.

4. Lighting & Control

The following lighting design measures are proposed.

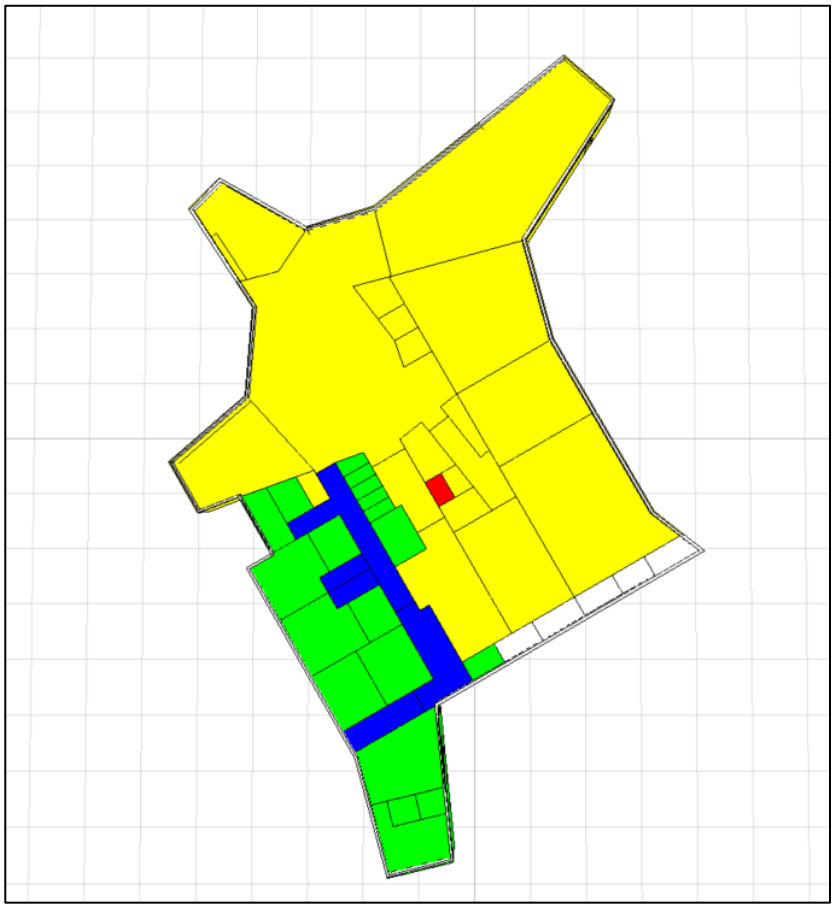
Room	Design Illuminance (Lux)	Installed Power Wattage (w/m2)	Control Type				
			Occupancy controls	Parasitic Power (w/m2)	Photoelectric	Sensor type	Parasitic Power (w/m2)
Office/Consultation	500	7	AUTO-ON-OFF	0.10	Dimming	Standalone	0.1
Meeting/Club Rooms	400	7	AUTO-ON-OFF	0.10	Dimming	Standalone	0.1
Toilet	200	7	AUTO-ON-OFF	0.10	-	-	-
Lobby / Corridor	150	7	AUTO-ON-OFF	0.10	-	-	-
Reception	200	10	AUTO-ON-OFF	0.10	Dimming	Standalone	0.1
Studios	300	7	AUTO-ON-OFF	0.10	Dimming	Standalone	0.1
Gym	200	7	AUTO-ON-OFF	0.10	Dimming	Standalone	0.1
Cafe	200	8	AUTO-ON-OFF	0.10	Dimming	Standalone	0.1
Changing Facilities	200	7	AUTO-ON-OFF	0.10	-	-	-
Storage	150	7	MAN-ON-AUTO-OFF	0.10	-	-	-
Kitchen	500	7	MAN-ON-AUTO-OFF	0.10	-	-	-
Comms Room	200	7	MAN-ON-AUTO-OFF	0.10	-	-	-

All spaces including the studios and gym will be fitted with presence detection automatic sensors to switch off the lighting when the rooms are unoccupied. In addition, the perimeter meeting/office areas, café, reception, studios & gym will also include daylight control to reduce artificial lighting energy when sufficient natural daylight is detected via multi-sensors.

5. HVAC

HVAC system design and equipment selection has been considered to ensure that minimal energy requirements are realised in the building. The following table is a list of the proposed HVAC systems and their designations;

Room	HVAC System	Ventilation Type	Heat Recovery Unit	Specific Fan Power (W/l/s)
Perimeter areas (in yellow zones)	Underfloor Heating	Natural Vent – Windcatchers (Heat Recovery backup)	65% Plate Heat Ex	0.18
Internal areas (in yellow zones)	Underfloor Heating	Mech Vent	75% Plate Heat Ex	1.9
Showers / Toilets (green zones)	LPHW radiator	Mech Vent	75% Plate Heat Ex	1.9
Internal Consultation/Meeting (green zones)	LPHW radiator	Mech Vent	75% Plate Heat Ex	1.9
Perimeter Consultation/Meeting (green zones)	LPHW radiator	Natural Vent – openable windows	-	-
Unheated storage at façade	None	Local Extract	-	0.3
Comms Room (Red)	Comms Split	-	-	-



The proposed HVAC systems are selected based upon their performance in providing heating, ventilation, and hot water generation at optimal efficiencies. Where the building allows, natural ventilation has been utilised via windcatchers and openable windows. The heating throughout shall be either underfloor or radiators fed via LPHW heated by air source heat pumps located externally.

Heating Plant System	Cooling Plant System	Domestic Hot Water
Generator Type 1 – Underfloor Heating Heat Source – Air Source Heat Pump Seasonal Efficiency – 3.5 Fuel Type – Electricity Pump Type – Variable speed differential sensor across pump **Generator Type 2** – LPHW Radiators Heat Source – Air Source Heat Pump Seasonal Efficiency – 3.5 Fuel Type – Electricity Pump Type – Variable speed differential sensor across pump	**Generator Type 1 –** Comms Split Heat Source – Heat Pump Air Source EER / SEER – 4.5 / 4.5 Fuel Type – Electricity	**Generator Type 1** – Heat pump (air source) Seasonal Efficiency – 3.2 Fuel Type – Electricity Overall Seasonal Efficiency (SCoP) – 3.2 Storage Volume (litres) – 700 Storage losses (KWh/(l.day)) – 0.00470 Circulation losses (W/m) – 10 Loop Length (metres) –65* Pump Power (kW) – 0.150 Time Switch – Yes *Rules of thumb applied in case of absence of data, where: $(\sqrt{total\ floor\ area\ served\ by\ DHW})x\ 4$ Note: DHW heat pump is to be tested to EN 16147. Otherwise, a default SCoP will be applied and may not achieve Part L Compliance

The ASHP system provides low-temperature hot water for space heating with a seasonal coefficient of performance (sCOP) of over 350%. The generation of high temperature hot water will be utilised through hydro box or heat pump technology with a domestic hot water tank connected to the heat pump achieving an sCOP of over 320%.

The following control types have been applied to all systems;

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

Central BMS Controls will be designed 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 emissions thus saving the cost.

6. Renewables

Renewable technologies have been employed to offset and exceed the requirements of the building regulations TGD Part L. The heating in the building is to be met by an air source heat pump system with a designed sCOP over 350% which is recognised as a form of renewable energy technology. The Domestic Hot Water is met by a heat pump system and therefore, is also identified as renewable energy technology.

As part of the sustainable design of the building, a provision for PV panels has been allocated. An initial figure of 24 panels, assumed to be 0.4kW peak power per panel, southwest facing with a 30deg inclination, has been assigned to the energy model. With a total peak power of 9.6kW. With this initial provision, a BER of A2 is proposed for the building.

To achieve a BER of A1, initial calculations suggest that a peak power of 115.8kW PV would be required. At 0.4kW per panel, this is estimated to be 290 PV panels. Refer to Appendices for proposed layout for this PV array.

7. Results

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

7.1 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.

23099 Regional Sports

Date: Thu Feb 22 13:40:52 2024

Administrative information

Building Details

Address: 23099 Regional Sports, Address 2, Address 3, Address 4, Co. Dublin, Eircode

NEAP

Calculation engine: SBEMIE

Calculation engine version: v5.6.a.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: 7.0.24

BRIRL compliance check version: v5.6.a.0

Client Details

Name: Name

Telephone number: Phone

Address: Street Address, Co. Dublin, Eircode

Energy Assessor Details

Name: Name

Telephone number: Phone

Email: you@yourISP

Address: Street Address, Co. Dublin, 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	97.3 kgCO2/m2.annum
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Heat Transmission through Building Fabric

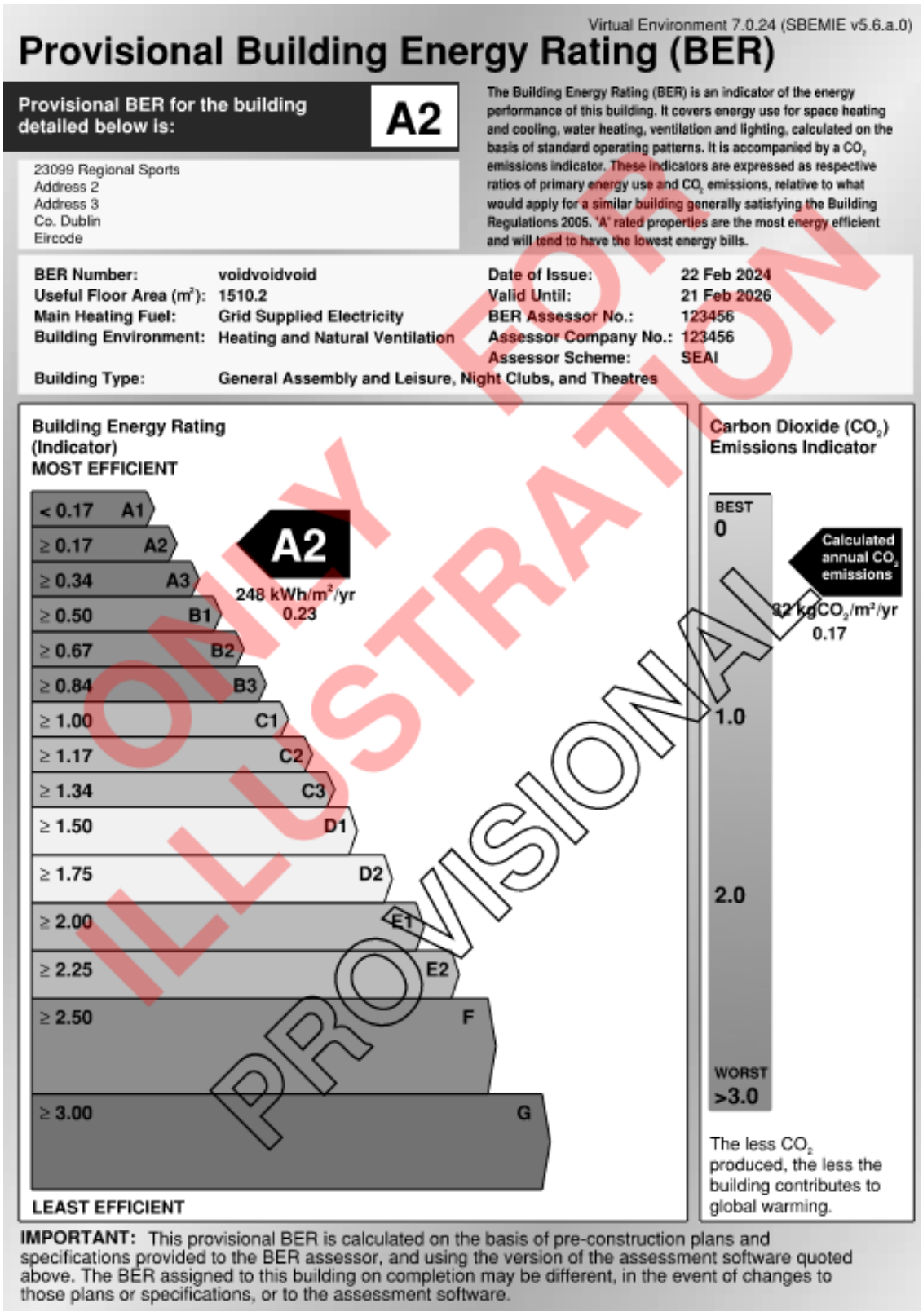
Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Limit}$	$U_{i\text{-}Calc}$	Surface with maximum U-value*
Walls**	0.21	0.16	0.6	0.2	63000000_W4_A0
Floors (ground and exposed)	0.21	0.18	0.6	0.18	43000000_F
Pitched roofs	0.16	-	0.3	-	"No heat loss pitched roofs"
Flat roofs	0.2	0.16	0.3	0.16	43000000_C
Windows, roof windows, and rooflights	1.6	1.4	3	1.4	42000000_W8_O0
Personnel doors	1.6	1.6	3	1.6	51000001_W0_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"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m2K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m2K)]
$U_{i\text{-}Limit}$ = Limiting individual element 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 whose area-weighted average and individual limiting standards are 1.8 and 3 W/m2K, respectively.

Air Permeability	Upper Limit	This Building's Value
m3/(h.m2) at 50 Pa	5	2

7.2 BER document



Virtual Environment 7.0.24 (SBEMIE v5.6.a.0)

Provisional Building Energy Rating (BER)

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

23099 Regional Sports
Address 2
Address 3
Co. Dublin
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:**	22 Feb 2024
Useful Floor Area (m^2):	1510.2	**Valid Until:**	21 Feb 2026
Main Heating Fuel:	Grid Supplied Electricity	**BER Assessor No.:**	123456
Building Environment:	Heating and Natural Ventilation	**Assessor Company No.:**	123456
		Assessor Scheme:	SEAI
Building Type:	General Assembly and Leisure, Night Clubs, and Theatres		

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

LEAST EFFICIENT

A2
248 kWh/m^2/yr
0.23

Carbon Dioxide (CO_2) Emissions Indicator

BEST
0
1.0
2.0
WORST
>3.0

Calculated annual CO_2 emissions
32 kgCO_2/m^2/yr
0.17

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.

8. Overheating Checks

8.1 Limiting the Effects of Solar gain in Summer

In accordance with TGD Part L section 1.3.5 Limiting the effects of solar gain in summer, the solar gain limit exceedance must be checked. According to the BRIRL report there were no issues identified with the current design. Further detailed analysis can be performed using dynamic thermal simulation software to assess the impact of changes to glazing location, percentages, and specifications.

Solar Gain in Summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
43: Consultation Room	N/A	N/A
24: Female Change 2	N/A	N/A
26: Female WC	N/A	N/A
22: Male Change 2	N/A	N/A
21: Female Change 2	N/A	N/A
25: Male WC	N/A	N/A
23: Male Change 1	N/A	N/A
49: Storage	N/A	N/A
50: Storage	N/A	N/A
52: Store	N/A	N/A
12: Acc Changing	N/A	N/A
WCs	N/A	N/A
WCs	N/A	N/A
WCs	N/A	N/A
WCs	N/A	N/A
WCs	N/A	N/A
63: Acc WC	N/A	N/A
42: Consultation	NO (-68.2%)	YES
51: Meeting Room/Office	NO (-81.8%)	YES
30: Meeting Room	NO (-88.8%)	YES
44: Cleaners Store	N/A	N/A
14: Kitchen	N/A	N/A
17: Store	N/A	N/A

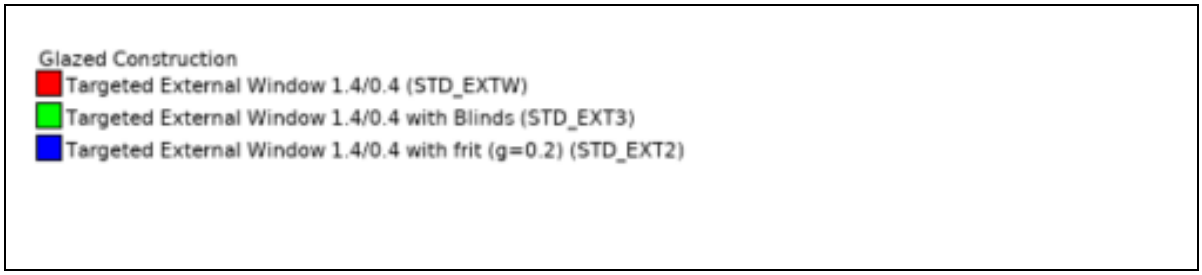
Zone	Solar gain limit exceeded? (%)	Internal blinds used?
14: Duty Office	N/A	N/A
16: Store	N/A	N/A
29: Store	N/A	N/A
Circulation	N/A	N/A
18: Kitchen	N/A	N/A
20: Consultation	N/A	N/A
19: Store	N/A	N/A
39: Studio 2A	NO (-31%)	NO
Studio 3	NO (-27.7%)	NO
40: Studio 2B	NO (-11.2%)	NO
38: Studio 1B	N/A	N/A
36: Studio 1A	N/A	N/A
45: Gym & Fitness	NO (-49%)	NO
47: Cafe	NO (-23.9%)	NO
61: Reception Foyer	NO (-2.1%)	NO
62: Shared Club Room	NO (-57%)	NO
60: Store	N/A	N/A
Lobby	N/A	N/A
Lobby	N/A	N/A
Circulation	N/A	N/A
Circulation	N/A	N/A
Circulation	N/A	N/A
15: Comms	N/A	N/A
64: Escape Lobby	N/A	N/A
65: Storage	N/A	N/A
66: Storage	N/A	N/A
67: Storage	N/A	N/A
68: Storage	N/A	N/A

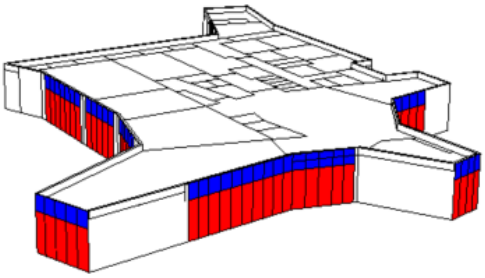
8.2 TM52 Overheating Results

A full analysis of the thermal comfort and overheating in line with TM52 has been completed for the Regional Sports Campus. Refer to Axiseng *"Overheating Analysis"* report for full details.

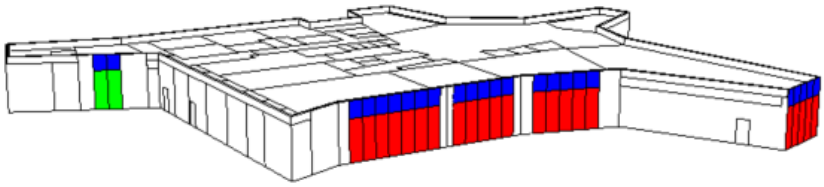
8.3 Glazing

The following figures show the locations of glazing types throughout the model.

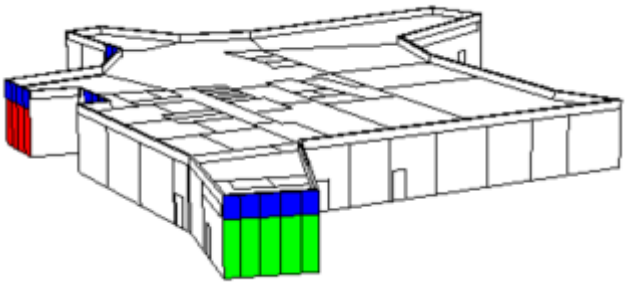




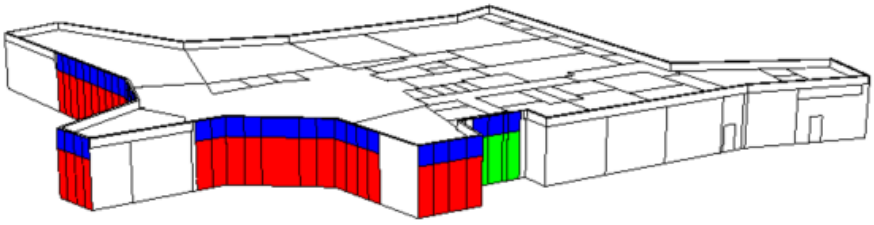
North



East



South



West

9. Conclusion

The passive measures included such as reducing fabric heat loss, solar gains, improving the airtightness and maximising window openings significantly contribute towards reducing the loads on the 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 the Part L compliance assessment show that the proposed development has an Energy Performance Coefficient (EPC) less than the 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 0.56 (56%) which exceeds the target under Part L.

Under the regulations for EU Taxonomy, the building is required to perform better than the NZEB and Part L maximum figures. The improvement on these is a 10% reduction. The table below shows that this development is exceeding the requirements for EU Taxonomy.

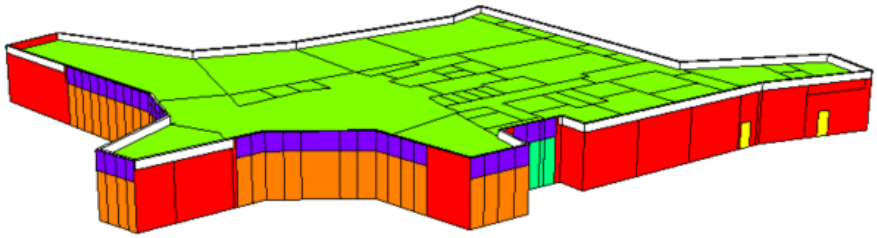
Coefficient	Result	Part L/NZEB Threshold	EU Taxonomy Threshold
EPC	0.49	1.0 - Pass	0.9 - Pass
CPC	0.33	1.15 - Pass	1.035 - Pass
RER	0.56	0.1 - Pass	0.11 - Pass

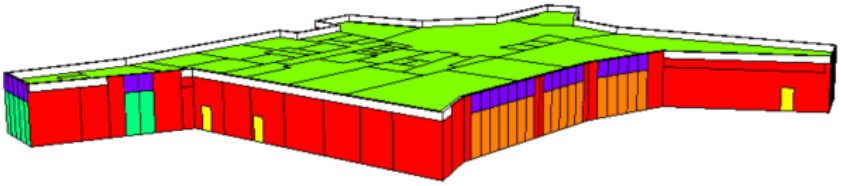
The proposed building achieves the NZEB performance specification for energy and carbon dioxide emissions and therefore is compliant with the performance criteria as set out in section 1.1.2, of the Building Regulations 2022 Part L for Buildings Other than Dwellings.

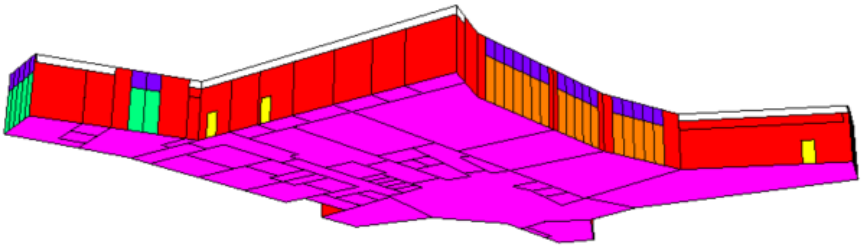
10. Appendices

10.1 Assigned Construction Details

Construction
- CLT External Wall 0.15 (STD_WAL1)
- Default Internal Ceiling/Floor (STD_CEIL)
- Default Internal Partition (STD_PART)
- Door (STD_DOOR)
- Insulated Internal Partition (STD_PAR1)
- Targeted Exposed Floor 0.18 (STD_FLO1)
- Targeted External Window 1.4/0.4 (STD_EXTW)
- Targeted External Window 1.4/0.4 with Blinds (STD_EXT3)
- Targeted External Window 1.4/0.4 with frit (g=0.2) (STD_EXT2)
- Targeted Roof 0.16 (STD_ROOF)

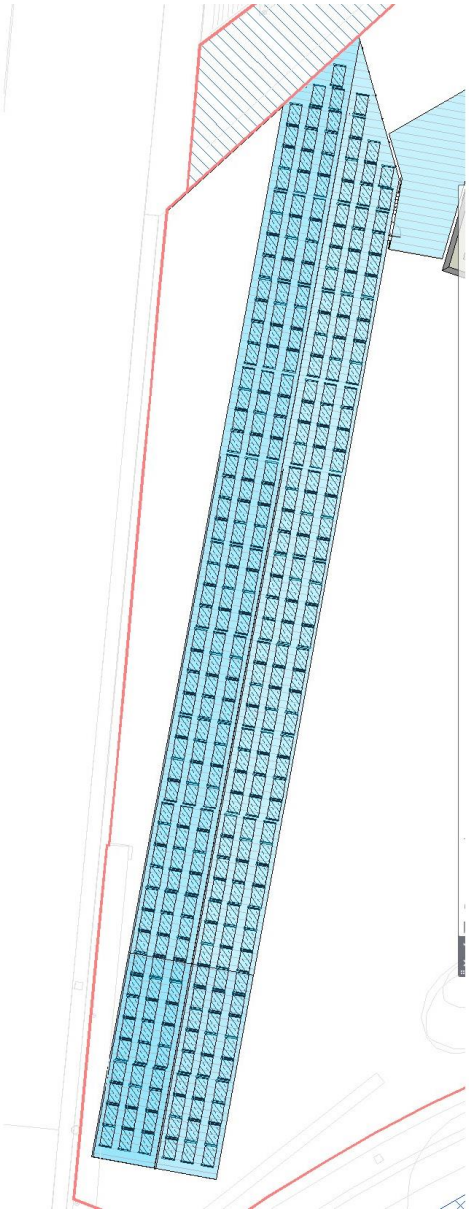






10.2 PV Array for A1 BER

Further to Section 6 above, the below sketch indicates the quantity of PV required in order to achieve an A1 rating.



External Lighting Report

For the

Lighting of Footpaths & Escape Doors

At

St Thomas Fields, Rathfarnham, Dublin 16

For

DLRCC/DSD

Date of Issue: 27/02/2024 Version: 0

Document History

Version No.	Description	Prepared By	Reviewed By	Date
0	Issued for Part 8 Submission	JS	RMcK	27/02/2024

Contents

1. Introduction

Axiseng have been commissioned by DLRCC/DSD., to complete an external lighting design for the extension of the sports facilities at St Thomas Fields, Tribadden, Co. Dublin.

The purpose of the report is to demonstrate that sufficient lighting shall be provided along the paths and at final exits. The proposal is for building mounted lighting for the final exit points, 4m tall columns on the entrance approach and bollard type fittings for the smaller path areas by the running track

Careful attention should be paid to the assumptions made within this report.

For the purpose of this project, this private developments lighting is based off of the following guidance standards:

- EN 13201- 2:2015 (CEN/CENELEC, 2016) – Road Lighting Part 2: Performance Requirements
- Dun Laoghaire Rathdown County Council – Street Lighting Technical Specification

The calculation has been carried out using 'Dialux Evo" software. The results of which are included in the Appendix.

This report shall be read in conjunction with the drawing 'RSC-AXE-XX-XX-DR-E-60101– Site Lighting'

Appendix A1 (Dialux Evo Report) demonstrate the following the lux levels reached for the development.

2. Lighting Design

To meet the required lighting design for the lighting levels and in keeping with the local authority's standards, the following shall be incorporated:

- LED luminaires with a 3000K colour temperature.
- The lighting control, to ensure local ecology is not affected, shall be via timeclock/photocell with an "Default" to OFF rather than ON. This shall be achieved via a Hand/OFF/Auto switch and shall be controlled & maintained by building staff.
- Luminaires shall provide a light output ratio in excess of 90% with an upward light output ratio of no more than 0.5%
- The luminaire shall be fully compatible for dimming, allowing for diagnostic and dimming functions. All LED drivers and dimming modules shall be contained within the lantern housing.

Other elements included within this design:

- The final exit points shall be lit via battery backed fittings in the case of an emergency.
- The maintenance pathway around the building has not been included within this report, only the final exits, as this path shall not be used in hours of darkness. Access shall be controlled by the building management.

The standard from the National Standards Authority of Ireland (NSAI) that deals with the issues of Emergency Lighting are the (I.S. 3217). The emergency lighting system has three major purposes:

"To illuminate exit routes, to keep communal areas lit and to provide sufficient light for proper shutdown during high-risk processes. Every building owner has an ethical and legal obligation to make sure that the emergency lighting system installed in the building is built, designed and installed according to IS 3217: 2013 standard."

- There shall be a controlled evacuation in the event of an emergency, supervised by the building staff.

The following has not been included within the calculations and report;

- Tree lines, proposed and existing, have not been included within the calculations
- Existing running track & carpark lighting has not been included within these calculations. This lighting will add to the levels around the Entrance to both buildings.

2.1 Proposed Lighting Design

The lighting design for the development has been assumed to be a P3 classification taken from the I.S. EN 13201- 2:2015 (CEN/CENELEC, 2016) – Road Lighting Part 2: Performance Requirements. EN 13201-2 defines the P/S Class as "For pedestrian traffic and cyclists for use on footways and cycleways, and drivers of motorised vehicles at low speed on residential roads, shoulder or parking lanes, and other road areas lying separately or along a carriageway of a traffic route or a residential road, etc." this has been applied to pathways in this report.

To meet this classification, the requirement is to achieve an average of 7.5lux on the pathways.

3. Proposed Luminaires

3.1 Private Development Lighting

There are 3No luminaire types proposed for this development. These shall be installed as per drawing RSC-AXE-XX-XX-DR-E-60101.

The proposed luminaires are:

- Type A iGuzzini iPro – building mounted at:
  - 3.6m above final exits on the main building
  - 2.2m above final exits on the sprint track building
- Type C iGuzzini Platea Pro – 4m column mounted, located on entrance approach
- Type B iGuzzini iWay round – 900mm bollard, located on paths surrounding the sprint track

4. Conclusion

4.1 Private Development Lighting

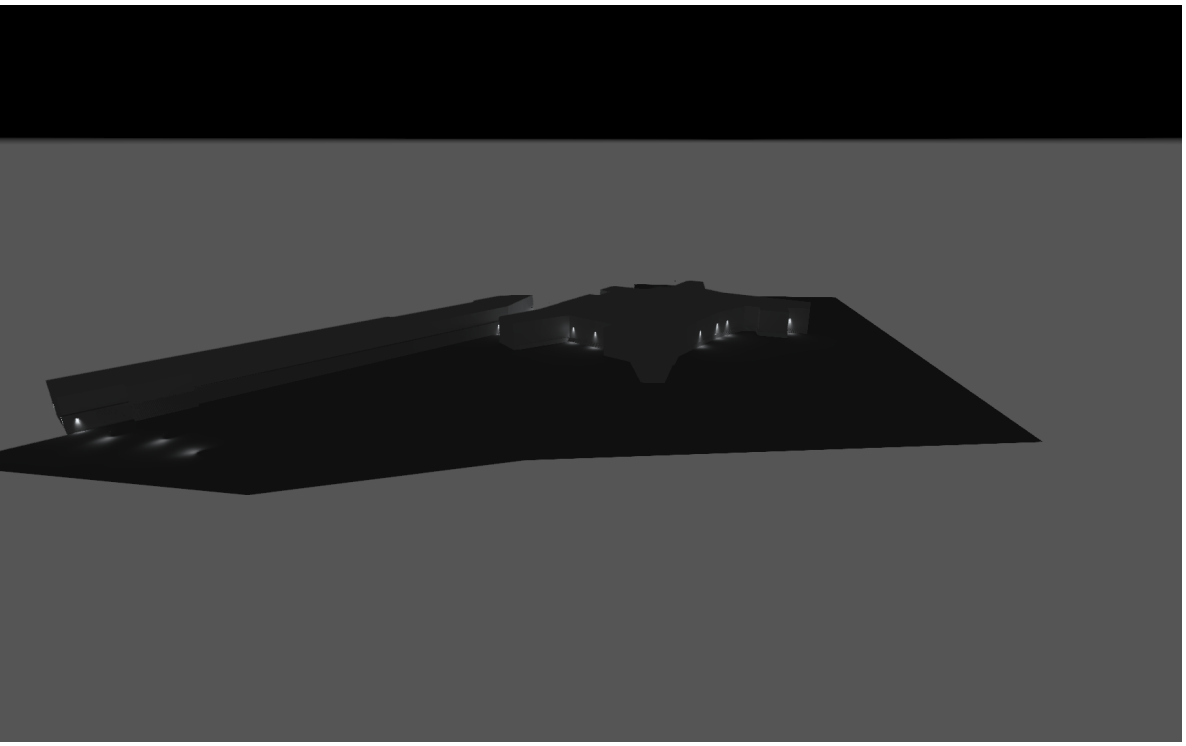
The results from the 'Dialux Evo" calculation demonstrates that the minimum average lux levels proposed are exceeded. The average requirement is to achieve 7.5lux on the paths.

The average lux levels achieved are all above 7.5lux across the development.

5. Appendices

Appendix A – Dialux Evo Report

Associated Drawings - RSC-AXE-XX-XX-DR-E-60101



Regional Sports Campus

Preface

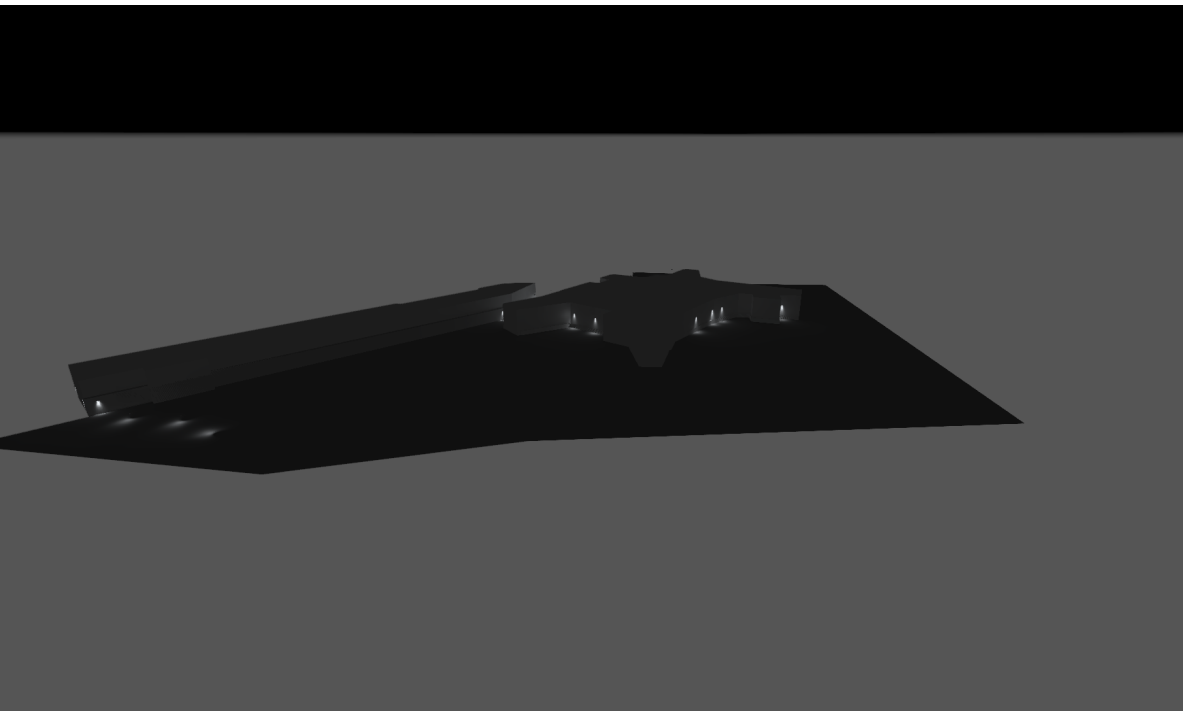
Notes on planning:

The energy consumption quantities do not take into account light scenes and their dimming levels.

Table of Contents

Product data sheets

Site 1



Description

Luminaire list

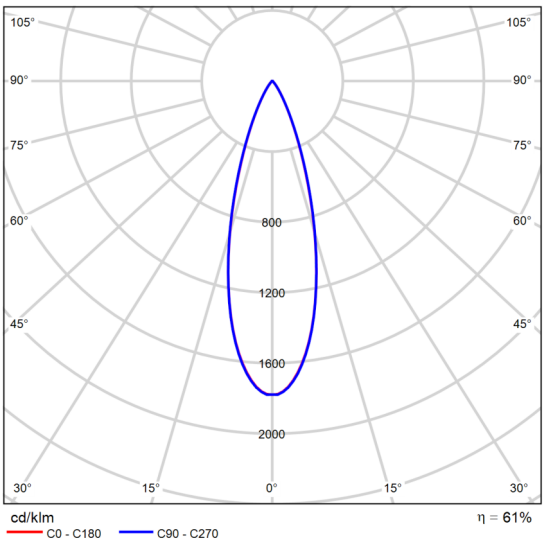
Φ_{total}	P_{total}	Luminous efficacy
26060 lm	344.4 W	75.7 lm/W

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
18	iGuzzini illuminazione S.p.A	BK32_C19B	iPro: Outdoor wall-mounted luminaire - Warm white LED - with electronic ballast Vin=100-240V ac - Flood optic - 7.7W 494.1lm - 3000K	7.7 W	494 lm	64.1 lm/W
6	iGuzzini illuminazione S.p.A	EN96_C44P	Ø180mm optical assembly - Warm White LED - 220÷240Vac - Super Comfort 180° optic - 12.3W 247.5lm - 3000K - Post for iWay optical compartment Ø170 mm - h = 169 mm	12.3 W	248 lm	20.1 lm/W
4	iGuzzini illuminazione S.p.A	P875_A09J	Platea Pro: Pole-mounted system - Small body optical assembly - Warm White - A45 street optic. - 33W 3920lm - 3000K	33.0 W	3920 lm	118.8 lm/W

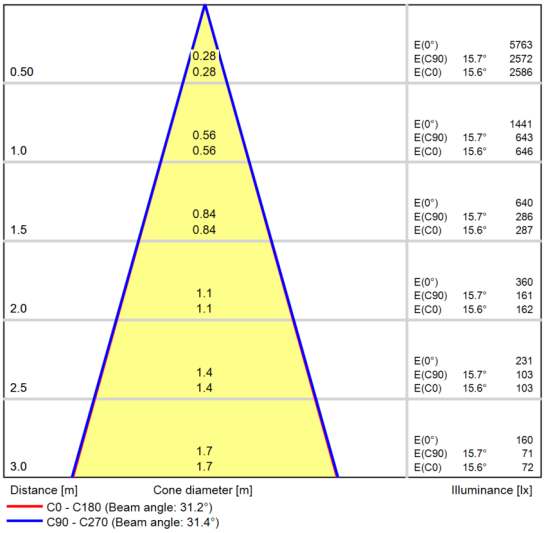
Product data sheet

iGuzzini illuminazione S.p.A - iPro: Outdoor wall-mounted luminaire - Warm white LED - with electronic ballast Vin=100-240V ac - Flood optic - 7.7W 494.1lm - 3000K

Article No.	BK32_C19B
P	7.7 W
Φ_{Lamp}	810 lm
$\Phi_{Luminaire}$	494 lm
η	60.96 %
Luminous efficacy	64.1 lm/W
CCT	3000 K
CRI	80



Polar LDC

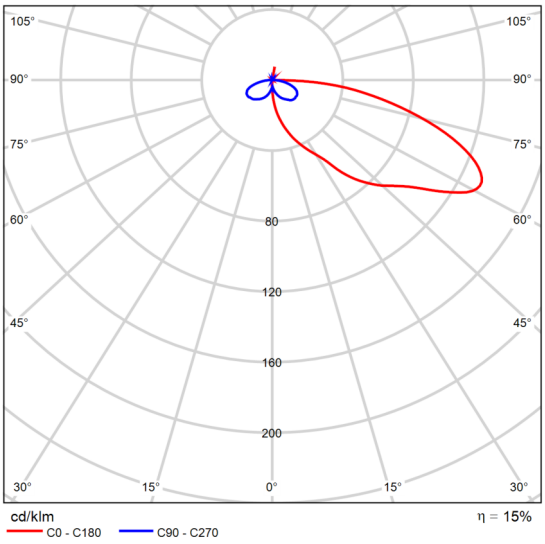


Cone diagram

Product data sheet

iGuzzini illuminazione S.p.A - Ø180mm optical assembly - Warm White LED - 220÷240Vac - Super Comfort 180° optic - 12.3W 247.5lm - 3000K - Post for iWay optical compartment Ø170 mm - h = 169 mm

Article No.	EN96_C44P
P	12.3 W
Φ_{Lamp}	1650 lm
$\Phi_{Luminaire}$	248 lm
η	15.00 %
Luminous efficacy	20.1 lm/W
CCT	3000 K
CRI	80

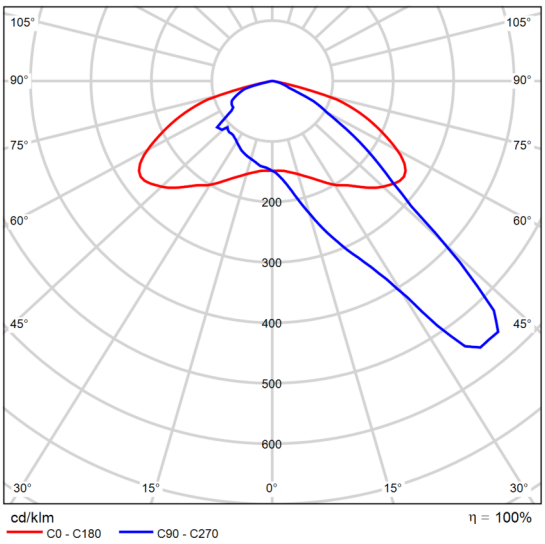


Polar LDC

Product data sheet

iGuzzini illuminazione S.p.A - Platea Pro: Pole-mounted system - Small body optical assembly - Warm White - A45 street optic. - 33W 3920lm - 3000K

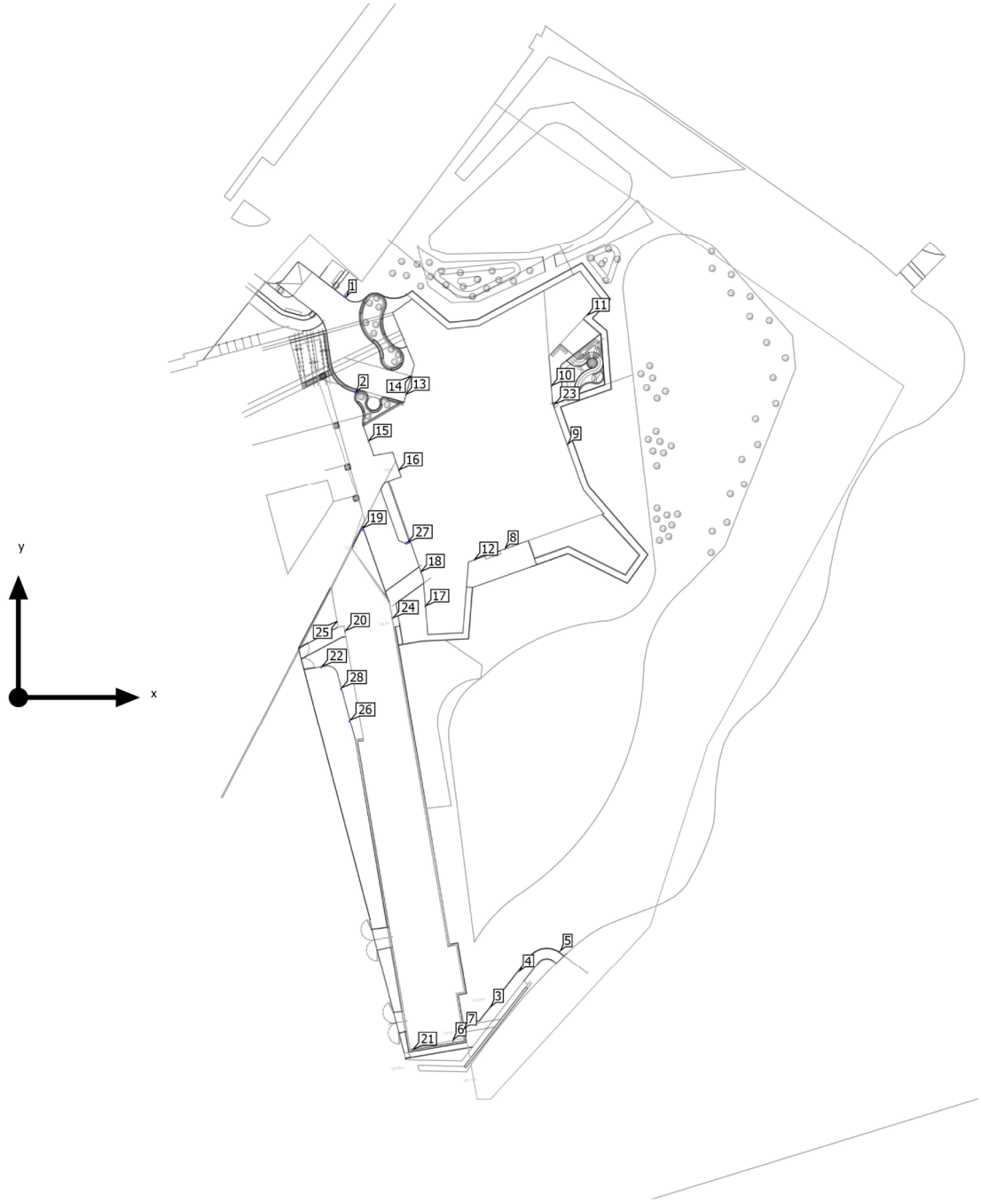
Article No.	P875_A09J
P	33.0 W
Φ_{Lamp}	3920 lm
$\Phi_{Luminaire}$	3920 lm
η	100.00 %
Luminous efficacy	118.8 lm/W
CCT	3000 K
CRI	60



Polar LDC

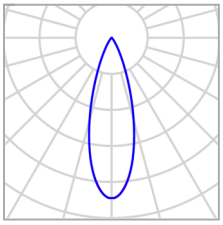
Site 1

Luminaire layout plan



Site 1

Luminaire layout plan



Manufacturer	iGuzzini illuminazione S.p.A
Article No.	BK32_C19B
Article name	iPro: Outdoor wall-mounted luminaire - Warm white LED - with electronic ballast Vin=100-240V ac - Flood optic - 7.7W 494.1lm - 3000K
Fitting	1x LED / 6.2W

P	7.7 W
$\Phi_{Luminaire}$	494 lm

Individual luminaires

X	Y	Mounting height	Luminaire
81.254 m	-64.346 m	2.200 m	6
83.018 m	-62.211 m	2.200 m	7
90.942 m	27.570 m	3.600 m	8
102.672 m	47.095 m	3.600 m	9
99.668 m	57.992 m	3.600 m	10
106.287 m	71.285 m	3.600 m	11
85.227 m	25.548 m	3.600 m	12
72.398 m	56.388 m	3.600 m	13
73.364 m	59.904 m	3.600 m	14
65.437 m	47.710 m	3.600 m	15

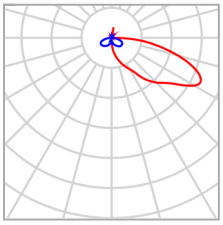
Site 1

Luminaire layout plan

X	Y	Mounting height	Luminaire
71.102 m	42.272 m	3.600 m	16
76.052 m	16.911 m	3.600 m	17
75.254 m	23.203 m	3.600 m	18
61.004 m	12.226 m	2.200 m	20
73.677 m	-66.023 m	2.200 m	21
100.147 m	54.547 m	3.600 m	23
69.896 m	14.694 m	2.200 m	24
59.510 m	14.027 m	2.200 m	25

Site 1

Luminaire layout plan



Manufacturer	iGuzzini illuminazione S.p.A
Article No.	EN96_C44P
Article name	Ø180mm optical assembly - Warm White LED - 220÷240Vac - Super Comfort 180° optic - 12.3W 247.5lm - 3000K - Post for iWay optical compartment Ø170 mm - h = 169 mm
Fitting	1x LED / 9.7W

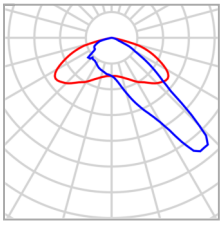
P	12.3 W
$\Phi_{Luminaire}$	248 lm

Individual luminaires

X	Y	Mounting height	Luminaire
88.196 m	-58.085 m	0.900 m	3
93.599 m	-51.318 m	0.900 m	4
101.173 m	-47.527 m	0.900 m	5
56.578 m	5.597 m	0.900 m	22
61.881 m	-4.456 m	0.900 m	26
60.291 m	1.548 m	0.900 m	28

Site 1

Luminaire layout plan



Manufacturer	iGuzzini illuminazione S.p.A	P	33.0 W
Article No.	P875_A09J	$\Phi_{Luminaire}$	3920 lm
Article name	Platea Pro: Pole-mounted system - Small body optical assembly - Warm White - A45 street optic. - 33W 3920lm - 3000K		
Fitting	1x LED / 29W		

Individual luminaires

X	Y	Mounting height	Luminaire
61.229 m	74.717 m	4.000 m	1
63.026 m	56.755 m	4.000 m	2
64.303 m	31.203 m	4.000 m	19
72.503 m	28.680 m	4.000 m	27

Site 1

Luminaire list

Φ_{total}	P_{total}	Luminous efficacy
26060 lm	344.4 W	75.7 lm/W

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
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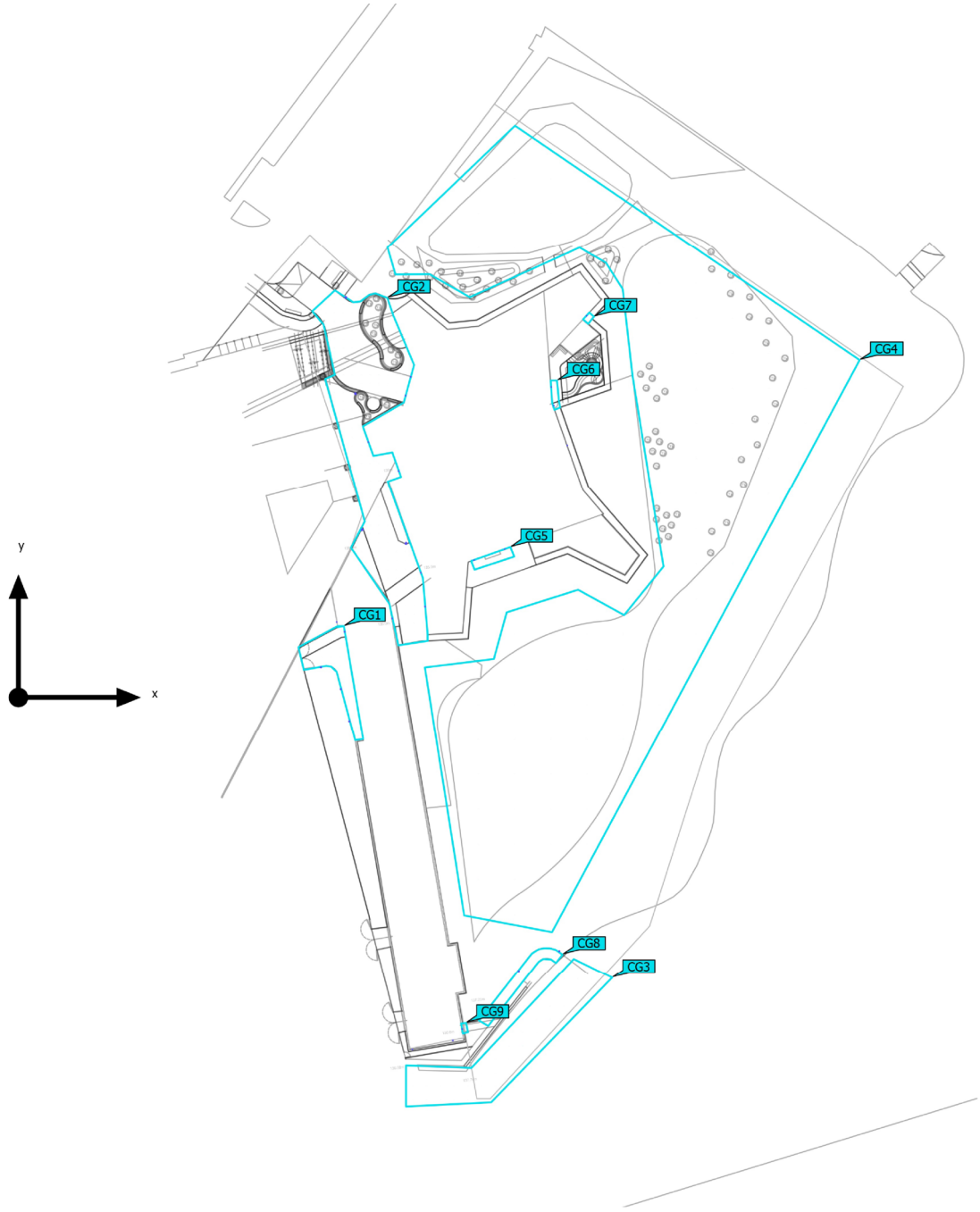
6	iGuzzini illuminazione S.p.A	EN96_C44P	Ø180mm optical assembly - Warm White LED - 220÷240Vac - Super Comfort 180° optic - 12.3W 247.5lm - 3000K - Post for iWay optical compartment Ø170 mm - h = 169 mm	12.3 W	248 lm	20.1 lm/W
4	iGuzzini illuminazione S.p.A	P875_A09J	Platea Pro: Pole-mounted system - Small body optical assembly - Warm White - A45 street optic. - 33W 3920lm - 3000K	33.0 W	3920 lm	118.8 lm/W

Site 1 (Light scene 1)

Calculation objects



Site 1 (Light scene 1)

Calculation objects

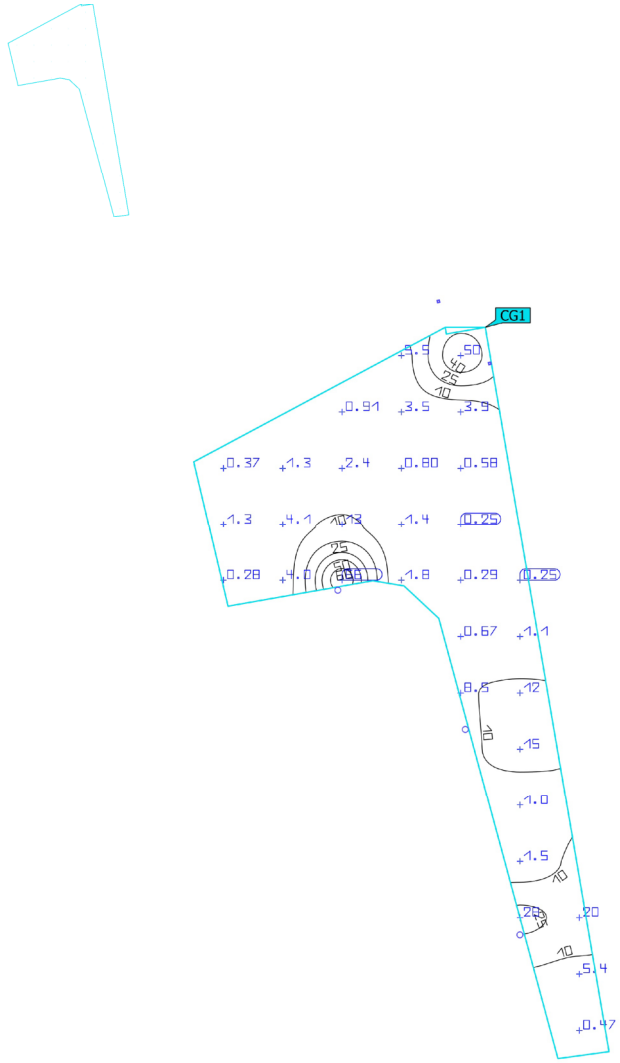
Calculation surfaces

Properties	$\bar{E}$	E_{min}	E_{max}	g_1	g_2	Index
Sprint track to Ext. Track Perpendicular illuminance Height: 0.100 m	8.01 lx	0.25 lx	66.0 lx	0.031	0.004	CG1
Entrance Perpendicular illuminance Height: 0.100 m	16.8 lx	0.28 lx	88.4 lx	0.017	0.003	CG2
Spill Area 1 Perpendicular illuminance Height: 1.700 m	0.007 lx	0.000 lx	0.050 lx	-	0.00	CG3
Spill Area 2 Perpendicular illuminance Height: 0.000 m	0.013 lx	0.000 lx	0.18 lx	0.00	0.00	CG4
South Doors Perpendicular illuminance Height: 0.100 m	23.8 lx	1.73 lx	83.9 lx	0.073	0.021	CG5
East Doors Perpendicular illuminance Height: 0.100 m	50.4 lx	11.8 lx	100.0 lx	0.23	0.12	CG6
Adjacent to Plant Room Perpendicular illuminance Height: 0.100 m	63.0 lx	26.2 lx	99.4 lx	0.42	0.26	CG7
Path to Running Track Perpendicular illuminance Height: 0.100 m	9.78 lx	0.19 lx	65.0 lx	0.019	0.003	CG8
Sprint to running track Perpendicular illuminance Height: 0.100 m	94.9 lx	16.5 lx	238 lx	0.17	0.069	CG9

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

Sprint track to Ext. Track

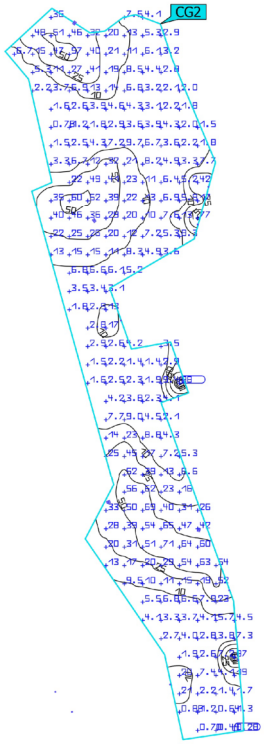


Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
Sprint track to Ext. Track Perpendicular illuminance Height: 0.100 m	8.01 lx	0.25 lx	66.0 lx	0.031	0.004	CG1

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

Entrance

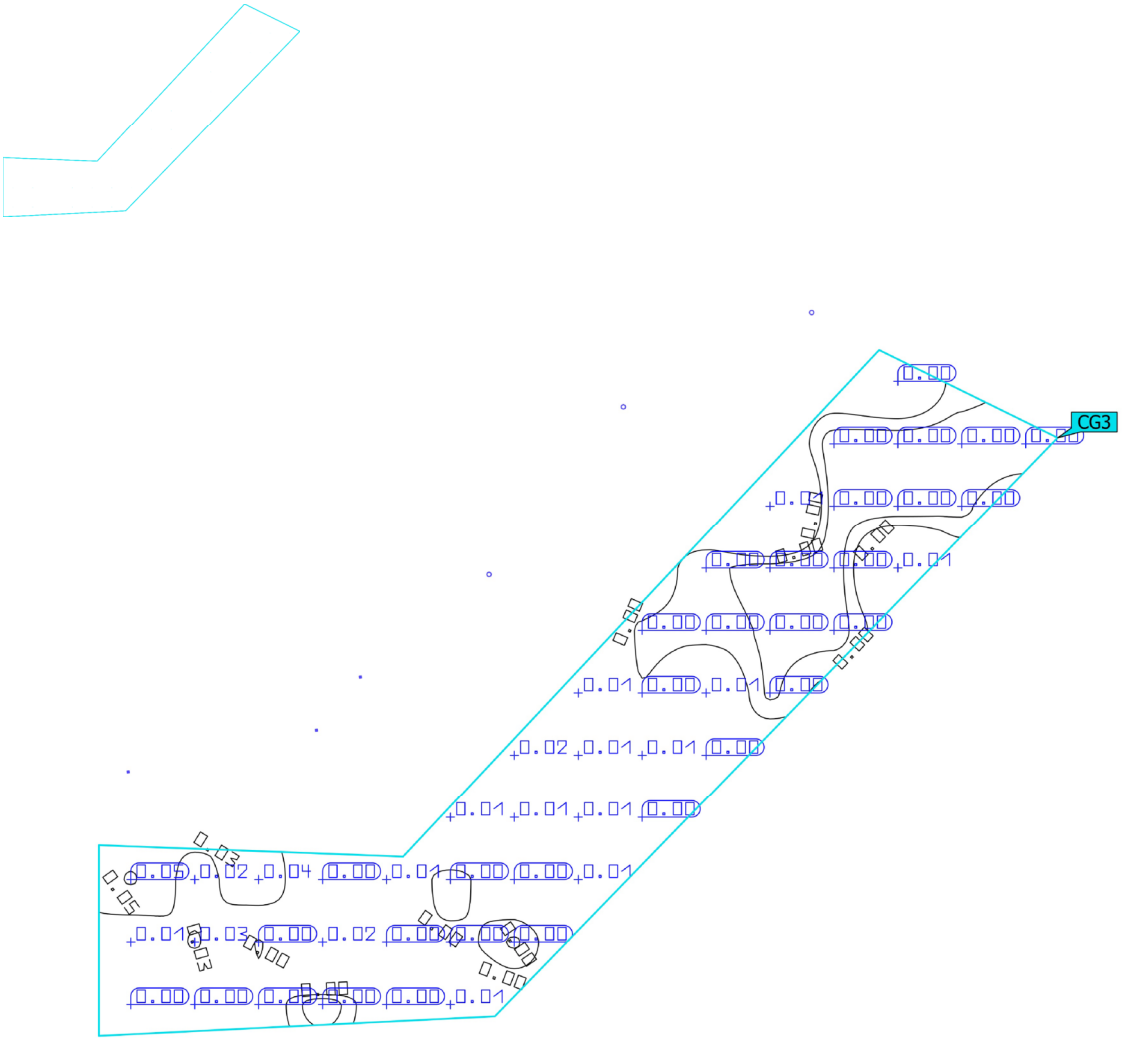


Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
Entrance Perpendicular illuminance Height: 0.100 m	16.8 lx	0.28 lx	88.4 lx	0.017	0.003	CG2

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

Spill Area 1

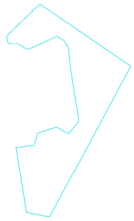


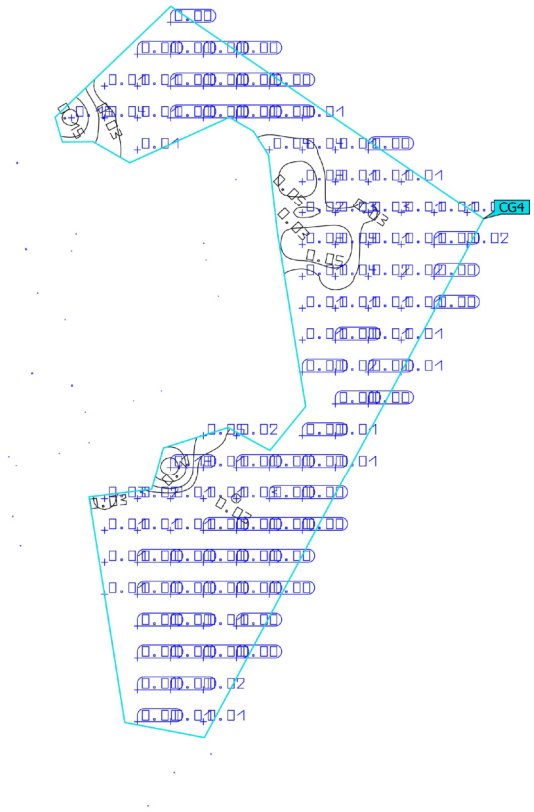
Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
Spill Area 1 Perpendicular illuminance Height: 1.700 m	0.007 lx	0.000 lx	0.050 lx	-	0.00	CG3

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

Spill Area 2



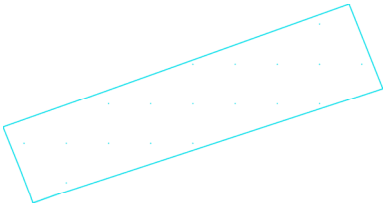


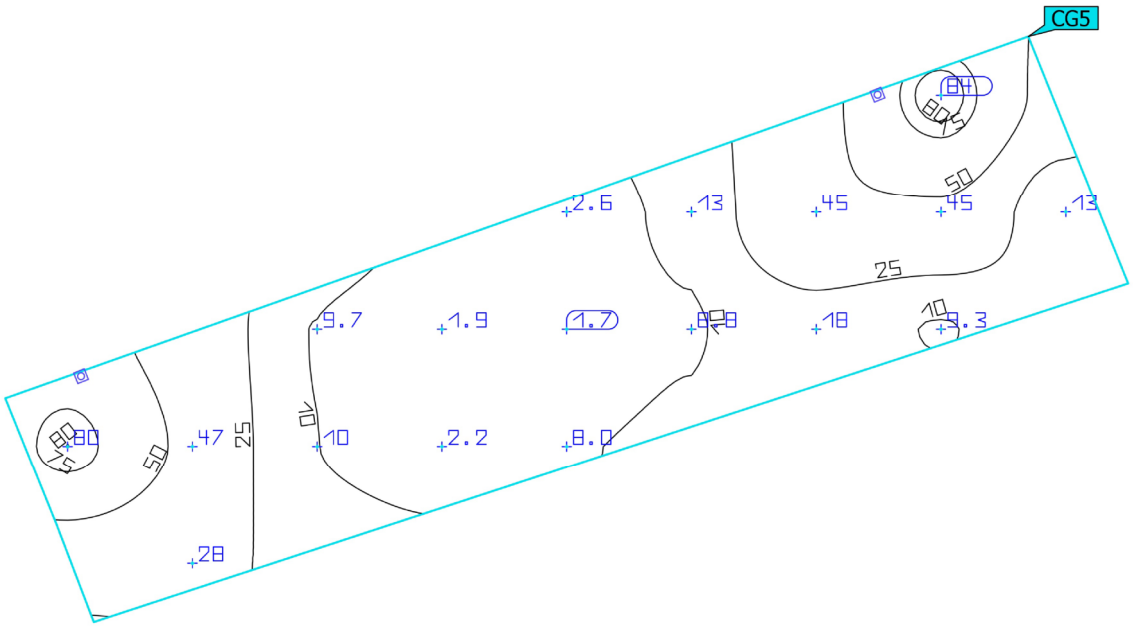
Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
Spill Area 2 Perpendicular illuminance Height: 0.000 m	0.013 lx	0.000 lx	0.18 lx	0.00	0.00	CG4

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

South Doors



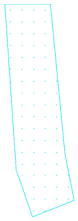


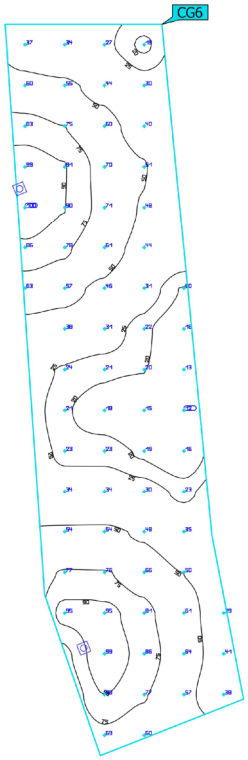
Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
South Doors Perpendicular illuminance Height: 0.100 m	23.8 lx	1.73 lx	83.9 lx	0.073	0.021	CG5

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

East Doors



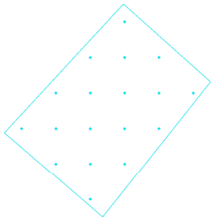


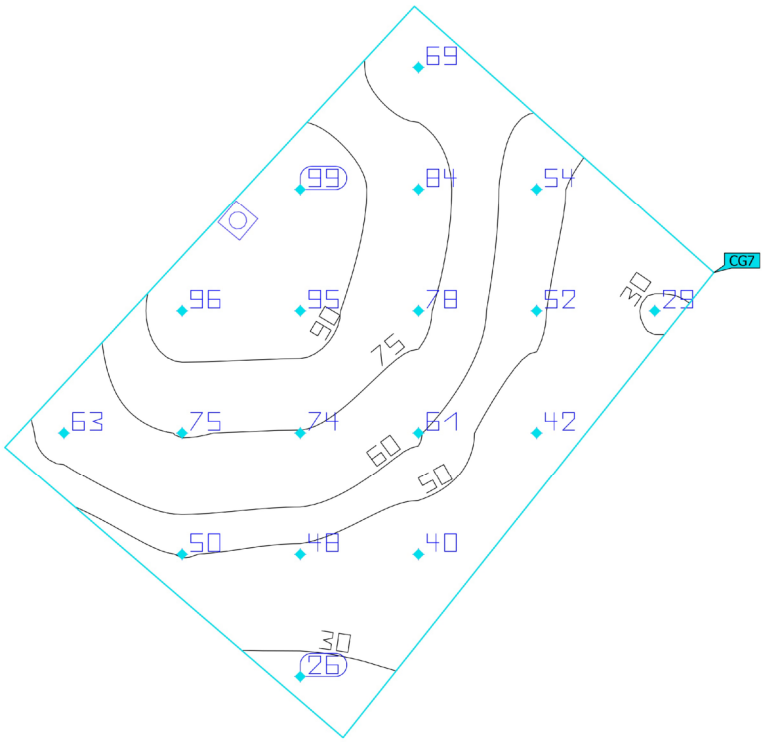
Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
East Doors Perpendicular illuminance Height: 0.100 m	50.4 lx	11.8 lx	100.0 lx	0.23	0.12	CG6

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

Adjacent to Plant Room



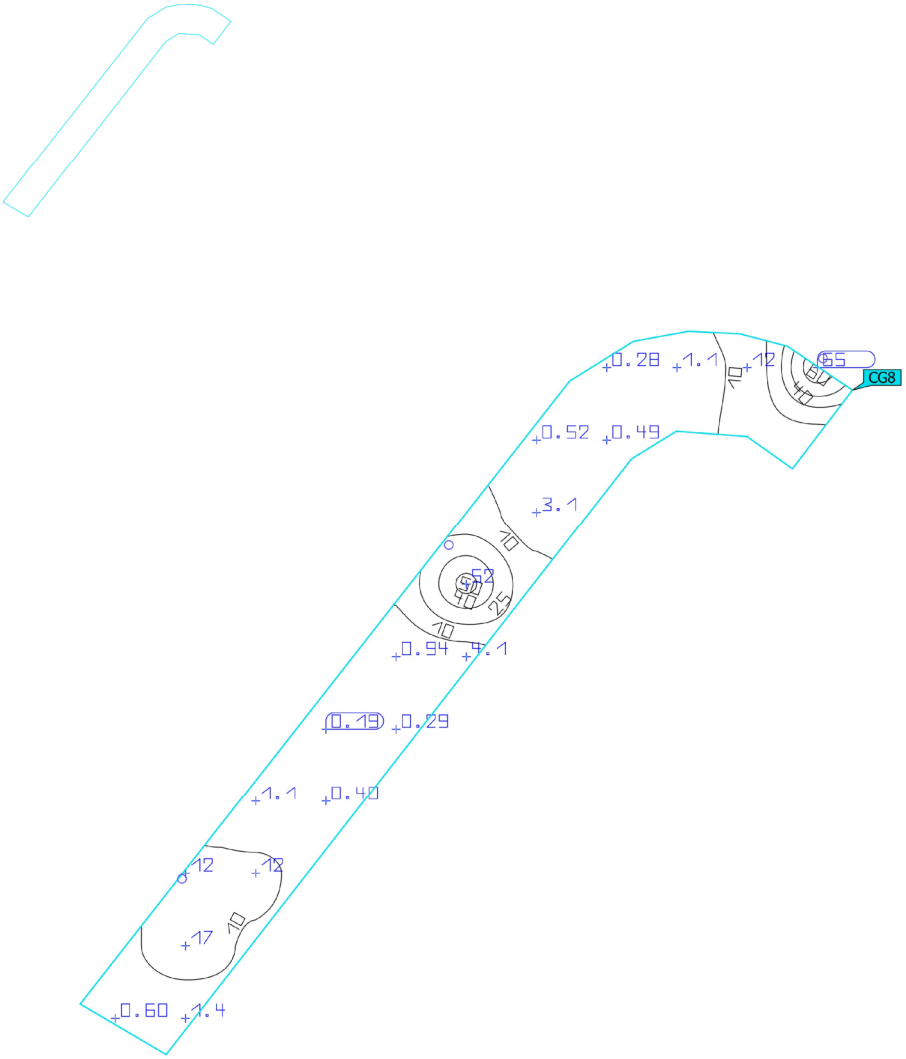


Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
Adjacent to Plant Room Perpendicular illuminance Height: 0.100 m	63.0 lx	26.2 lx	99.4 lx	0.42	0.26	CG7

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

Path to Running Track

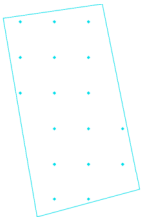


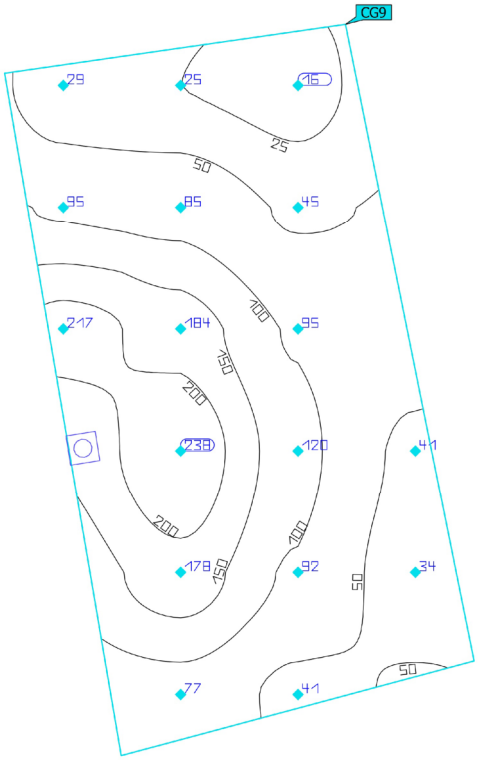
Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
Path to Running Track Perpendicular illuminance Height: 0.100 m	9.78 lx	0.19 lx	65.0 lx	0.019	0.003	CG8

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Site 1 (Light scene 1)

Sprint to running track





Properties	Ē	E_{min}	E_{max}	g_1	g_2	Index
Sprint to running track Perpendicular illuminance Height: 0.100 m	94.9 lx	16.5 lx	238 lx	0.17	0.069	CG9

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))