Greggs Bakery / Twickenham

External Lighting Report

February 2019 | 1823-63-RPT-01

LONDON SQUARE DEVELOPMENTS LTD

FORMER GREGGS BAKERY SITE
TWICKENHAM
TW2 6RT

Exterior Lighting Assessment

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Issue No.: 02
Date: January 2019
Ref: 1823-63-RPT-01
Author: JC
Checked/Authorised: AMD

SCHEDULE OF REVISIONS

Revision	Date	Changes	Author	Checked
01	31/01/2019	DRAFT FOR COMMENT	JC	AD
02	18/02/2019	SUBMITTED FOR PLANNING	JC	AD

INDEX

1.0 INTRODUCTION

This report outlines the preliminary external lighting design for the proposed residential development at the former Greggs Bakery site in Twickenham. The project comprises construction of 51 new townhouses and 65 new apartments. Also included in the proposal is car parking, vehicle access roads, cycle and refuse storage and two storeys of commercial space at the south of the site.

The site is located within the London Borough of Richmond upon Thames and is situated in the centre of an established low-rise residential area mainly comprising townhouses. The development is accessible via both Gould and Crane Road, and Twickenham station sits approximately 900 metres due East of the site.

2.0 LIGHTING DESIGN

The external lighting design needs to satisfy various design criteria set out by professional bodies as detailed below.

The design will comply with the Society of Light and Lighting's CIBSE LG6: The Outdoor Environment – 2016. The class of lighting proposed for the development has been selected as E3 for 'small town centres or suburban locations' as outlined within Table 2.1 below, extracted by CIBSE from CIE 150 : 2003 (Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations) and used in section 2.1.10 of LG6.

In this section of LG6, the document states that the local context should be considered when designing the lighting so that the building does not appear visually out of keeping with its immediate surroundings; E0 being protected areas such as a dark sky park where no lighting is permitted, and E3 (our selection) being suburban areas with medium district brightness.

Table 2.1 Environmental zones

Zone	Surroundings	Lighting environment	Examples
E0	Protected	Dark	IDA Dark Sky Parks, UNESCO Starlight Reserves
E1	Natural	Intrinsically dark	Areas of Outstanding Natural Beauty, relatively uninhabited rural areas
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town and city centres, commercial areas

Source: CIE 150: 2003.

When designing in an E3 classification area the designer must ensure that upwards light is no greater than 15% (Upward Light Ratio – ULR) as stated in table 6.3, chapter 6 of the Society of Light and Lighting handbook.

Environmental zone	Maximum upward light output ratio (%)
E1	0
E2	5
E3	15
E4	25

The referenced E3 environmental zone is outlined in the Institution of Lighting Engineers Guidance Notes for the Reduction of Obtrusive Light GN01:2011, shown below:

Table 2 – Obtrusive Light Limitations for Exterior Lighting Installations – General Observers

Environmental Zone	Sky Glow ULR [Max %](1)	Light Intrusion (into Windows) E_v [lux] (2)		Luminaire Intensity I [candelas] (3)		Building Luminance Pre-curfew (4)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average, L [cd/m²]
E0	0	0	0	0	0	0
E1	0	2	0 (1*)	2,500	0	0
E2	2.5	5	1	7,500	500	5
E3	5.0	10	2	10,000	1,000	10
E4	15	25	5	25,000	2,500	25

ULR = **Upward Light Ratio of the Installation** is the maximum permitted percentage of luminaire flux that goes directly into the sky.

E_v = **Vertical Illuminance in Lux -** measured flat on the glazing at the centre of the window.

I = **Light Intensity in Candelas (cd)**

L = **Luminance in Candelas per Square Metre (cd/m²)**

Curfew = **the time after which stricter requirements (for the control of obtrusive light) will apply**; often a condition of use of lighting applied by the local planning authority. If not otherwise stated - 23.00hrs is suggested.

* = **Permitted only from** Public road lighting installations

The road lighting illuminance will comply with the levels outlined in BS5489-1:2013 Code of practice for the design of road lighting, lighting of roads and public amenity areas. Table A.6 (below) provides lighting classes for subsidiary roads with mainly slow moving vehicles, cyclists and pedestrians. As this is a residential site, a quite traffic flow has been selected which relates to a P6 lighting class.

Table A.6 **Lighting classes for subsidiary roads with mainly slow-moving vehicles, cyclists and pedestrians**

Traffic flow	Lighting class	
	Ambient luminance: very low (E1) or low (E2)	Ambient luminance: moderate (E3) or high (E4)
Busy [A)]	S4 or P4	S4 or P4
Normal [B)]	S5 or P5	S5 or P5
Quiet [C)]	S6 or P6	S6 or P6

NOTE 1 If facial recognition is important then an ES lighting class from BS EN 13201-2:2003, Table 5, or an E_{sc} lighting class from CIE 115:2010 [N1], Table 7, can be selected as an additional criterion. Good colour rendering contributes to a better facial recognition. (The ES lighting class in BS EN 13201-2:2003 is expected to be replaced by SC upon publication of the revised edition.)

NOTE 2 To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

NOTE 3 It is recommended that the actual overall uniformity of illuminance U_o be as high as reasonably practicable.

NOTE 4 Grey highlighting indicates situations that would not usually occur in the UK.

NOTE 5 The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N5].

A) Busy traffic flow refers to areas where the traffic usage is high and can be associated with local amenities such as clubs, shopping facilities, public houses, etc.

B) Normal traffic flow refers to areas where the traffic usage is of a level equivalent to a housing estate access road.

C) Quiet traffic flow refers to areas where the traffic usage is of a level equivalent to a residential road and mainly associated with the adjacent properties or properties on other equivalent roads accessed from this road.

The referenced P6 lighting class is outlined in BS EN 13201-2:2015 Table 3 below and will achieve a minimum maintained average illuminance within road and pathway areas of 2 lux and a minimum level of 0.4 lux.

Table 3 — P lighting classes

Class	Horizontal illuminance		Additional requirement if facial recognition is necessary	
	$\bar{E}$ [a] [minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15,0	3,00	5,0	5,0
P2	10,0	2,00	3,0	2,0
P3	7,50	1,50	2,5	1,5
P4	5,00	1,00	1,5	1,0
P5	3,00	0,60	1,0	0,6
P6	2,00	0,40	0,6	0,2
P7	performance not determined	performance not determined		

[a] To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum $\bar{E}$ value indicated for the class.

NOTE 4 A high colour rendering contributes to a better facial recognition.

The lighting design for the car park areas is based on a light traffic level and will achieve a minimum maintained average illuminance of 5 lux and a minimum uniformity of 0.25 lux as defined in Table 5 of BS 5489-1:2013.

Table 5 **Maintained lighting levels for outdoor car parks**

Type of area and usage	$\bar{E}$ lx	U_o
Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	0.25
Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	0.25
Heavy traffic, e.g. parking areas of schools, churches, major sports and multipurpose sports and building complexes	20	0.25

The lighting layout has been modelled using Dialux lighting design software to ensure that the above criteria are adhered to.

The proposed design will generally comprise luminaires mounted on 4m columns throughout, supplemented with wall mounted bulkheads at the exit/entrance routes from the buildings.

Area	Description	Fittings Used
Main Vehicle Roadways	Roadways illuminated to an average of 2 lux and maintain a minimum of 0.4 lux.	31W LED luminaire mounted on 4 metre columns complete with optics specific for use on roadways. Elongated light distribution to improve uniformity. Colour rendering index is 70+ for good facial recognition.
Car Parks	Car parks illuminated to 5 lux with a uniformity of 0.25.	31W LED luminaire mounted on 4 metre columns complete with optics specific for use in open plan car parks to improve uniformity. Colour rendering index is 70+ for good facial recognition.
Footpaths	Footpaths illuminated to an average of 2 lux and maintain a minimum of 0.4 lux.	31W LED luminaire mounted on 4 metre columns complete with optics specific for use on roadways. Elongated light distribution to improve uniformity. Colour rendering index is 70+ for good facial recognition.

THORLUX STARBEAM

LED floodlight luminaires mounted on 4 meter columns will be located along roadways and in car park areas.

Each fitting comprises a die cast aluminium housing, polycarbonate cover and high efficiency 31W LED 4000k lamp source.

Specific optics designed for use in car parks and roadways ensure that minimum lighting levels can be achieved using a reduced number of fittings.

Biodiversity Design Considerations

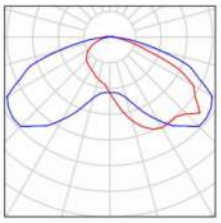
As part of the design process, the impact of external lighting on the local biodiversity has been considered, in particular to bats which currently commute across and forage over the site. In order to minimise any disturbance to the local bat population (and other nocturnal wildlife), the proposed lighting scheme shall incorporate the following measures:

- The use of mercury or metal halide lamps which emit high levels of UV have been avoided. External luminaires comprise LED lamps which produce light with a wavelength of 590nm to minimise disturbance to bats. Also, the LED lamps produce no UV emissions which ensures insects are not attracted away from neighbouring habitats.
- The proposed luminaires comprise integral reflectors which control the direction and spread of the light so that only the immediate area is illuminated. The design of the light fittings ensures minimum upward light spill as detailed in section 2.0 LIGHTING DESIGN of this report.
- Illuminance between lighting columns generally drops below 1 lux. These lower lighting levels will encourage bats to fly between columns and prevent the formation of a 'light barrier' which can be detrimental to some species of bat.
- The luminaires shall comprise louvres and diffusers which reflect/direct light to the required areas, thus avoiding unnecessary light spillage and upward light pollution.
- The external lighting has been modelled using lighting design software, the calculation outputs of which are enclosed within this report. This has enabled lighting levels and spill across the space to be accurately predicted, thus ensuring that light is not provided to areas which do not require illumination.
- There is no proposed uplighting to trees and other landscape features, both new and existing, which will avoid illuminating bat foraging and commuting habitats, as well as any bat boxes installed on retained trees.

3.0 LUMINAIRE PARTS LIST

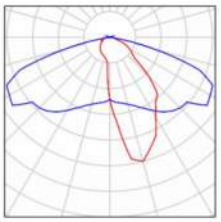
7 Pieces

Thorlux SB17553 STARBEAM LED AREA
Article No.: SB17553
Luminous flux (Luminaire): 3504 lm
Luminous flux (Lamps): 3500 lm
Luminaire Wattage: 35.0 W
Luminaire classification according to CIE: 98
CIE flux code: 25 59 90 98 100
Fitting: 1 x 31W LED (Correction Factor 1.000).



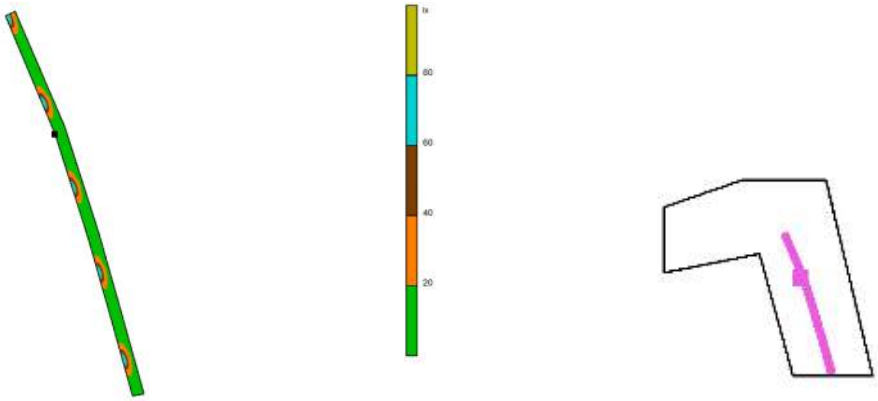
6 Pieces

Thorlux SB17561 STARBEAM LED ROADWAY
Article No.: SB17561
Luminous flux (Luminaire): 3700 lm
Luminous flux (Lamps): 3700 lm
Luminaire Wattage: 33.0 W
Luminaire classification according to CIE: 99
CIE flux code: 42 76 97 99 100
Fitting: 1 x 31W LED (Correction Factor 1.000).



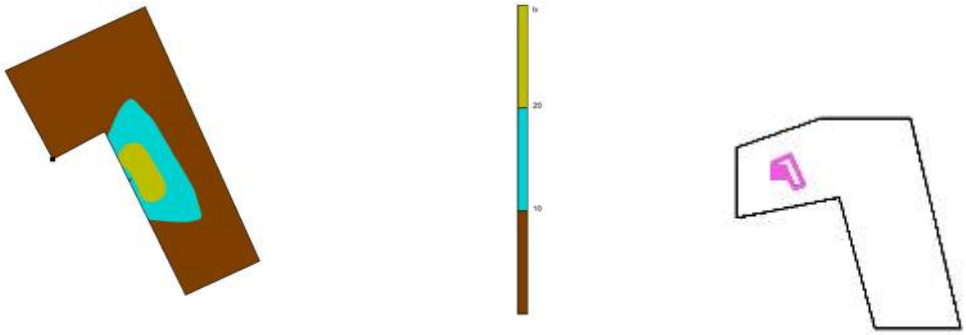
4.0 CALCULATION SURFACES

Main Roadway



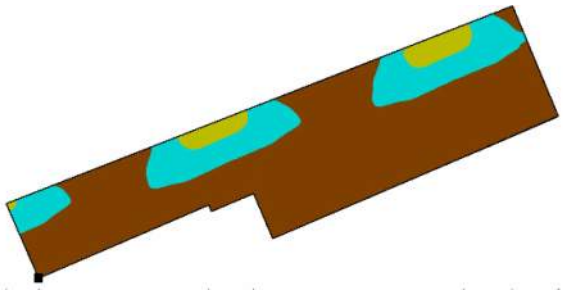
E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
15	1.02	88	0.067

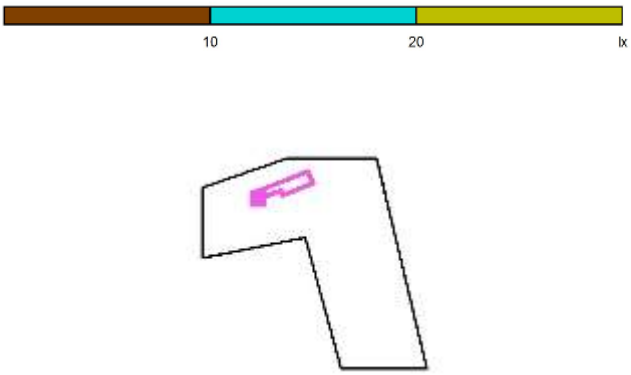
North West Car Park



E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
6.73	0.56	28	0.084

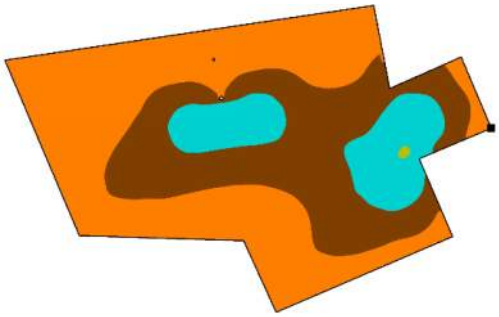
North Car Park

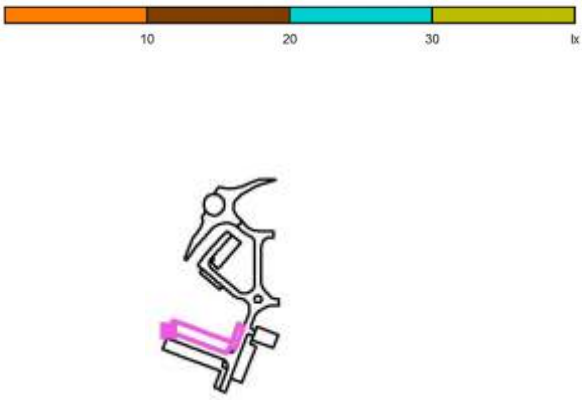




E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
7.56	0.71	28	0.093

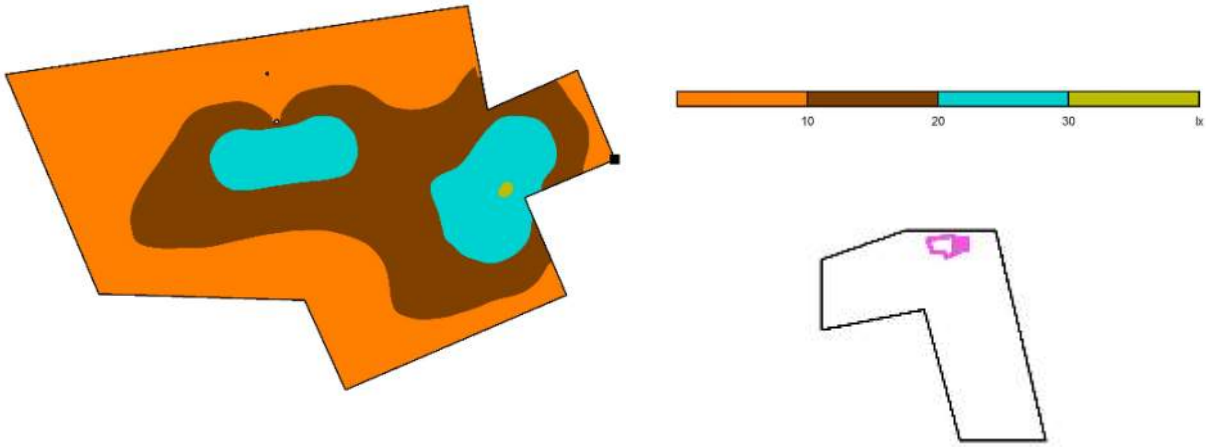
North East Car Park





E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
11	1.17	31	0.102

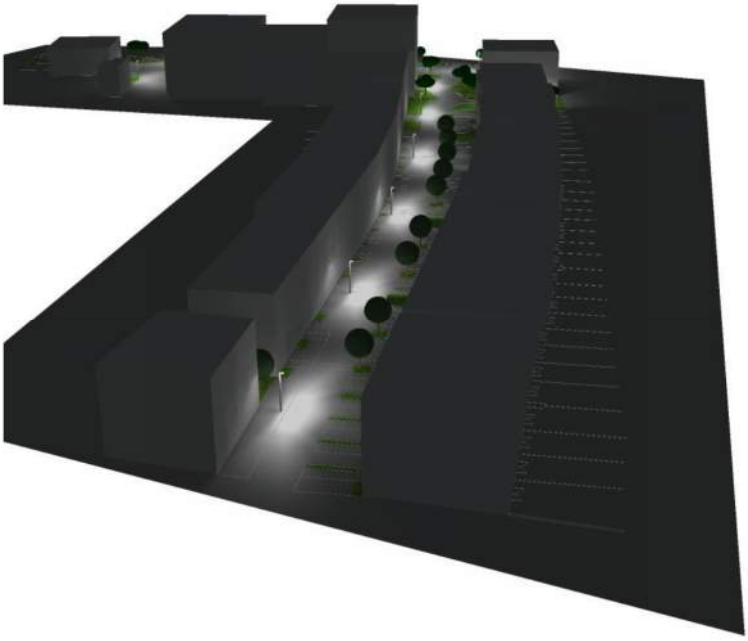
North East Car Park 2



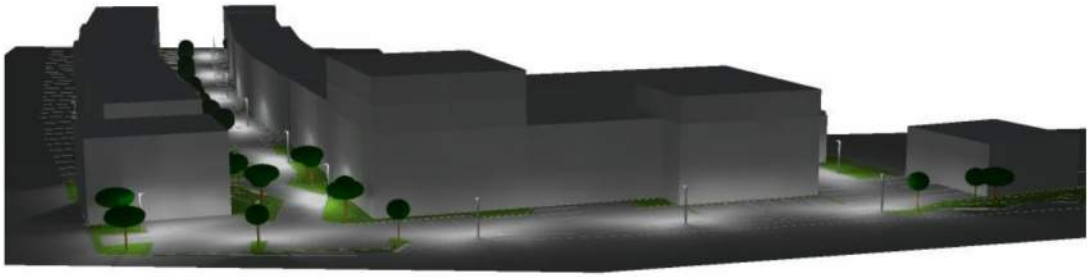
E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
11	1.17	31	0.102

5.0 3D RENDERING

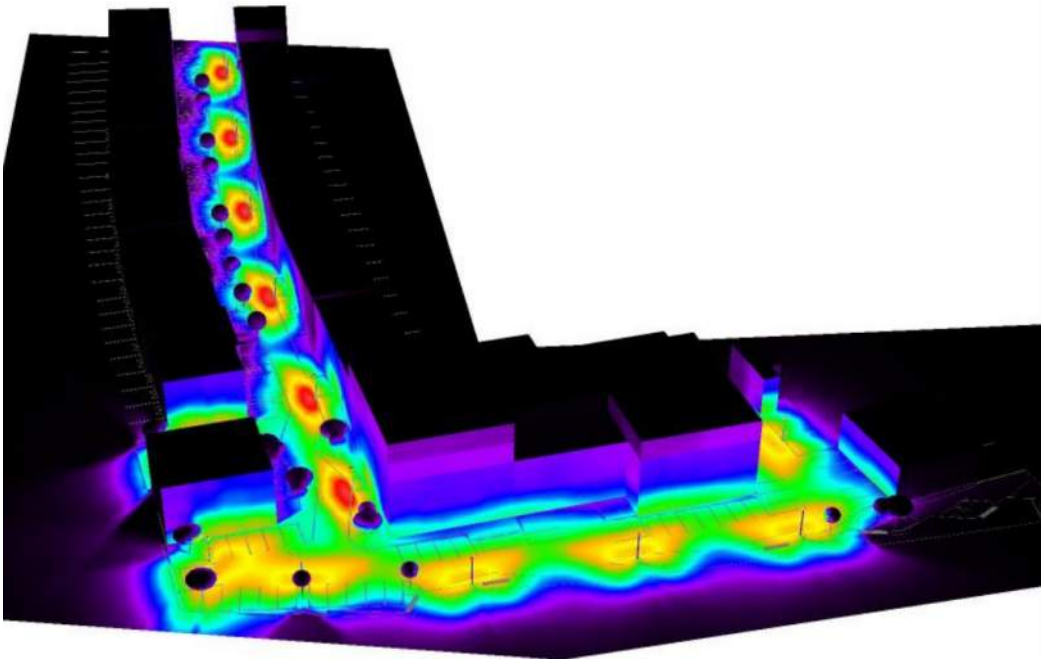
View Looking North



View Looking South



3D Colour Rendering



6.0 LIGHTING DATASHEETS

Thorlux Starbeam Area and Roadway

LED AREA FLOODLIGHTS AND STREET LIGHTS

IP66 IK10 CE LED

WINDAGE - small: 0.06m² large: 0.07m²

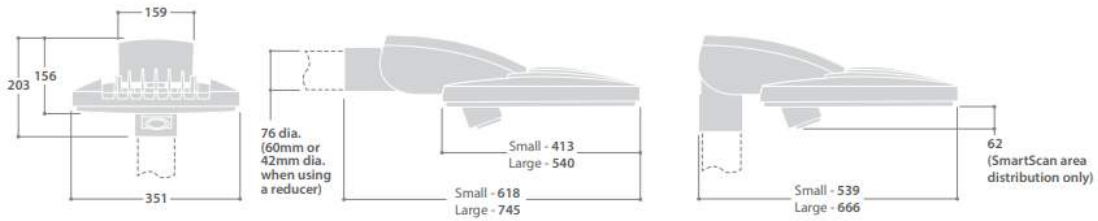
SPECIFICATION

- Die-cast aluminium body and gear compartment finished polyester silver RAL9006
- Die-cast aluminium, fast release gear compartment lid finished polyester graphite
- Polycarbonate cover and acrylic high efficiency LED lenses
- Area or roadway optical distributions
- Integral high efficiency driver
- Extremely efficient and long system life up to 100,000 hours
- Suitable for ambient temperatures up to 50°C
- Smart External versions with intelligent lighting control for use up to 12 metres mounting height
- SmartScan wireless technology removes the need for control cabling. Ideal for retro-fit
- Pole top 76mm as standard, adjustable through 90°
- Wall mounting bracket accessory
- Wide range of mounting options (see page 5 for details)
- Photocell option
- Fitted with 4000K or 5700K LEDs

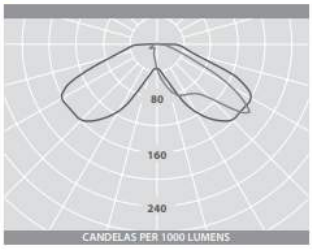
RANGE

	LED	AREA DISTRIBUTION	ROADWAY DISTRIBUTION	APPROX. kg
STANDARD	**Small Version**			
	31W - 4000K	**SB 17553L**	**SB 17561L**	8.0
	62W - 4000K	**SB 17554L**	**SB 17562L**	8.0
	31W - 5700K	**SB 15800L**	**SB 15801L**	8.0
	62W - 5700K	**SB 15802L**	**SB 15803L**	8.0
	Large Version			
	88W - 4000K	**SB 17555L**	**SB 17563L**	9.2
	123W - 4000K	**SB 17556L**	**SB 17564L**	9.2
	161W - 4000K	**SB 18350L**	**SB 18351L**	9.2
	88W - 5700K	**SB 15804L**	**SB 15805L**	9.2
	123W - 5700K	**SB 15806L**	**SB 15807L**	9.2
	161W - 5700K	**SB 18362L**	**SB 18363L**	9.2

DIMENSIONS

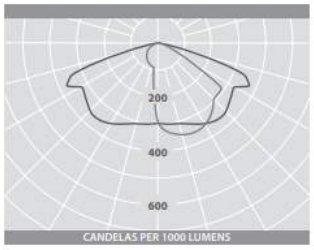


PHOTOMETRIC GUIDE



AREA DISTRIBUTION

Luminaire Lumen Output:
31W = 3500lm
62W = 6750lm
88W = 10150lm
123W = 13550lm
161W = 17250lm



ROADWAY DISTRIBUTION

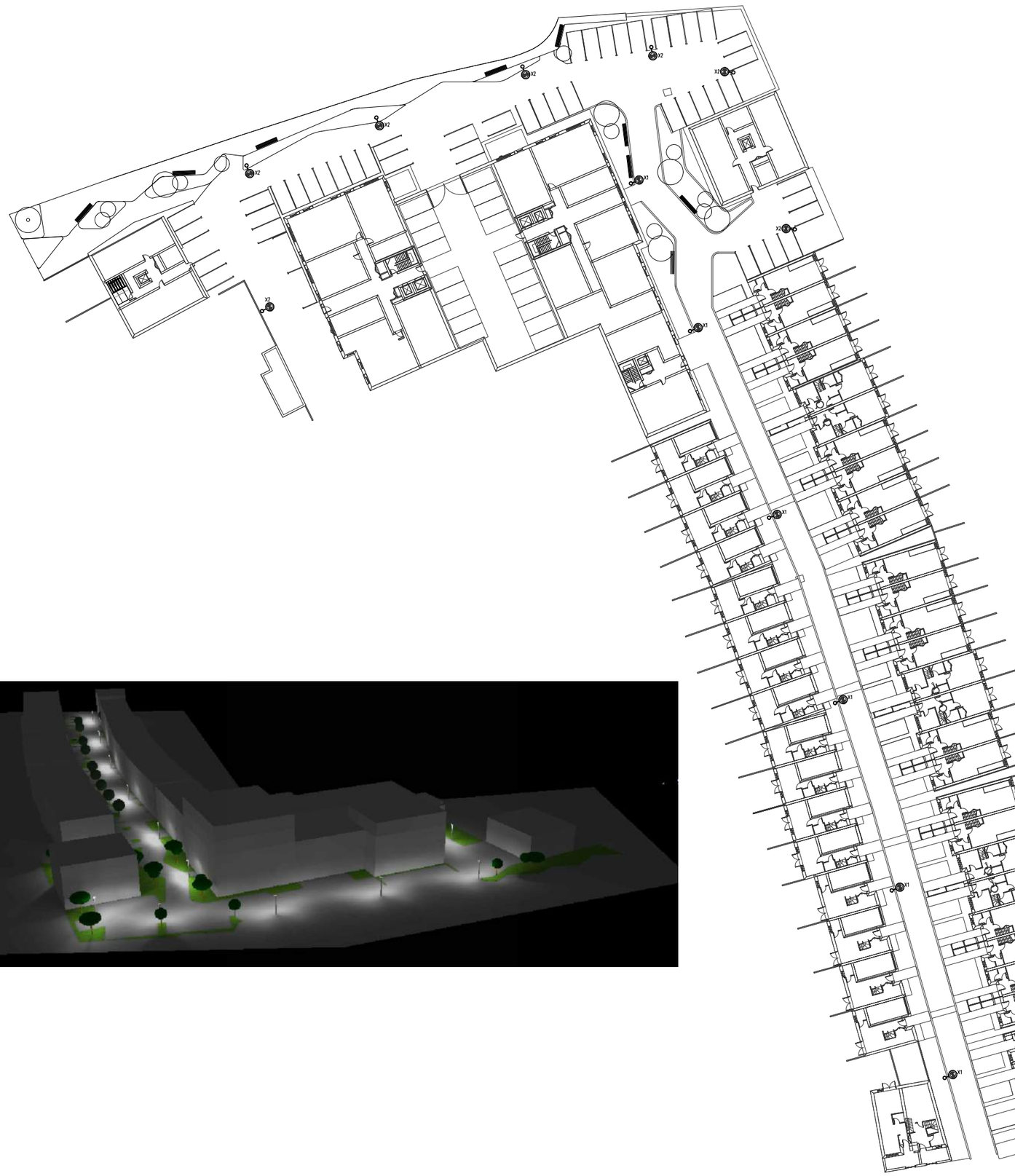
Luminaire Lumen Output:
31W = 3700lm
62W = 7100lm
88W = 10700lm
123W = 14250lm
161W = 18150lm

7.0 CONCLUSION

The results obtained from the Dialux lighting calculations indicate that the illuminance and uniformity criteria set out in section 2.0 of this report are achieved using the luminaires and lighting layout proposed. A copy of the overall lighting layout has been appended to this report.

The calculations also show that upward light spill has been kept to a minimum thanks to the optics integral to each luminaire which direct the light downwards to the areas requiring illumination. This, together with the use of modern high efficiency LED lamps will reduce the impact of the lighting installation on local biodiversity in the area.

8.0 APPENDIX A – PHASE 1 LIGHTING LAYOUT



Original drawing size A0
Original line length 50mm

THIS DRAWING HAS BEEN DEVELOPED FROM THE FOLLOWING DESIGN DRAWINGS

GREGG'S BAKERY
GREGGS BAKERY LANDSCAPE - FLOOR PLAN - FOUNDATION WP
DRAWING No. _ Rev -
EMAIL RECEIVED 5th DECEMBER 2018

THIS DRAWING REFERS TO THE FOLLOWING XREF FILES:
XR_S1v.DWG

NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH :
   THE PROJECT SPECIFIC M&E SPECIFICATIONS.
   THE PROJECT SPECIFIC DESIGNERS RISK ASSESSMENTS.

LEGEND:

X1 — THORLUX 'STARBEAM' 31W 4,000K LED LUMINAIRE C/W ROADWAY LIGHT DISTRIBUTION. MOUNTED ON 4M COLUMN

X2 — THORLUX 'STARBEAM' 31W 4,000K LED LUMINAIRE C/W AREA LIGHT DISTRIBUTION. MOUNTED ON 4M COLUMN

REV	DATE	BY	DESCRIPTION	CHK/APP
01	31.01.19	LA	FOR PLANNING	JC

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AMP House, 6th Floor
Dingwall Road
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Tel: 0208 6865583
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DRAWING STATUS	SCALE	SIZE
PLANNING	1:250	A0

CLIENT
LONDON SQUARE

ARCHITECT
ASSAEL

PROJECT
GREGGS BAKERY SITE
TWICKENHAM

TITLE
ELECTRICAL SERVICES
EXTERNAL LIGHTING LAYOUT

DRAWING NUMBER	REV.
1823-S-63-LAY-01	01