



External Artificial Lighting Report
Barnsley Youth Zone
PA1562

Client
OnSide

Consulting Engineers

TACE
Portland House
Oak Green
Earl Road
Cheadle Hulme
Cheshire
SK8 6QL

www.tace.co.uk

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<i>Prepared by:</i>	Sam Mathieson		14.06.21
<i>Checked:</i>	Nick Thomas		
<i>TACE Approved:</i>	Stephen Senior		

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1.0 Introduction

1.1 General

TACE was commissioned by On Side to carry out 'RIBA Stage 3' designs of mechanical and electrical services for the development of a new Youth Zone (Barnsley Youth Zone). The site is located on Schwabish Gmund Way next to Mottram Way. The site offered by Barnsley Council for development of the Youth Zone is approximately 3600m².

This report has been produced in support of a planning application as a narrative summary of the proposed external artificial lighting systems.

The electrical services design was undertaken by:

Samuel Mathieson
Electrical Design Engineer
TACE

Lighting calculations carried out using ReluxPro lighting design software.

2.0 Executive Summary

This report has been produced to explain and summarise the proposed external artificial lighting systems, confirming compliance with recognised guidance and good practices as published by:

- CIBSE (The Society of Light & Lighting)
- ILP (Institute of Lighting Professionals)
- Sport England

The external artificial lighting designs have been produced to satisfy three key needs:

- **Visual Comfort** - to create an aesthetic quality to the building further enhancing a feeling of well-being to young people, staff and visitors.
- **Visual Performance** - ensures there is sufficient lighting to compete within sports and activities at a social level without any visual impairment, as well as adequate general lighting to maintain building security.
- **Safety** - to provide above the minimum level of illuminance for the safe passageway, circulation and navigation in and around the building. Provision of an adequate lighting level at building entrances / exits during site fire drills/ emergency evacuations.

It has been calculated that the artificial light spill beyond the site boundary will have zero or negligible impact to surrounding residential areas in terms of obtrusive/ nuisance lighting. In addition, the proposed external lighting designs, including both flood lighting and general lighting, will have no significant impact on the local wildlife.

3.0 Approved Lighting Guidance

The following guidance parameters have been utilised for the designs of the external artificial lighting. (See Appendix A)

CIBSE

(SLL Code for Lighting) – Minimum 5 lux E'Average to external walkways exclusively for pedestrians.

Sport England

Minimum 120 lux E'Average horizontal illumination for Multi-Use Games Areas (MUGAs, 5 aside football). (Community Level).

4.0 Obtrusive Lighting

To safeguard and enhance the night time environment it is necessary to control obtrusive light (also known as light pollution), which can present physiological and ecological problems to surroundings and people.

The external artificial lighting designs have been produced in compliance with the limits of obtrusive light for exterior lighting installations, to minimise problems for people, flora and fauna. (See Appendix B). *Environmental Zone E3*. The pre-curfew maximum allowance of obtrusive lighting to surrounding properties may be no greater than 10 lux.

The calculations show maximum 1 lux light spill to the West elevation toward the properties on Mottram Street.

It has been proposed that a curfew between the hours of 22:00 and 06:00 is enforced on all external lighting, ensuring that all lighting is turned off during these hours. The curfew is designed to mitigate any potential issues caused by lighting to the surrounding residents of the area and to further conserve energy usage.

4.1 Neighbouring Residents

To the West of the proposed development lie existing residential properties on Mottram Street. The rear windows of these properties face the direction of the proposed site at a distance of approximately 42m away.

A lighting measurement has been calculated for the rear surface of the properties facing toward the proposed Youth Zone location. The following results were obtained;

In accordance with Appendix B the maximum light spill to a property pre-curfew must not exceed 10lux.

5.0 Flood Lighting

The Flood Lighting has been designed to achieve a minimum 120lux average at floor level in compliance with the recommendations of the Sport England. This lighting scheme has been designed based on Sport England requirements for community level use. This category relates to school and community use where there is no formal competitive structure or no specific need for space for officials or spectator accommodation.

The Kick-Pitch floodlighting consists of 8 fence mounted LED luminaires.

The Whitecroft – Selise Maxi LED has been chosen for the kick-pitch flood lighting for the development, favoured by outdoor sports for its outstanding performance and light control. Flat-glass technology with zero-degree tilt angle and asymmetric reflector mean excellent efficiency and beam purity, reducing upward light, overspill and glare. (See Appendix E luminaire data sheet).

Artificial lighting is always designed with a maintenance factor as the build-up of dirt deposit cannot be predicted which is subject to the installed environment, local air pollution and weather conditions. The maintenance factor applied to this external lighting scheme is 0.8.

Floodlighting will only come on when the kick-pitch is in use, or when natural light levels fall below a sufficient level. In the peak of winter months this is likely to correspond with the opening time of the facility i.e. after school in term times circa 16:00 hours. The floodlighting will be automatically turned off at 22:00 hours.

5.1 Flood Lighting Fixing

Each Whitecroft floodlight will be fixed at the top of kick pitch fence. The building mounted luminaires to be mounted at 3.5m AFFL.

6.0 General Lighting

All general lighting is proposed to be LED type only. The building will be equipped with wall mounted single beam LED luminaires directed at the ground to provide a minimum of 5 lux to floor level around the perimeter of the building.

Spatial spread/light spill from general lighting will be minimal. The general lighting will utilize relatively low power lamps of less than 1500 lumens (75W) LED, in line with BCT/ILE recommendations.

The level of 5 lux around the perimeter of the building will be maintained during the hours of darkness (pre-curfew) to enhance the functionality of CCTV. During the curfew hours of 22:00-06:00 when the lighting is switched off the CCTV will switch to infra-red monitoring. The ambient light level of 5 lux is maintained on all building perimeter walkways for the safety of staff and customers during pre-curfew hours only. As detailed above, this ambient light level will be maintained using low power lamps, with no illumination at canopy level of the treeline along adjacent boundaries.

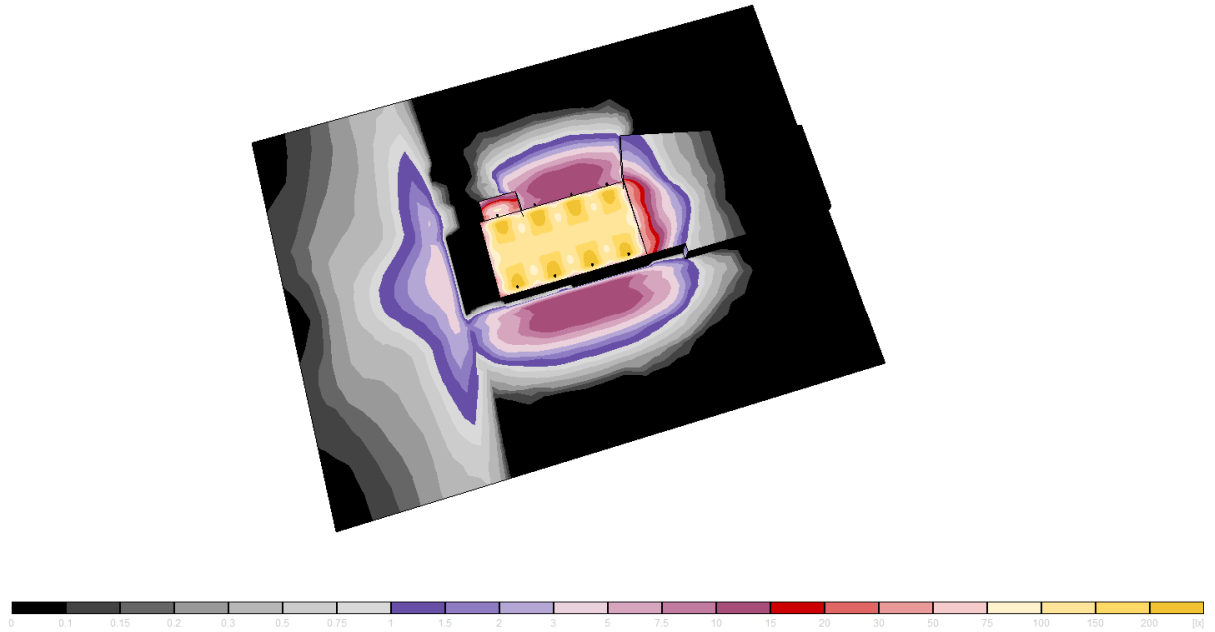
7.0 Lighting Control

Flood Lighting – Time Clock controlled to be switched off between the hours of 22:00 & 08:00. Photocell controlled to be turned on only when natural light falls below a sufficient level. Manually controlled to be switched off if/when kick-pitch is not in use.

General External Lighting – Photocell controlled to be turned on only when natural light falls below a sufficient level.

8.0 Site Plan – Lux Plots

The lux plots produced illustrate the contours of illuminance depreciation away from the kick-pitch. It can be seen that illuminance spill depreciates down to one within a 10m distance away from the building perimeter.



Appendix A – CIBSE SLL Code for Lighting 2012 Table

Table 3.5 General circulation areas at outdoor work places

Ref No.	Type of area, task or activity	$\bar{E}_m$ / lx	U_o	GR_L	R_s	Remarks
3.5.1	Walkways exclusively for pedestrians	5	0.25	50	20	Where there are other hazards present higher values of $\bar{E}_m$ are required. For example in water and sewerage treatment works 20 lx, on building sites 20–50 lx and in petroleum and chemical works 50 lx

Sport England – Artificial Sports Lighting for MUGA – Multi-Use Games Area

Club and Community lighting for tennis, netball, 5-a-side, basketball, rush hockey					
Club			Community		
		Horizontal Illuminance (Lux)	Uniformity (E _{min} / E _{ave})		
		Horizontal Illuminance (Lux)	Uniformity (E _{min} / E _{ave})		
Netball		400	0.7	400 0.7	
Tennis (recommended)	PPA	500	0.7	500 0.7	
	TPA	400	0.6	400 0.6	
5-a-side football		120	0.6	120 0.6	
Basketball		200	0.6	75 0.5	
Rush hockey		350	0.7	200 0.7	

Appendix B – CIBSE SLL Code for Lighting

Table 3.2 Maximum obtrusive light permitted for exterior lighting installations

Environmental zone	Light on properties		Luminaire intensity		Upward light	Luminance	
	E_v		I		ULR	L_b	L_s
	lx		cd		%	cd·m ⁻²	cd·m ⁻²
	Pre curfew ^(a)	Post curfew	Pre curfew	Post curfew		Building	Signs
E1	2	0 ^(b)	2500	0	0	0	50
E2	5	1	7500	500	0.05	5	400
E3	10	2	10 000	1000	0.15	10	800
E4	25	5	25 000	2500	0.25	25	1000

^(a) In case no curfew regulations are available, the higher values shall not be exceeded and the lower values should be taken as preferable limits.

^(b) If the luminaire is for public (road) lighting, then this value may be up to 1 lx.

Where:

E1 represents intrinsically dark areas, such as national parks or protected sites

E2 represents low district brightness areas, such as industrial or residential rural areas

E3 represents medium district brightness areas, such as industrial or residential suburbs

E4 represents high district brightness areas, such as town centres and commercial areas

E_v is the maximum value of vertical illuminance on properties in lx

I is the light intensity of each source in the potentially obtrusive direction in cd

ULR is the proportion of the flux of the luminaire(s) that is emitted above the horizontal, when the luminaire(s) is (are) mounted in its (their) installed position and attitude, and given in %

L_b is the maximum average luminance of the facade of a building in cd·m⁻²

L_s is the maximum average luminance of signs in cd·m⁻².



Barnsley Youth Zone

Installation : External Lighting

Project number : PA1562
Customer : OnSide
Processed by : Samuel Mathieson
Date : 03.06.2021

Project description:

Project description:

The external lighting has been carefully selected to compliment the natural landscaping proposed. It will comply fully with Part L and the following guides:

- LG6 The Exterior Environment

The following values are based on precise calculations performed on calibrated lamps and luminaires, and their configurations, whereby gradual, unavoidable deviations can occur in practice. All guarantee claims are excluded for the specified data.

This exclusion of liability applies irrespective of the legal grounds for both damages and consequential damages suffered by users and third parties.

Object : Barnsley Youth Zone
 Installation : External Lighting
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 Date : 03.06.2021



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Object : Barnsley Youth Zone
 Installation : External Lighting
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1 Luminaire data

1.1 Whitecroft Lighting, SPECTRE WX (SPXAH14K)

1.1.1 Data sheet

Manufacturer: Whitecroft Lighting



SPXAH14K wall-mounted luminaire **SPECTRE WX**
SPECTRE WX

IP65 wall mounted LED semi-conical luminaire with forward throw. Die cast aluminium body with thermal shock resistant clear tempered glass. Includes first fix wall mounting bracket.

Emergency Lumens:- 704lm

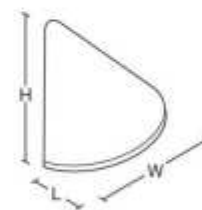
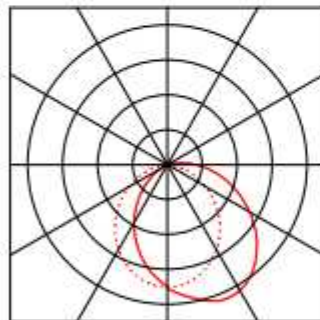
Luminaire data

Absolute Photometry
 Luminaire efficacy : 124.31 lm/W
 Classification : A40 ↓98.1% ↑1.9%
 CIE Flux Codes : 47 77 93 98 100
 UGR 4H 8H : 30.7 / 24.0
 Control gear : electronic ballast
 Power : 9 W
 Luminous flux : 1118.8 lm

Equipped with

Quantity : 1
 Designation : LED
 Colour : 4000K
 Colour reproduction : 80

Dimensions : 375 mm x 224 mm x 329 mm



Object : Barnsley Youth Zone
 Installation : External Lighting
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1 Luminaire data

1.2 Whitecroft Lighting, BROADWALK L360 (BLF3614KG)

1.2.1 Data sheet

Manufacturer: Whitecroft Lighting



BLF3614KG bollard / pole mounted luminaires BROADWALK L360

BROADWALK L360 flange plate mounted IP65 bollard with symmetrical distribution. 1100mm high finished in Graphite Grey.

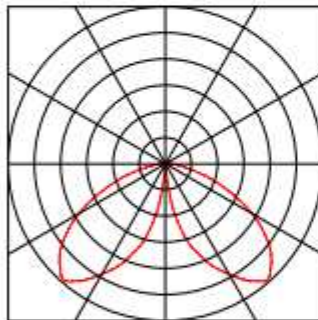
Luminaire data

Luminaire efficiency : 100%
 Luminaire efficacy : 52.61 lm/W
 Classification : A31 ↓97.4% ↑2.6%
 CIE Flux Codes : 36 76 96 97 100
 UGR 4H 8H : 22.5 / 22.5
 Control gear : electronic ballast
 Power : 9.2 W
 Luminous flux : 484 lm

Equipped with

Quantity : 1
 Designation : LED
 Power : 9.2 W
 Colour : 4000K
 Luminous flux : 484 lm
 Colour reproduction : 1B

Dimensions : Ø180 mm x 200 mm



Object : Barnsley Youth Zone
 Installation : External Lighting
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1 Luminaire data

1.3 Whitecroft Lighting, SELISE MAXI (SEMH24KG)

1.3.1 Data sheet

Manufacturer: Whitecroft Lighting



SEMH24KG EXTERIOR SELISE MAXI
SELISE MAXI

IP66 LED floodlight with maximum cast aluminium body, glass visor and asymmetric distribution, adjustable wall mounting bracket included.

Electronic control gear with temperature regulator to operate 4000K LED light

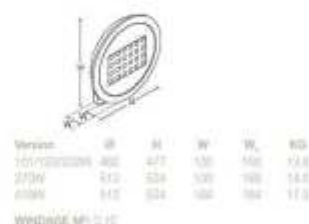
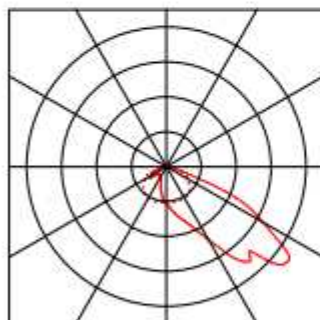
Luminaire data

Luminaire efficiency : 100%
 Luminaire efficacy : 96.36 lm/W
 Classification : A30 ↓100.0% ↑0.0%
 CIE Flux Codes : 37 79 99 100 100
 UGR 4H 8H : 38.5 / 30.7
 Control gear : electronic ballast
 Power : 202 W
 Luminous flux : 19465 lm

Equipped with

Quantity : 1
 Designation : LED
 Power : 202 W
 Colour : 4000K
 Luminous flux : 19465 lm
 Colour reproduction : 1B

Dimensions : Ø462 mm x 160 mm



Object : Barnsley Youth Zone
Installation : External Lighting
Project number : PA1562
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2 Exterior 1

2.1 Description, Exterior 1

2.1.1 Floor plan



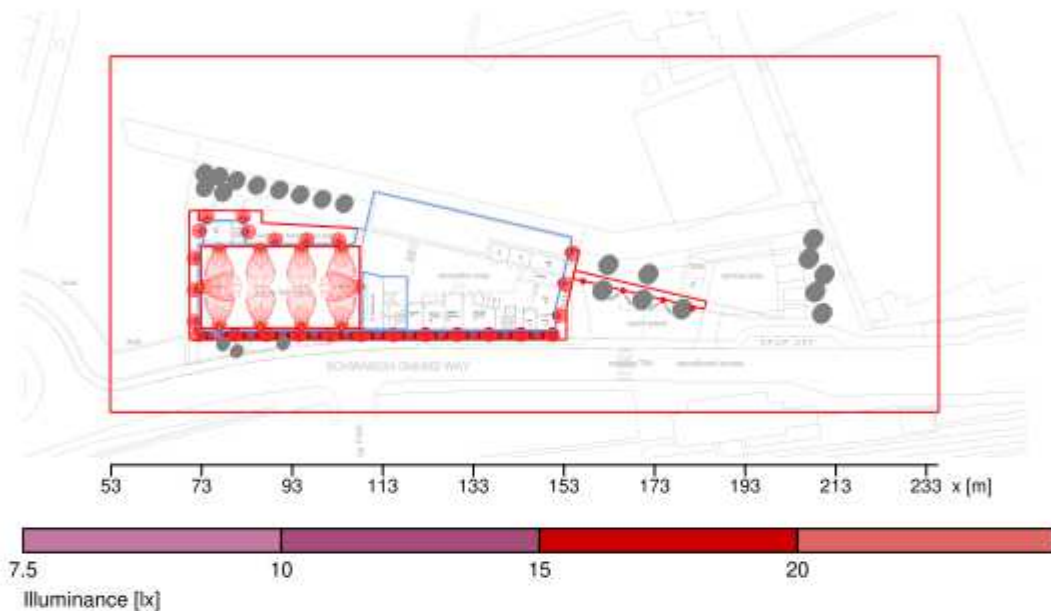
Object : Barnsley Youth Zone
 Installation : External Lighting
 Project number : PA1562
 Date : 03.06.2021

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2 Exterior 1

2.2 Summary, Exterior 1

2.2.1 Result overview, Measuring area 1



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux of all lamps	224561 lm
Total power	2281.8 W
Total power per area (14326.25 m ²)	0.16 W/m ²

Illuminance

Average illuminance	Em	19.2 lx
Minimum illuminance	Emin	8.2 lx
Maximum illuminance	Emax	29.7 lx
Uniformity Uo	Emin/Em	1:2.33 (0.43)
Diversity Ud	Emin/Emax	1:3.61 (0.28)

Type No. Make

Whitecroft Lighting	
1	25
	Order No. : SPXAH14K
	Luminaire name : SPECTRE WX
	Equipment : 1 x LED 9 W / 1119 lm
2	4
	Order No. : BLF3614KG
	Luminaire name : BROADWALK L360
	Equipment : 1 x LED 9.2 W / 484 lm

Object : Barnsley Youth Zone
Installation : External Lighting
Project number : PA1562
Date : 03.06.2021

2 Exterior 1

2.2 Summary, Exterior 1

2.2.1 Result overview, Measuring area 1

3 10  Order No. : SEMH24KG
Luminaire name : SELISE MAXI
Equipment : 1 x LED 202 W / 19465 lm

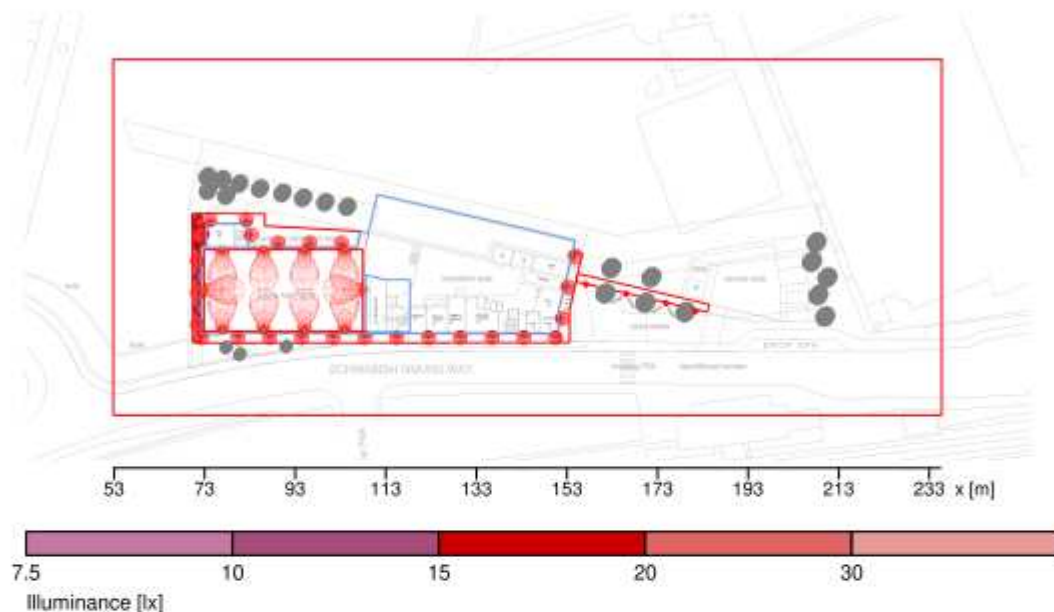


Object : Barnsley Youth Zone
 Installation : External Lighting
 Project number : PA1562
 Date : 03.06.2021

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2.2 Summary, Exterior 1

2.2.2 Result overview, Measuring area 2



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux of all lamps	224561 lm
Total power	2281.8 W
Total power per area (14326.25 m ²)	0.16 W/m ²

Illuminance

Average illuminance	Em	21.7 lx
Minimum illuminance	Emin	8.2 lx
Maximum illuminance	Emax	38.4 lx
Uniformity Uo	Emin/Em	1:2.63 (0.38)
Diversity Ud	Emin/Emax	1:4.66 (0.21)

Type No. Make

Whitecroft Lighting	
1 25	Order No. : SPXAH14K
	Luminaire name : SPECTRE WX
	Equipment : 1 x LED 9 W / 1119 lm
2 4	Order No. : BLF3614KG
	Luminaire name : BROADWALK L360
	Equipment : 1 x LED 9.2 W / 484 lm

Object : Barnsley Youth Zone
Installation : External Lighting
Project number : PA1562
Date : 03.06.2021



2.2 Summary, Exterior 1

2.2.2 Result overview, Measuring area 2

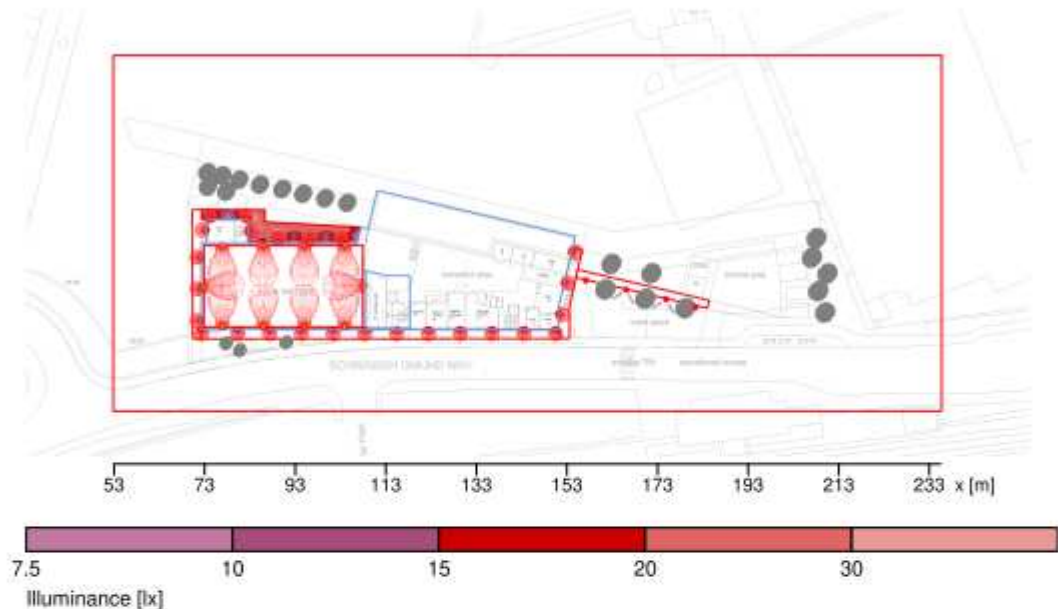
3 10  Order No. : SEMH24KG
Luminaire name : SELISE MAXI
Equipment : 1 x LED 202 W / 19465 lm

Object : Barnsley Youth Zone
 Installation : External Lighting
 Project number : PA1562
 Date : 03.06.2021

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2.2 Summary, Exterior 1

2.2.3 Result overview, Measuring area 3



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux of all lamps	224561 lm
Total power	2281.8 W
Total power per area (14326.25 m ²)	0.16 W/m ²

Illuminance

Average illuminance	Em	21.9 lx
Minimum illuminance	Emin	7.6 lx
Maximum illuminance	Emax	41 lx
Uniformity Uo	Emin/Em	1:2.88 (0.35)
Diversity Ud	Emin/Emax	1:5.38 (0.19)

Type No. Make

Whitecroft Lighting	
1	25
	Order No. : SPXAH14K
	Luminaire name : SPECTRE WX
	Equipment : 1 x LED 9 W / 1119 lm
2	4
	Order No. : BLF3614KG
	Luminaire name : BROADWALK L360
	Equipment : 1 x LED 9.2 W / 484 lm

Object : Barnsley Youth Zone
Installation : External Lighting
Project number : PA1562
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2.2 Summary, Exterior 1

2.2.3 Result overview, Measuring area 3

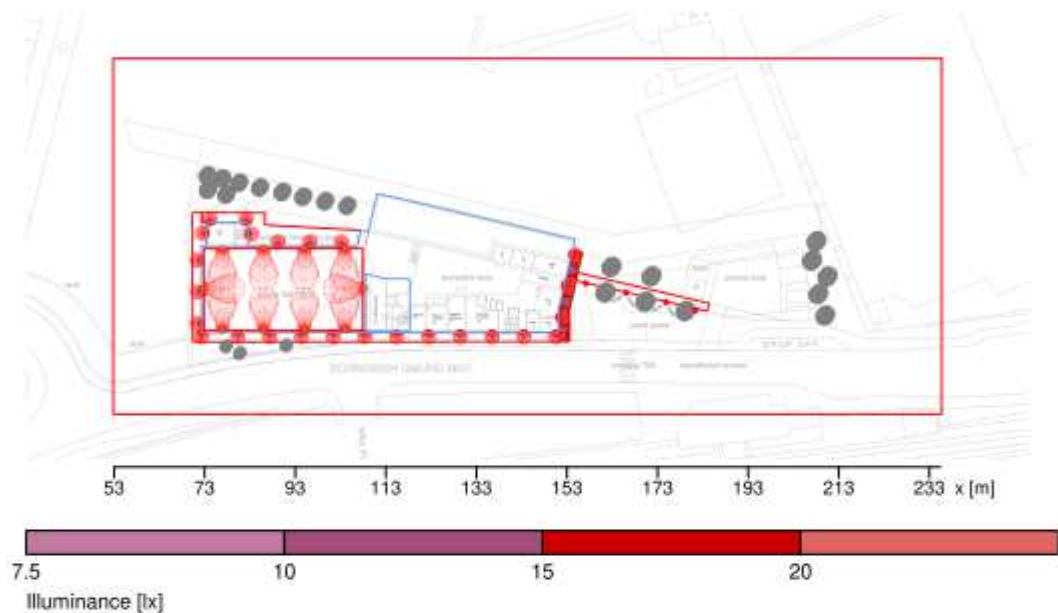
3 10  Order No. : SEMH24KG
Luminaire name : SELISE MAXI
Equipment : 1 x LED 202 W / 19465 lm

Object : Barnsley Youth Zone
 Installation : External Lighting
 Project number : PA1562
 Date : 03.06.2021

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2.2 Summary, Exterior 1

2.2.4 Result overview, Measuring area 4



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux of all lamps	224561 lm
Total power	2281.8 W
Total power per area (14326.25 m ²)	0.16 W/m ²

Illuminance

Average illuminance	Em	19.3 lx
Minimum illuminance	Emin	8.5 lx
Maximum illuminance	Emax	29.2 lx
Uniformity Uo	Emin/Em	1:2.27 (0.44)
Diversity Ud	Emin/Emax	1:3.45 (0.29)

Type No. Make

		Whitecroft Lighting	
1	25	Order No.	: SPXAH14K
		Luminaire name	: SPECTRE WX
		Equipment	: 1 x LED 9 W / 1119 lm
2	4	Order No.	: BLF3614KG
		Luminaire name	: BROADWALK L360
		Equipment	: 1 x LED 9.2 W / 484 lm

Object : Barnsley Youth Zone
Installation : External Lighting
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2.2 Summary, Exterior 1

2.2.4 Result overview, Measuring area 4

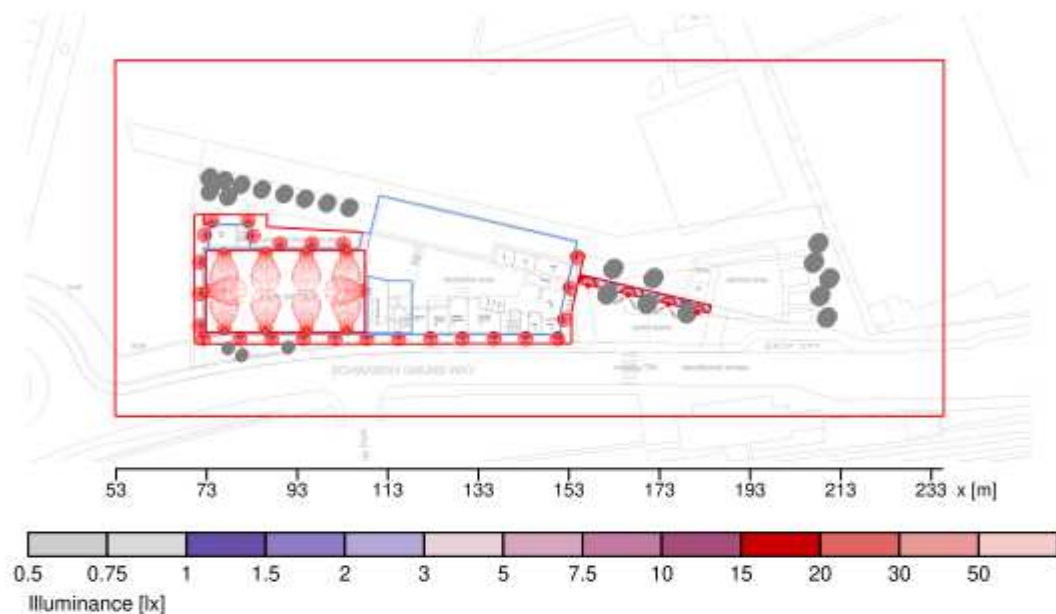
3 10  Order No. : SEMH24KG
Luminaire name : SELISE MAXI
Equipment : 1 x LED 202 W / 19465 lm

Object : Barnsley Youth Zone
 Installation : External Lighting
 Project number : PA1562
 Date : 03.06.2021

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2.2 Summary, Exterior 1

2.2.5 Result overview, Measuring area 5



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux of all lamps	224561 lm
Total power	2281.8 W
Total power per area (14326.25 m ²)	0.16 W/m ²

Illuminance

Average illuminance	Em	12.6 lx
Minimum illuminance	Emin	0.5 lx
Maximum illuminance	Emax	70.8 lx
Uniformity Uo	Emin/Em	1:24.3 (0.04)
Diversity Ud	Emin/Emax	1:137 (0.01)

Type No. Make

Whitecroft Lighting

1	25	Order No.	: SPXAH14K
		Luminaire name	: SPECTRE WX
		Equipment	: 1 x LED 9 W / 1119 lm
2	4	Order No.	: BLF3614KG
		Luminaire name	: BROADWALK L360
		Equipment	: 1 x LED 9.2 W / 484 lm

Object : Barnsley Youth Zone
Installation : External Lighting
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2.2 Summary, Exterior 1

2.2.5 Result overview, Measuring area 5

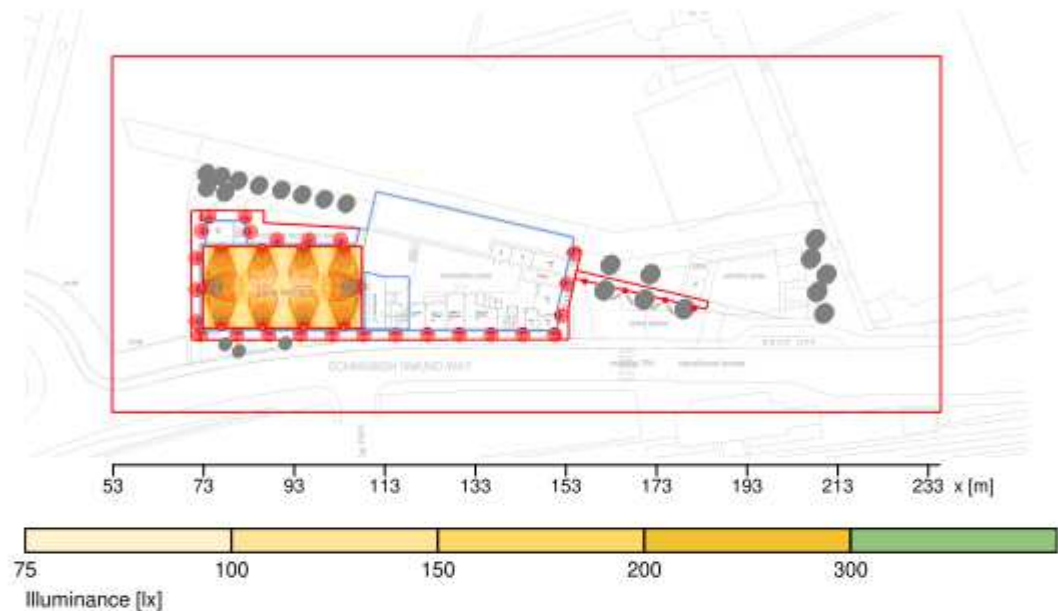
3 10  Order No. : SEMH24KG
Luminaire name : SELISE MAXI
Equipment : 1 x LED 202 W / 19465 lm

Object : Barnsley Youth Zone
 Installation : External Lighting
 Project number : PA1562
 Date : 03.06.2021

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2.2 Summary, Exterior 1

2.2.6 Result overview, Measuring area 7



General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	10.14 m
Maintenance factor	0.80
Total luminous flux of all lamps	224561 lm
Total power	2281.8 W
Total power per area (14326.25 m ²)	0.16 W/m ²

Illuminance

Average illuminance	Em	195 lx
Minimum illuminance	Emin	80 lx
Maximum illuminance	Emax	419 lx
Uniformity Uo	Emin/Em	1:2.44 (0.41)
Diversity Ud	Emin/Emax	1:5.25 (0.19)

Type No. Make

		Whitecroft Lighting	
1	25	Order No.	: SPXAH14K
		Luminaire name	: SPECTRE WX
		Equipment	: 1 x LED 9 W / 1119 lm
2	4	Order No.	: BLF3614KG
		Luminaire name	: BROADWALK L360
		Equipment	: 1 x LED 9.2 W / 484 lm

Object : Barnsley Youth Zone
Installation : External Lighting
Project number : PA1562
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2.2 Summary, Exterior 1

2.2.6 Result overview, Measuring area 7

3 10  Order No. : SEMH24KG
Luminaire name : SELISE MAXI
Equipment : 1 x LED 202 W / 19465 lm