

OrchardStreet

Development at Altrincham Retail Park,  
George Richards Way, Altrincham  
WA14 5GR



*External Lighting Proposal*

Issue 1 - Dated 9<sup>th</sup> July 2019

A Submission by



The Chartered Institution  
of Building Services Engineers

LOW CARBON CONSULTANTS

**DOCUMENT ISSUE STATUS**

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# 1. Summary

This External Lighting Proposal describes the proposed new lighting scheme for the customer car park and service yards, and calculated results, for the new development of Unit 1 (Homebase), Altrincham Retail Park, Unit 1 George Richards Way, Altrincham WA14 5GR.

The retail park is owned by Orchard Street Investment Management LLP.

The proposed development is described in Section 2.

The parameters for the intended lighting levels and proposed lighting equipment are described in Section 3.

The results are given in Section 4.

The proposed scheme and results of the calculated lighting levels are shown on drawing 5585-LTG-02.

The impact on adjacent residential properties has been considered and the design has been carried out to avoid any light pollution.

**The results in section 4 show that the target lighting levels have been achieved, and the effect on the surrounding properties has been minimised.**

**Uniformity in the car park has been improved.**

**The proposed luminaires have zero direct upward light – an improvement over the existing floodlights.**

The lighting report consists of:

- This External Lighting Proposal document
- Drawing 5585-LTG-01: Existing External Lighting
- Drawing 5585-LTG-02: Proposed External Lighting

## 2. Description of the Project

The development works are as follows:

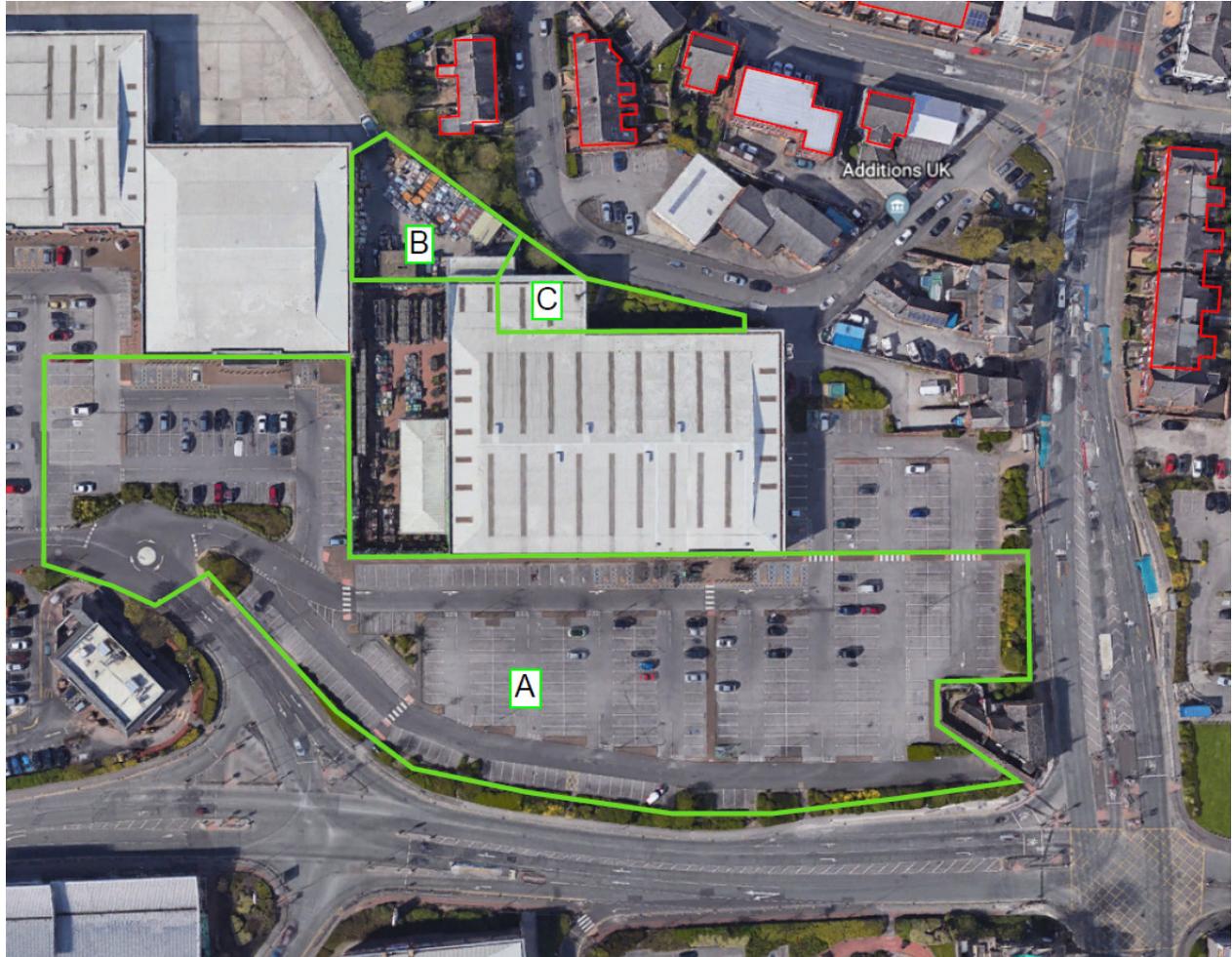
- Existing garden centre and western end of the Homebase store shall be demolished.
- The rear part of the Homebase store shall be demolished.
- A new retail unit shall be constructed in place of the old garden centre and demolished building.
- A new garden centre shall be constructed in place of the car park to the eastern end of the site.
- The existing service yard to the rear of Homebase shall be retained for the new retail unit.
- A new service yard shall be constructed to the rear of the remaining part of Homebase.

The areas being developed are shown by the red outlines below.



A new lighting scheme shall be implemented to:

- A. The existing customer car park to the front of Homebase/new retail unit and to the side of the new retail unit/front of Currys-PC World.  
Note: other parts of the retail park are not being developed and the existing lighting in these areas shall remain.
- B. The existing service yard to the rear of the new retail unit.
- C. The new service yard to the rear of Homebase.



The surrounding areas are:

- Residential properties on Huxley Street to the rear of the service yards to the north and on the other side of Manchester Road to the north east side (red outlines).
- Other parts of Altrincham Retail Park and car parking to the west.
- Other retail/commercial properties to the east and south, separated from the site by the main roads.

The areas requiring particular attention are the residential properties, to avoid overspill of light causing nuisance.

### 3. Proposed Lighting Scheme

#### Existing Luminaires (To Be Replaced)

The existing luminaires in the customer car park and service yard shall be replaced.

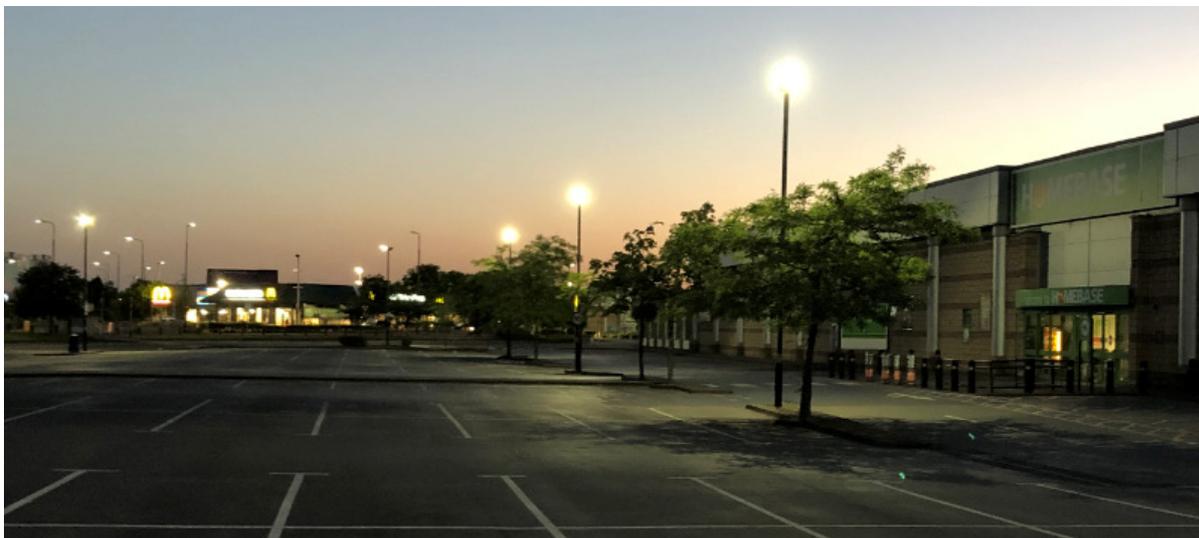
These are general purpose floodlights – LED fittings in the car park and high pressure sodium (SON) in the service yard.

The control of light by the existing luminaires is poor – they are very wide angle output and many are aimed at a high angle to project across the car park or service yard.

This creates a high proportion of glare and direct upward illumination, i.e. light pollution.

The effect at ground level is to create bright areas near the floodlights, but ineffective control of the light by the floodlights directs a lot of illumination away from the surface (i.e. upwards and throwing too far across the car park) and creates darker areas in the spaces between.

The existing car park lighting level is an average of approximately 16 lux, but the effect is very patchy and lacks uniformity – lowest levels measured in the darker areas between columns was <2 lux (0.125 uniformity). Refer to drawing 5585-LTG-01.



Existing Customer Car Park



Existing Service Yard

## Proposed New Lighting Scheme

The new lighting shall consist of the following:

- Area A: new luminaires in the customer car park, to replace the existing general-purpose floodlights.  
The new luminaires shall be fitted to existing 8m high lighting columns. The columns are all existing apart from one, which shall be relocated a short distance to suit the revised car park layout.
- Area B: new luminaires in the existing service yard. These shall be fitted to 4No existing 10m high lighting columns, located on the outer perimeter and aimed inwards. 2No existing lighting columns on the inner perimeter and shining outwards shall not be used.
- Area C: new luminaires in the new service yard. These shall be fitted to 2No new 8m high lighting columns, located on the outer perimeter and aimed inwards.

The effect on residential neighbours has been mitigated by choice of luminaires and light sources to minimise the overspill into the adjacent properties.

Lighting levels to the car park and service yard have been selected to meet the requirements of British Standards and recommendations of professional bodies, and the Client's requirement to provide a well-lit car park to promote safety and security.

- BSEN 12464 Part 2: 2014 – Light and Lighting – Lighting of Work Places, Part 2: Outdoor work Places
- BS 5489 Part 1: 2013 – Code of Practice for the Design of Road Lighting, Part 1: Lighting of Roads and Public Amenity Areas

## Target Lighting Levels

The target lighting levels are as follows:

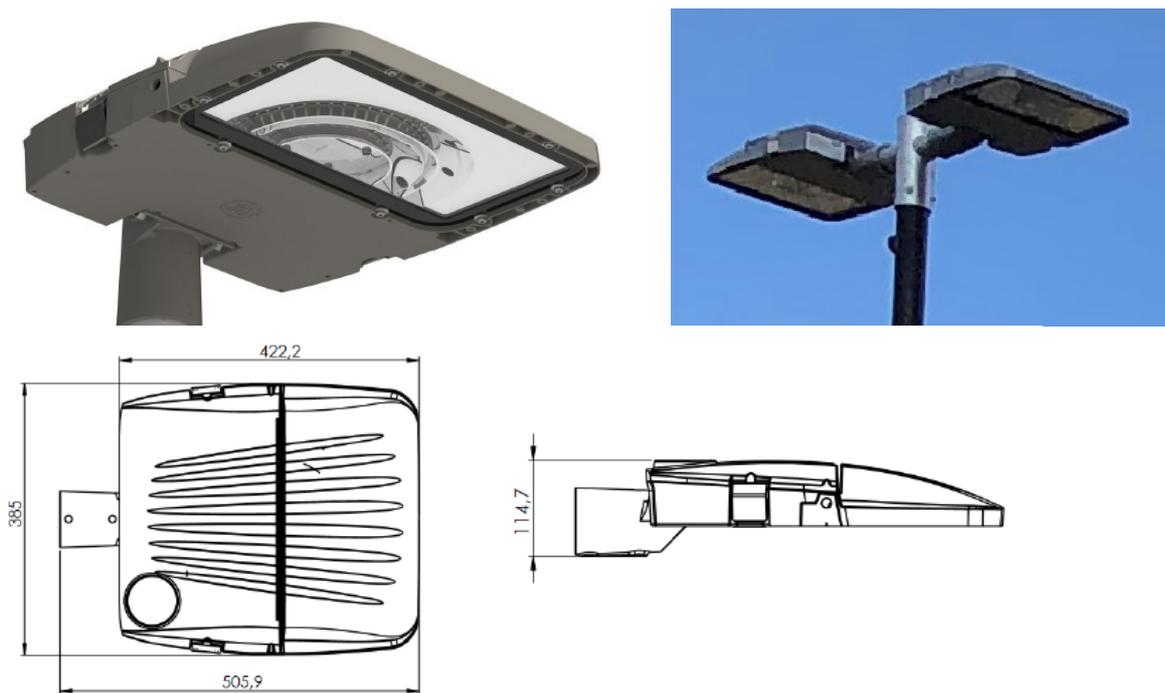
- (i) **Car park and service yards: 20 lux average, 0.25 uniformity or better.** (BSEN 12464-2, table 5.9.3 for “Parking Areas”)  
The lighting level of 20 lux complies with the requirements for “heavy traffic”. The lower level of 10 lux for “medium traffic” (table 5.9.2) was not chosen as the car parks are combined with service yards where lorries may mix with cars and pedestrians – a higher level will provide enhanced visibility for safety, as well as a better sense of security.  
The same lighting levels are given in BS 5489 Part 1.
- (ii) The **Environmental Zone** chosen from Section 4.5 Table 2 of BSEN 12464-2 (Reduction of Obtrusive Light) is **E3: medium district brightness (small town centres or urban locations)**.  
(Zone E4: “high district brightness” could be chosen as this applies to the retail park, but it is felt that E3 is more appropriate to the residential properties to the rear of the retail park).  
E4 limits the upward light (sky glow) to 15% of the total installed flux, and limits the overspill lighting on neighbouring properties to 10 lux (pre curfew) and 2 lux (post curfew).  
In practice it is proposed to choose luminaires with much better performance than E3 requirements.  
Direct upward light is permitted to be 15% of the total installed lighting flux – in practice the scheme is targeting 0% direct upward light.

## Proposed Lighting Equipment

Luminaires have been chosen to conform to the following requirements:

High efficiency/low energy luminaires, by use of LED light sources.
The design of luminaires shall be chosen to provide good control of light (i.e. tight beam control) to create minimal stray light, and shall be aimed at the activity area only.
Luminaires shall be constructed with recessed LEDs, with flat cover glass to the underside, installed at 0° inclination, to achieve zero upward light (full horizontal cut off).
Luminaires shall have an asymmetric forward throw light output, to make best use of the existing lighting columns.
Location of luminaires shall further reduce the overspill, e.g. in the service yard they shall be placed on the outer perimeter and aimed back “inwards”, away from neighbouring properties.
Good colour rendering, CRI Ra>70.
Colour temperature of 3000K (this reduces the effect on any wildlife and is usually recommended by the Bat Conservation Trust). The intention of the BCT advice is to limit UV and the blue component of light which may attract insects and affect the feeding pattern of bats. The use of 3000K LED light sources allows a good colour rendering whilst still complying with the BCT advice, because the LEDs are designed to have zero UV (100-400nm wavelength) and much reduced blue component (<550nm wavelength) <sup>(1)</sup> .
Baffles or shields shall be used where necessary to provide further control of the light output, to avoid overspill into sensitive areas (adjacent residential properties).

### Proposed luminaire: Edge Lighting “Parq Area LX1”: 140W, 14,662 lumens



The lighting columns are:

- Zone A (customer car park) – existing columns – 8m high.
- Zone B (existing service yard) – existing columns – 10m high.
- Zone C (new service yard) – new columns – 8m high.

This is high enough to allow the luminaires to be aimed in a downwards direction, reducing sideways aiming which may cause overspill and glare.

**The luminaire locations are shown on drawing 5576-LTG-02.**

e.g.



### Proposed Lighting Control

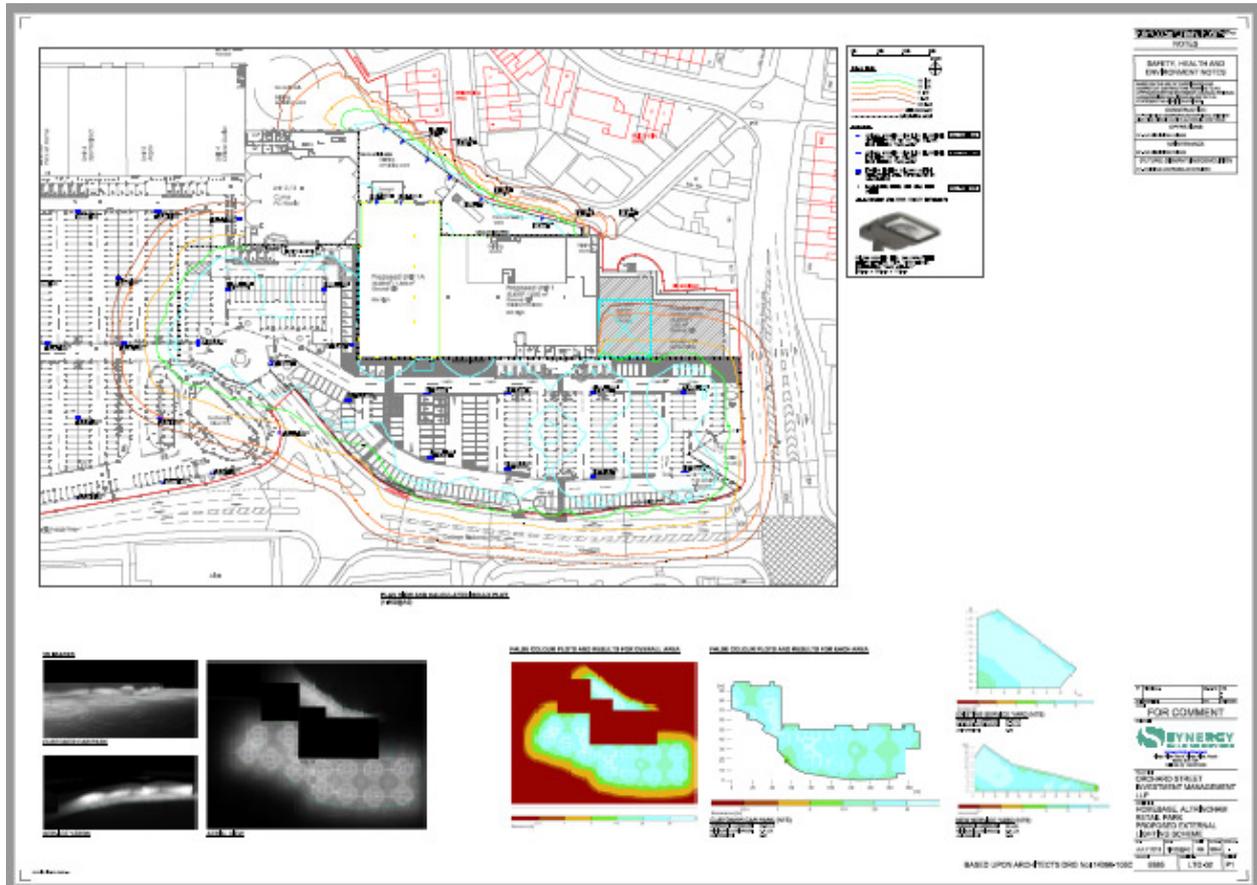
The lighting for each car park area shall be automatically controlled (existing system).

Lighting shall be switched using a building management system (BMS) to only switch on the lighting for pre-determined hours, and photocell sensors to only allow the lighting to operate during hours of darkness.

(The hours of operation are as existing for the retail park).

## 4. Lighting Calculation Results

Refer to the Proposed External Lighting Layout drawing, 5585-LTG-02, showing the proposed lighting column and luminaire positions, and the calculated lighting levels achieved.



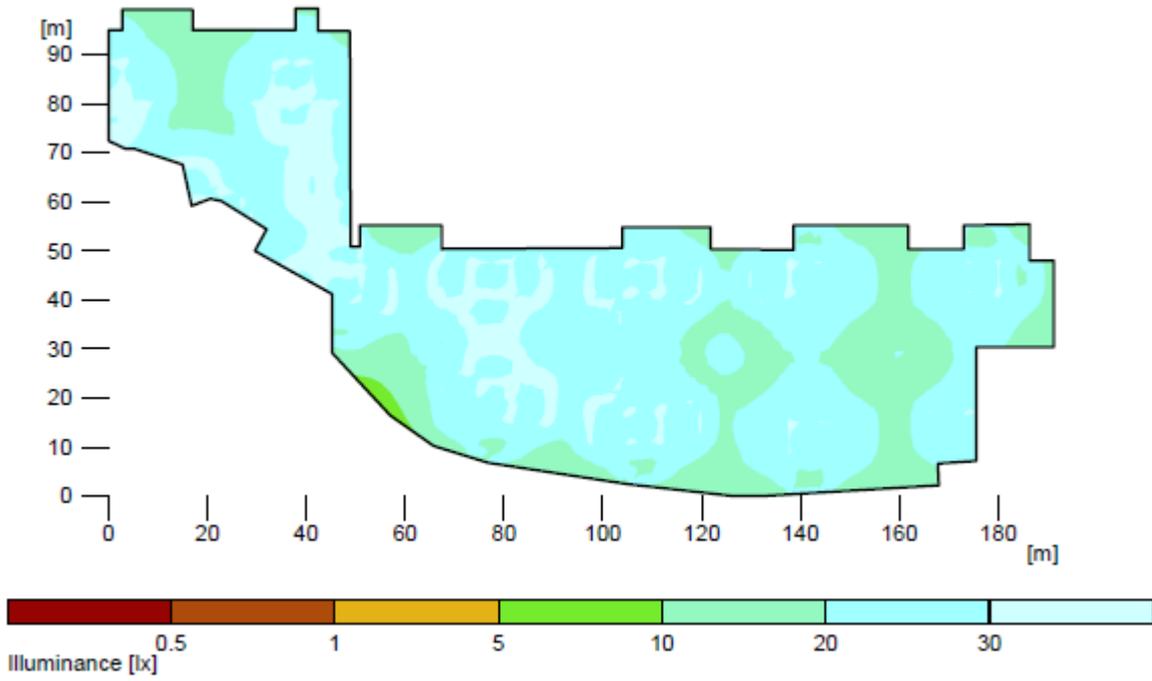
The calculations show that the predicted lighting levels are:

Customer Car Park	23.9 lux average, 7.4 lux minimum, 0.31 uniformity (Target: 20 lux, 0.25 uniformity) (Target exceeded by a small margin – result accepted.)
New Retail Unit Service Yard	34.5 lux average, 14.4 lux minimum, 0.42 uniformity (Target: 20 lux, 0.25 uniformity) (Target exceeded – lighting positions determined by using existing lighting columns –lighting level is higher than required but result accepted.)
Homebase New Service Yard	28 lux average, 8.9 lux minimum, 0.32 uniformity (Target: 20 lux, 0.25 uniformity) (Target exceeded – higher lighting level than required but result accepted as the service yard is usually also used for storage and becomes very congested.)

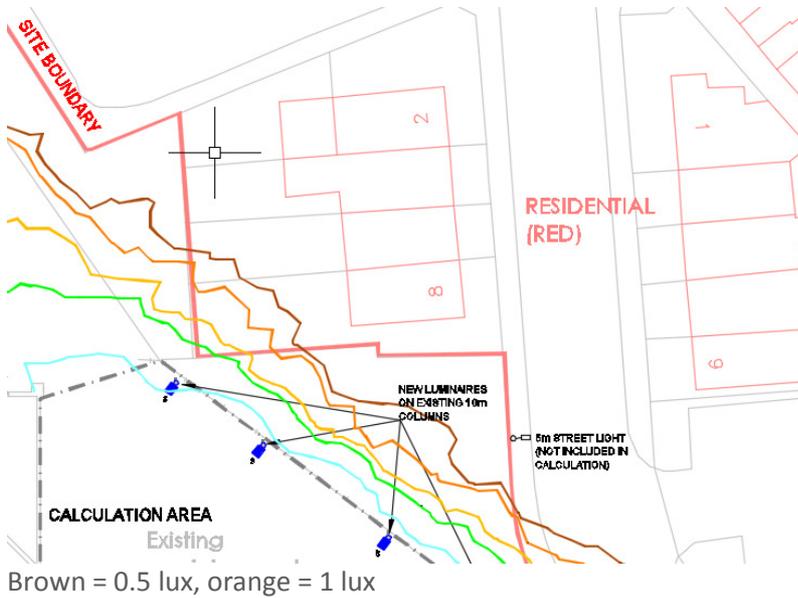
The uniformity is very good, as shown by the isolux contours on the drawing 5585-LTG-02 and the false colour plots.

The uniformity has improved from 0.125 (existing car park) to 0.31 ( new car park) to 0.32/0.42 (new service yards).

e.g.



The overspill into the neighbouring residential properties is within the requirements for the Reduction of Obtrusive Light: the limit is 2 lux on the neighbouring buildings – the results show the lighting level has reduced to 0.5 lux before reaching the buildings, indicated by the brown isolux contour line.



## 5. Notes

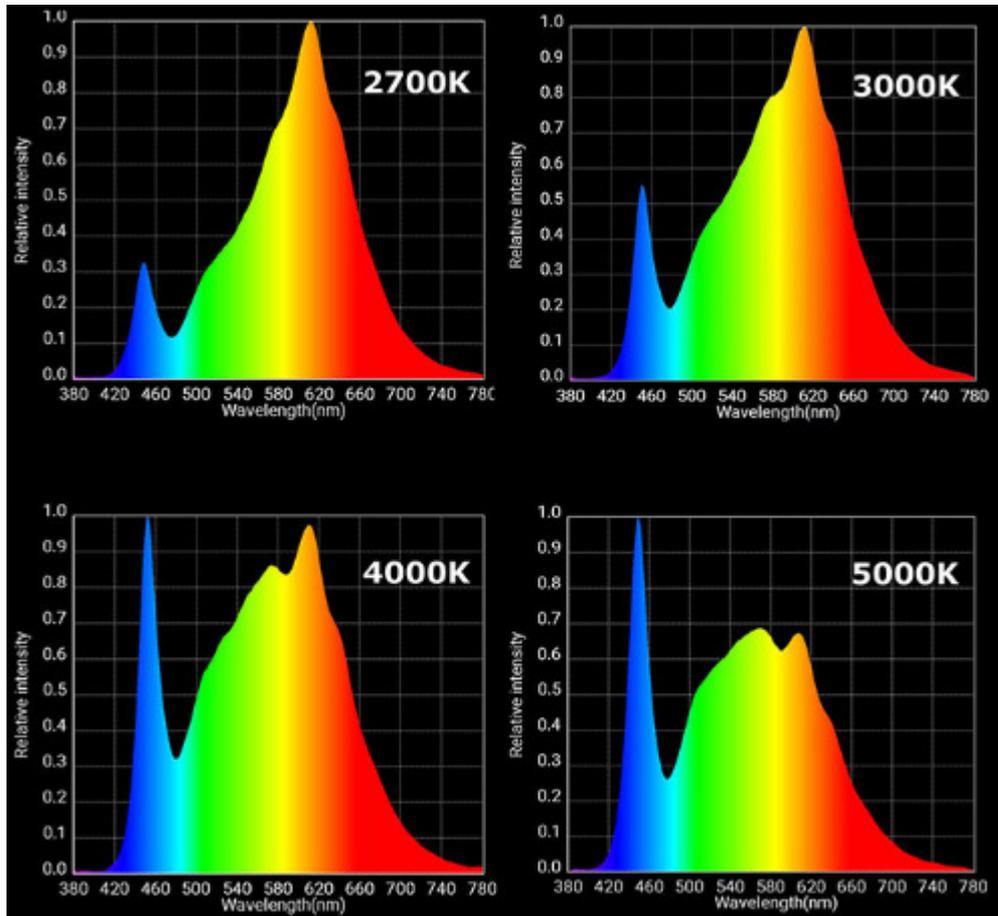
(1) Typical LED spectra shown below.

Note 3000K spectrum: indicating near zero UV and much reduced blue light output.

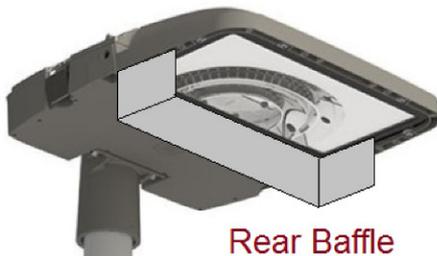
UV light = 100-400nm wavelength.

Blue light <550nm wavelength.

Proposed luminaires use 3000K LEDs.



(2) Baffles/shields to be tailor-made where required for each location.



(3) Full calculation results.

# Homebase Altrincham

Installation : New LED Lighting

Project number :

Customer :

Processed by :

Date : 05.07.2019

The following values are based on exact calculations on calibrated lamps, luminaires and their arrangement. In practice, gradual divergences can occur.

Guarantee claims for luminaire data are excluded.

Relux and the luminaire manufacturers accept no liability for consequential damage and damage which is occasioned to the user or to third parties.

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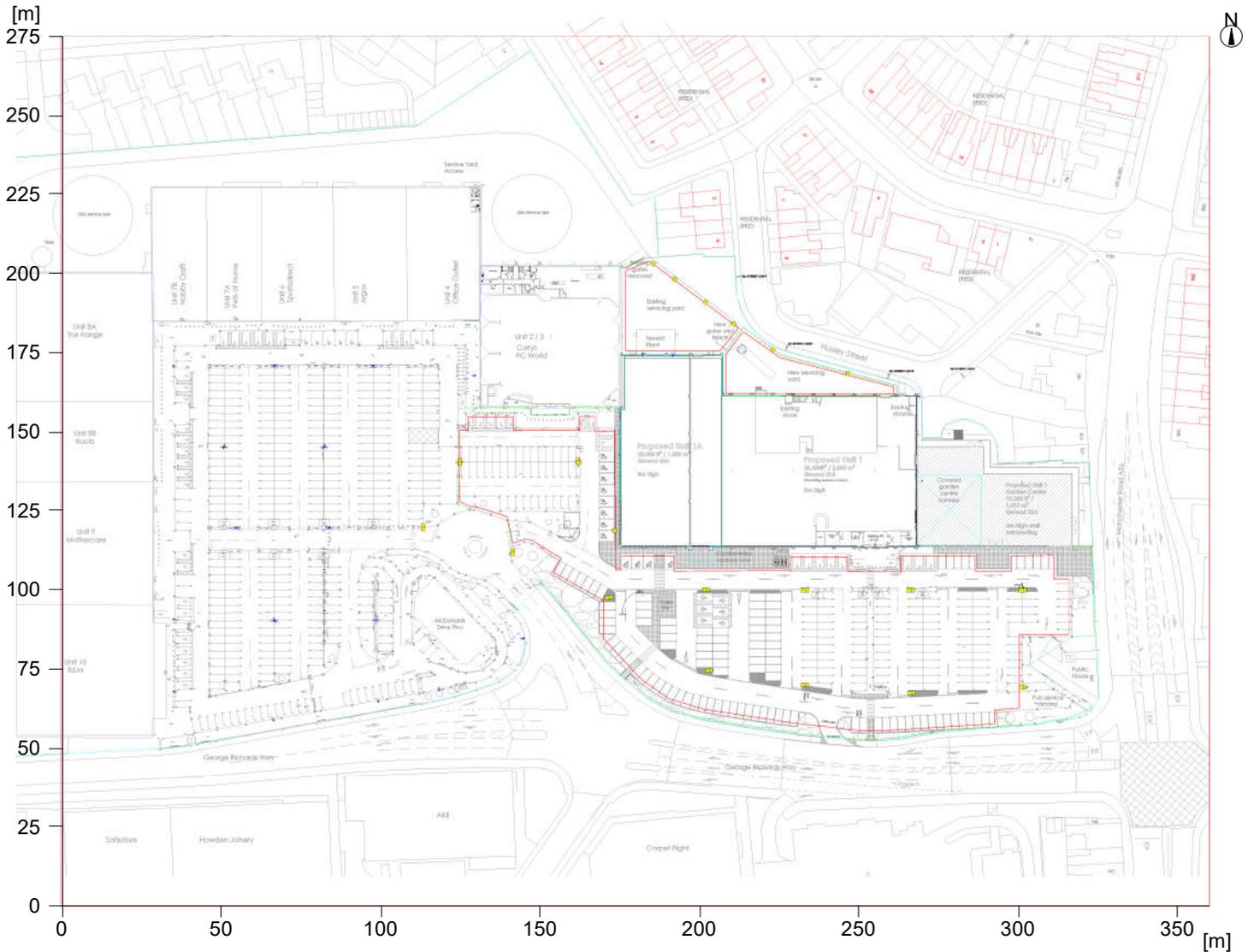
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Object : Homebase Altrincham  
Installation : New LED Lighting  
Project number :  
Date : 05.07.2019

# 1 Exterior 1

## 1.1 Description, Exterior 1

### 1.1.1 Floor plan



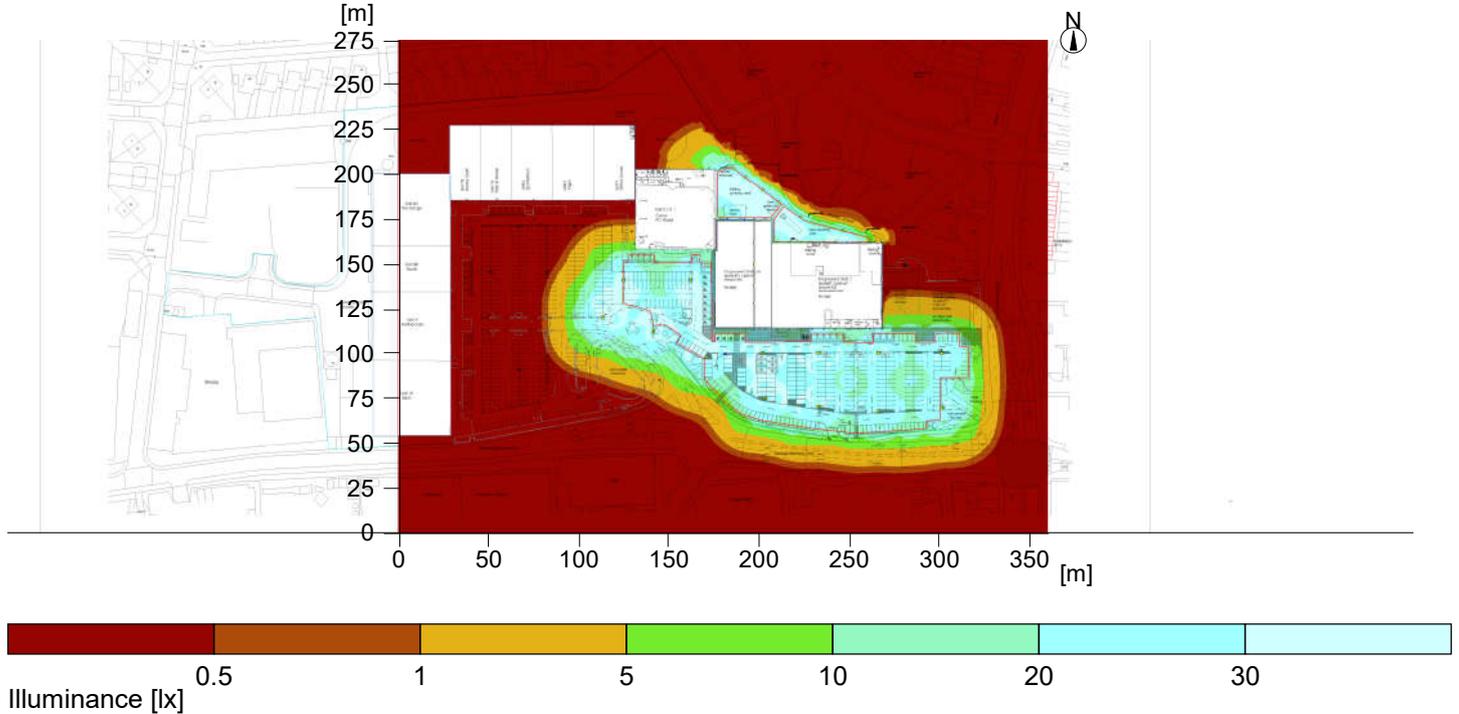
-please put your own address here-

Object : Homebase Altrincham  
 Installation : New LED Lighting  
 Project number :  
 Date : 05.07.2019

# 1 Exterior 1

## 1.2 Summary, Exterior 1

### 1.2.1 Result overview, Evaluation area 1



#### General

Calculation algorithm used	Average indirect fraction
Maintenance factor	0.85
Total luminous flux of all lamps	472560.00 lm
Total power	4620.0 W
Total power per area (99000.00 m <sup>2</sup> )	0.05 W/m <sup>2</sup> (1.06 W/m <sup>2</sup> /100lx)

#### Evaluation area 1

#### Reference plane 1.1

	Horizontal
Em	4.41 lx
Emin	0 lx
Emin/Eav (Uo)	---
Emin/Emax (Ud)	---
Position	0.00 m

#### Type No.\Make

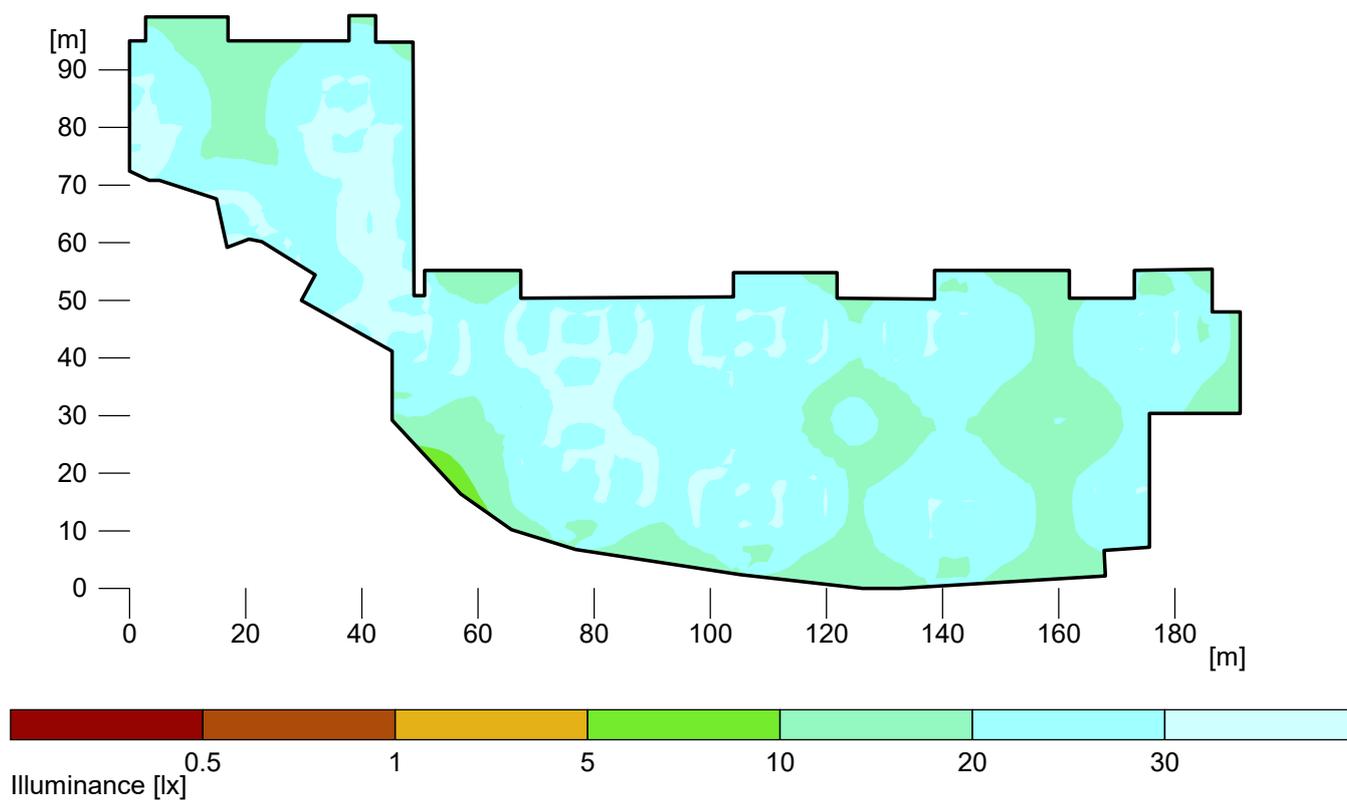
1	33	<b>EDGE LIGHTING</b>
	Order No.	: !ALIX/3/F/AF/140/30/
	Luminaire name	: ALIX 140W AF 3000K
	Equipment	: 1 x GEN2 LED 140 W / 14320 lm

Object : Homebase Altrincham  
Installation : New LED Lighting  
Project number :  
Date : 05.07.2019

## 1 Exterior 1

### 1.3 Calculation results, Exterior 1

#### 1.3.5 Pseudo colours, CUSTOMER CAR PARK (E)

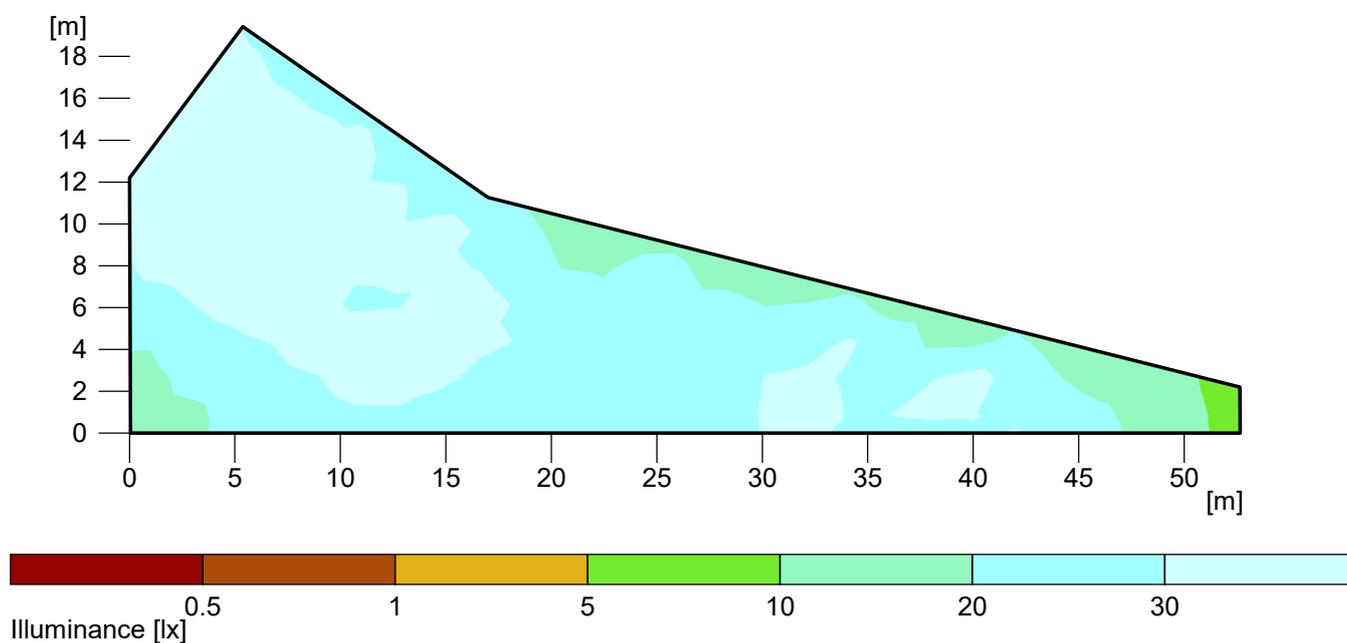


Height reference plane	:	0.00 m
Average illuminance	Eav	: 23.9 lx
Minimum illuminance	Emin	: 7.4 lx
Maximum illuminance	Emax	: 40.4 lx
Uniformity U <sub>o</sub>	Emin/Eav	: 1 : 3.24 (0.31)
Diversity U <sub>d</sub>	Emin/Emax	: 1 : 5.47 (0.18)

Object : Homebase Altrincham  
Installation : New LED Lighting  
Project number :  
Date : 05.07.2019

### 1.3 Calculation results, Exterior 1

#### 1.3.6 Pseudo colours, NEW SERVICE YARD (E)



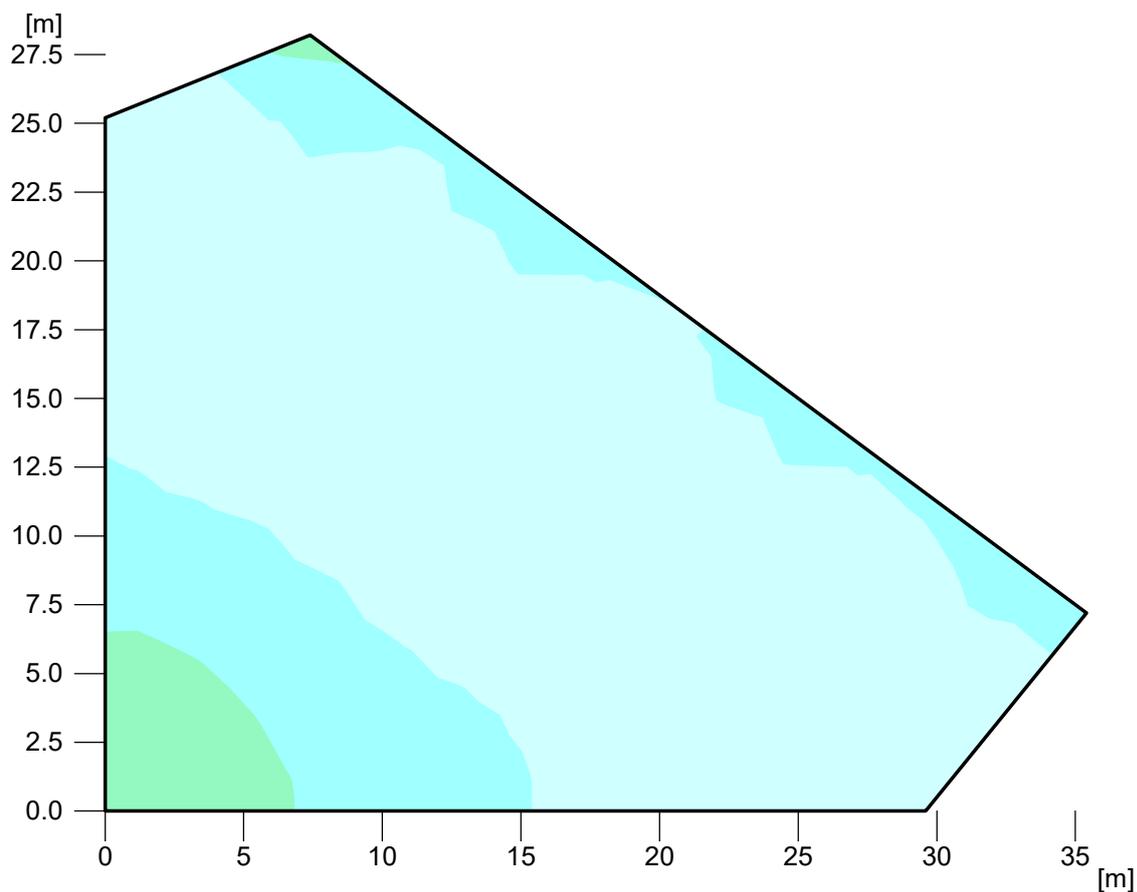
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Height reference plane	:	0.00 m
Average illuminance	Eav	: 28 lx
Minimum illuminance	Emin	: 8.9 lx
Maximum illuminance	Emax	: 44.1 lx
Uniformity U <sub>o</sub>	Emin/Eav	: 1 : 3.16 (0.32)
Diversity U <sub>d</sub>	Emin/Emax	: 1 : 4.97 (0.20)

Object : Homebase Altrincham  
 Installation : New LED Lighting  
 Project number :  
 Date : 05.07.2019

### 1.3 Calculation results, Exterior 1

#### 1.3.7 Pseudo colours, EXISTING SERVICE YARD (E)



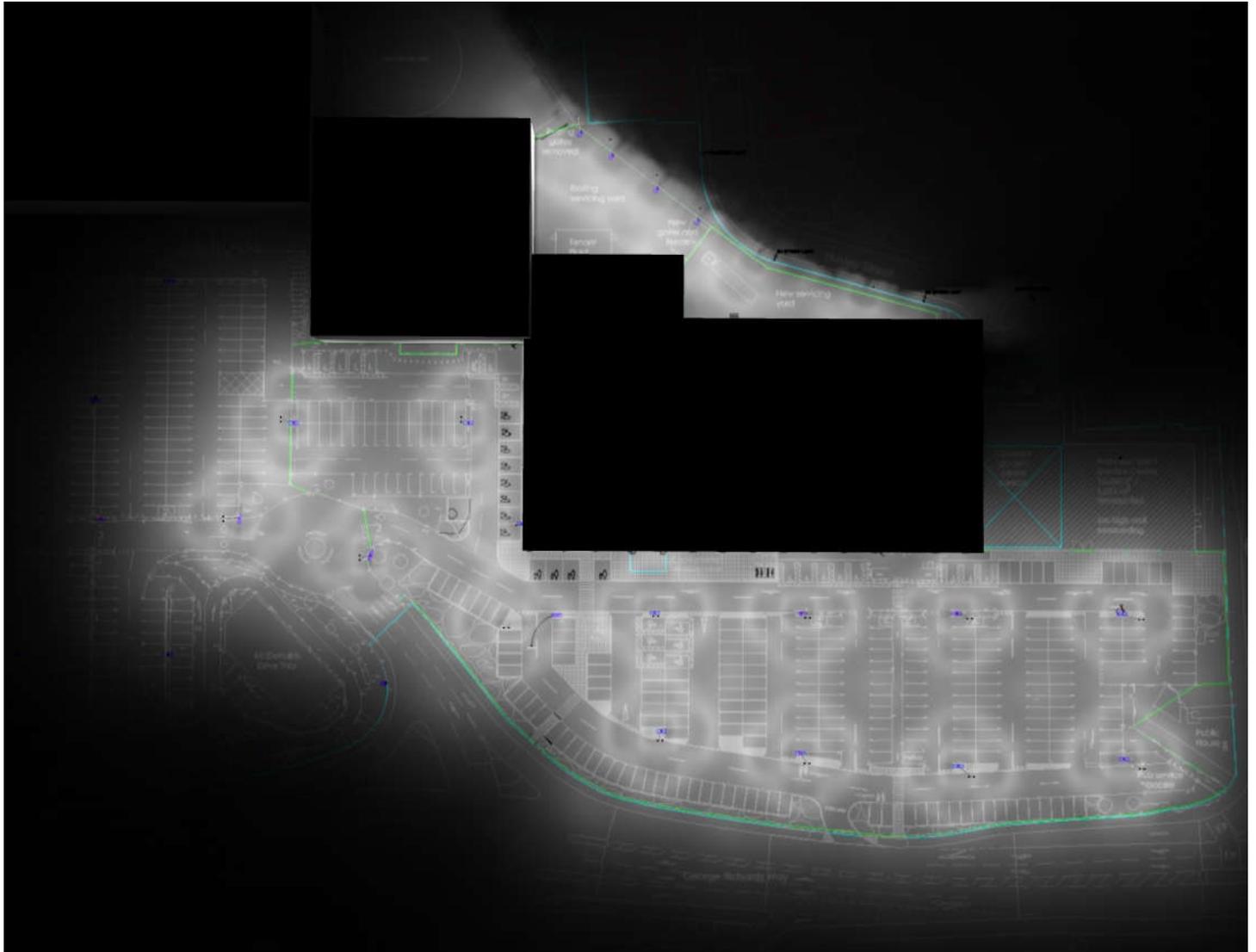
Height reference plane	:	0.00 m
Average illuminance	Eav	: 34.5 lx
Minimum illuminance	Emin	: 14.4 lx
Maximum illuminance	Emax	: 47.6 lx
Uniformity Uo	Emin/Eav	: 1 : 2.39 (0.42)
Diversity Ud	Emin/Emax	: 1 : 3.29 (0.30)

-please put your own address here-

Object : Homebase Altrincham  
Installation : New LED Lighting  
Project number :  
Date : 05.07.2019

### 1.3 Calculation results, Exterior 1

#### 1.3.8 3D luminance, View from above

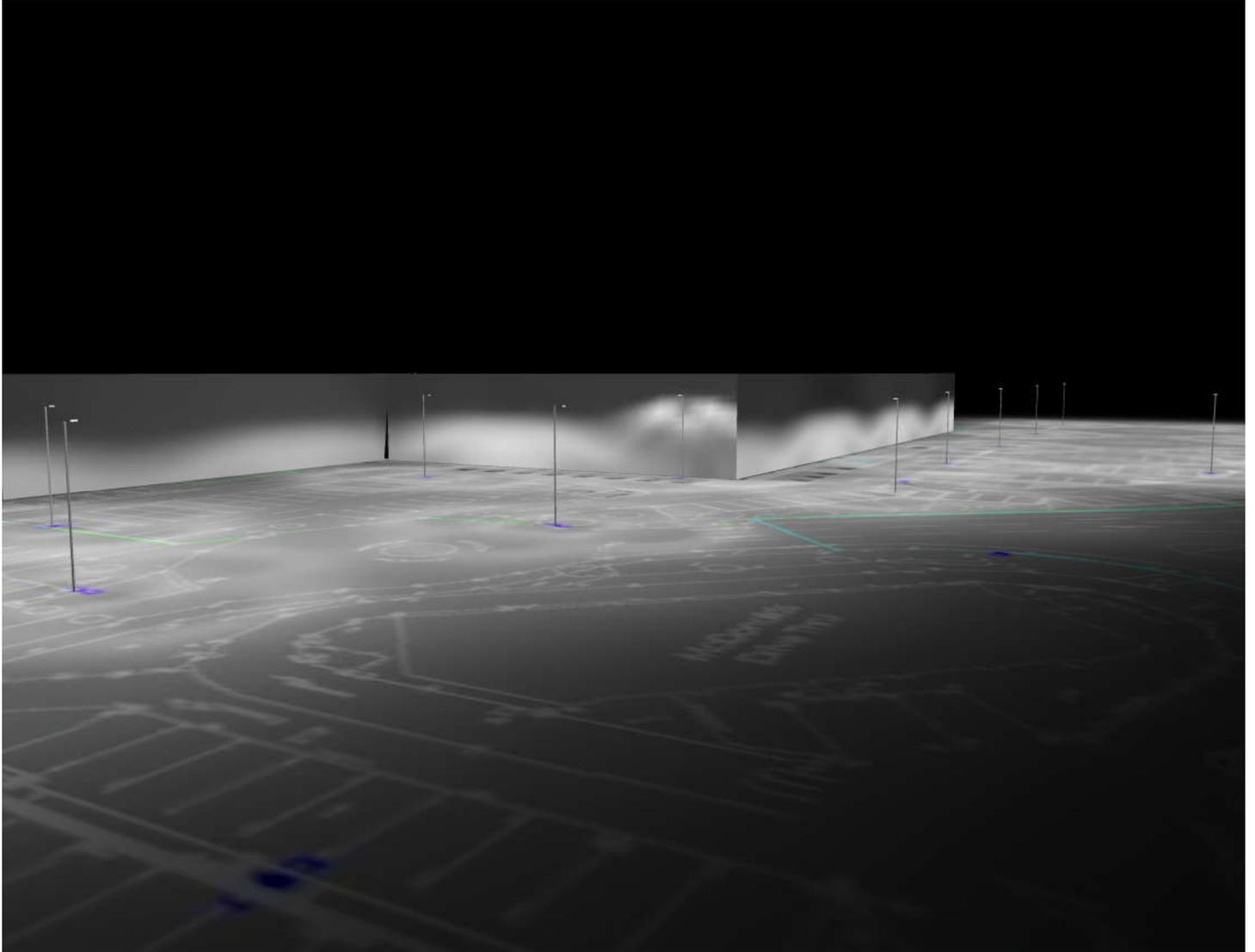


Luminance in the scene  
Minimum: : 0 cd/m<sup>2</sup>  
Maximum: : 1520 cd/m<sup>2</sup>

Object : Homebase Altrincham  
Installation : New LED Lighting  
Project number :  
Date : 05.07.2019

### 1.3 Calculation results, Exterior 1

#### 1.3.9 3D luminance, View 2



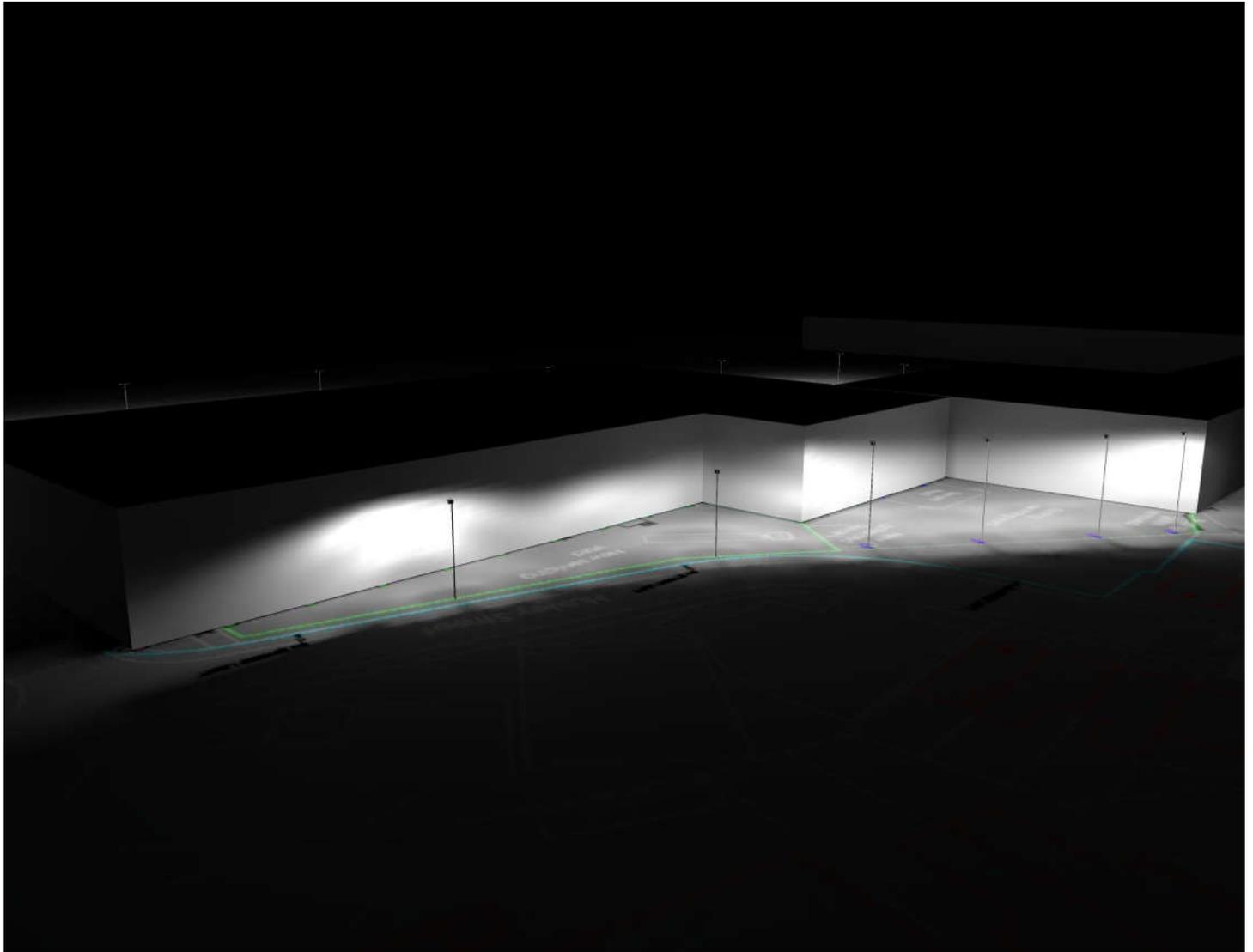
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Luminance in the scene  
Minimum: : 0 cd/m<sup>2</sup>  
Maximum: : 1520 cd/m<sup>2</sup>

Object : Homebase Altrincham  
Installation : New LED Lighting  
Project number :  
Date : 05.07.2019

### 1.3 Calculation results, Exterior 1

#### 1.3.10 3D luminance, View 3



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Luminance in the scene  
Minimum: : 0 cd/m<sup>2</sup>  
Maximum: : 1520 cd/m<sup>2</sup>

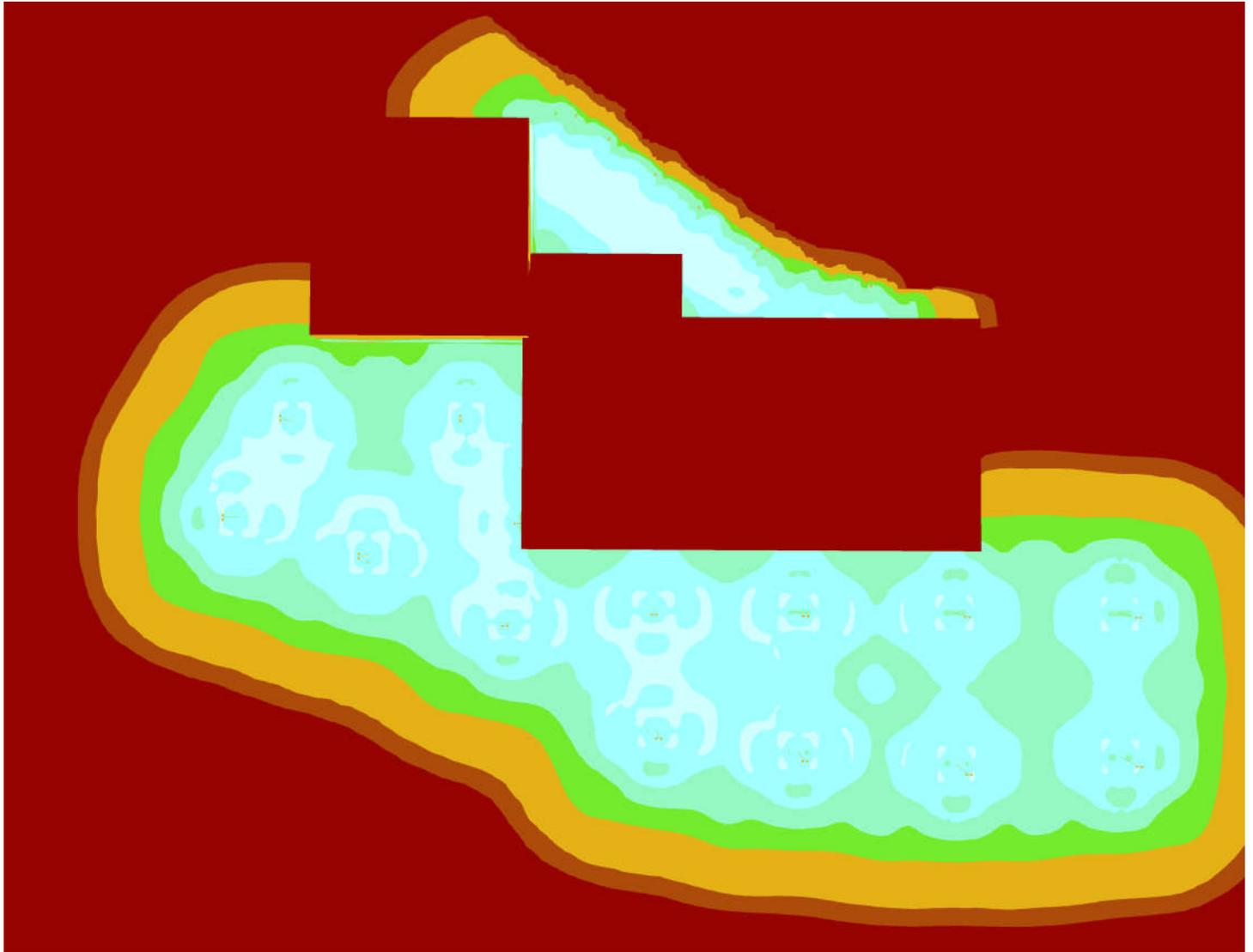
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Object : Homebase Altrincham  
Installation : New LED Lighting  
Project number :  
Date : 05.07.2019

### 1.3 Calculation results, Exterior 1

#### 1.3.11 3D pseudo colours, View from above (E)



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