London & Regional Properties

Reserve Matters Application

Lighting Assessment

Bicester Gateway

December 2017

Executive Park, Avalon Way, Anstey, Leicester, LE7 7GR
Tel: 0116 234 8000
Email: nigel.mann@wyg.com

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Prepared by:	Nathan Allen *Environmental Consultant*	Initialled:	NA
Checked by:	Daniel Clampin *Senior Environmental Consultant*	Initialled:	DC
Verified by:	Nigel Mann *Director*	Initialled:	NM

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Bicester Gateway

Lighting Assessment

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1.0 Introduction

London and Regional Properties commissioned WYG Environment Planning Transport Limited to prepare a Lighting Assessment for a reserve matters application for a proposed hotel at Bicester Gateway, Oxford Road, Bicester.

1.1 Site Location and Context

The development site currently consists of open land off John Dixon Lane, the approximate national grid reference of which is 457355, 221194.

The proposed site is bounded by:

- Vendee Drive to the south;
- Wendlebury Road to the east;
- The A41 to the west;
- Bicester Avenue Retail Area to the north.

Reference should be made to Figure 1 for a visual representation of the application site and surrounding area.

1.2 Lighting Design and Assessment - Overview

The proposed development will require the installation of a number of luminaires that have the potential to increase existing light levels at sensitive locations within the vicinity of the site. The following stages have therefore been undertaken in order to produce a suitable lighting layout and assess potential impacts:

- Baseline survey
- Quantitative assessment of potential lighting impacts at existing light sensitive receptors bordering the proposed development site, based on the proposed external lighting design; and,
- Formulation of appropriate mitigation measures, where necessary, in order to minimise the potentially detrimental impacts of the proposed lighting scheme.

The results of the assessment are detailed in the following section of this report.

2.0 Policy, Legislation and Relevant Agencies

2.1 Documents Consulted

The following documents were consulted during the undertaking of this assessment:

- Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Professionals, 2011;
- National Planning Policy Framework, Department for Communities and Local Government, 2012;
- Planning Practice Guidance on Light Pollution, Department for Communities and Local Government, 6th March 2014, ID 31-007-20140306;
- The Conservation of Habitats and Species Regulations, 2010
- Environmental Protection Act, 1990;
- Statutory Nuisance from Insects and Artificial Light, Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005, DEFRA 2006;
- Artificial Lighting and Wildlife Interim Guidance: Recommendations to Help Minimise the Impact of Artificial Lighting, Bat Conservation Trust, 2014;
- BS EN 12464-2: Lighting of Work Places - Outdoor Work Places, British Standards Institute, 2007;
- BS EN 13201-4: Road Lighting – Methods of Measuring Lighting Performance, 2003;
- BS 5489-1: Code of Practice for the Design of Outdoor Lighting - Lighting of Roads and Public Amenity Areas, British Standards Institute, 2013;
- PLG 04- Guidance on Undertaking Environmental Lighting Impact Assessments, ILP, 2013;
- Cherwell Local Plan 2011-2031 Part 1

2.2 Legislative Framework

Light pollution was introduced within the Clean Neighbourhoods and Environment Act (2005) as a form of statutory nuisance under the Environmental Protection Act (1990), which was amended to include the following definition:

"(fb) artificial light emitted from premises so as to be prejudicial to health or nuisance;"

Although light was described as a statutory nuisance, no prescriptive limits or rules have been set for assessment. Guidance within the National Planning Policy Guidance with regards to Light pollution has been referred to while producing this assessment as well as documents produced by the International Commission on Illumination (CIE), Institution of Lighting Professionals (ILP) and the Chartered Institute of Building Services Engineers (CIBSE).

2.3 Planning Policy and Guidance

2.3.1 National Policy

The National Planning Policy Framework (NPPF) principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF broadly retains the principles of PPS 23: Planning and Pollution Control and with regard to light pollution, states that:

> *'By encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'*

The national Planning Practice Guidance web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 to support the National Planning Policy Framework and make it more accessible. It states that "for maximum benefit, the best use of artificial light is about getting the right light, in the right place and providing light at the right time". In light of this guidance, the assessment has considered the following implications of the proposed lighting design:

- *Does a new development proposal, or a major change to an existing one, materially alter light levels outside the development and/or have the potential to adversely affect the use or enjoyment of nearby buildings or open spaces?*
- *Does an existing lighting installation make the proposed location for a development unsuitable? For example, this might be because:*
    - *the artificial light has a significant effect on the locality;*
    - *users of the proposed development (e.g. a hospital) may be particularly sensitive to light intrusion from the existing light source.*
- *Does a proposal have a significant impact on a protected site or species e.g. located on, or adjacent to, a designated European site or where there are designated European protected species that may be affected?*

- *Is the development in a protected area of dark sky or an intrinsically dark landscape where it may be desirable to minimise new light sources?*
- *Are forms of artificial light with a potentially high impact on wildlife (e.g. white or ultraviolet light) being proposed close to sensitive wildlife receptors or areas, including where the light shines on water?*
- *Does the proposed development include smooth, reflective building materials, including large horizontal expanses of glass, particularly near water bodies (because it may change natural light, creating polarised light pollution that can affect wildlife behaviour)?*

If the answer to any of the above questions is 'yes', consideration should be made for:

- where the light shines;
- when the light shines;
- how much light shines; and
- possible ecological impact.

2.3.2 Local Policy

Following a review of the Cherwell Local Plan 2011-2031 Part 1, the following policy was identified as being relevant to the assessment of lighting impacts:

Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment.

Policy ESD 13: Local Landscape Protection and Enhancement –

Policy ESD 15: The Character of the Built and Historic Environment

> *"New development proposals should:*
>
> *… Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

3.0 Methodology

The Lighting Assessment includes an evaluation of impacts associated with the proposed lighting design. This includes an assessment of change in light obtrusion at existing receptor locations.

Light modelling was undertaken using DIALux software, an independent lighting model which is capable of calculating daylight and artificial lighting scenes in interior and exterior scenarios. The model incorporates ILP, CIE 112 and BS EN 12464-2 calculation methodologies and is commonly used for lighting impact assessment.

3.1 Lighting Design

The proposed lighting scheme for the proposed development was designed in accordance with the previously outlined standards and guidance. The design of the lighting has been undertaken in a manner such as to address three potentially conflicting needs; namely, on the one hand, to provide a safe environment for the movement of both staff and guests and to adequately light the site and, on the other hand, to meet the light obtrusion limitations stated within the relevant standards and guidance in order to avoid any detriment to local amenity and wildlife.

3.2 Quantitative Lighting Assessment

3.2.1 Obtrusive Light

The ILP has developed an Environmental Zone classification system for the categorisation of sensitive receptor locations based on typical levels of baseline obtrusive light. This is summarised in Table 1.

Table 1. Environmental Zone Classification

Category	Description	Examples
E0	Dark landscapes	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Intrinsically dark landscapes	National Parks, Areas of Outstanding National Beauty, etc
E2	Low district brightness areas	Village or relatively dark outer suburban urban locations
E3	Medium district brightness	Small town centres or suburban locations
E4	High district brightness areas	Town/city centres with high levels of night-time activity

For each Environmental Zone, recommended obtrusive light limits for exterior lighting installations have also been determined. These are summarised in Table 2.

Table 2. Obtrusive Light Limitations for Exterior Lighting Installations

Environmental Zone	Max Sky Glow ULR[a] (%)	Light Trespass (into Windows) Ev (lx)[b]		Source Intensity I (kcd)		Building Luminance Pre-curfew
		Pre-curfew[d]	Post-curfew[e]	Pre-curfew[d]	Post-curfew[e]	Average L[c] (Cd.m^{-2})
E0	0	0	0	0	0	0
E1	0	2	1(*)	2.5	0	0
E2	2.5	5	1	7.5	0.5	5
E3	5.0	10	2	10	1.0	10
E4	15.0	25	5	25	2.5	25

NOTE:
(a) Upward light ratio of the installation - maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.
(b) Vertical Illuminance measured flat at the glazing at the centre of the window.
(c) Luminance.
(d) Typically considered to be between 07:00 and 23:00
(e) Typically considered to be between 23:00 and 07:00
(*) Permitted only from public road light installations

Modelling of the lighting scheme was undertaken and predicted obtrusive light values compared with the relevant guidelines, as detailed within Table 2. The potential environmental effects of the proposed development are identified, in so far as current knowledge of the site and development allows. The significance of potential environmental effects is assessed according to their scale (magnitude) and the sensitivity of the receptors.

For the purposes of this assessment the effects of the development are considered to be 'significant' if:

- The development is predicted to exceed the maximum sky glow ULR at any surrounding receptor; or
- The development is predicted to cause either an exceedance of the ILP obtrusive light trespass limitation at a receptor.

4.0 Baseline

This section provides a review of the existing lighting levels at the site in order to provide a benchmark against which to assess potential impacts associated with the development.

4.1 Baseline Survey

4.1.1 Survey Conditions

A baseline lighting survey was undertaken on the 28th November 2017. An initial survey was undertaken between 19:30 hours and 22:30 hours to establish the existing pre-curfew lighting conditions.

The survey was conducted using a Digital Lux Meter which meets CIE photopic spectral response, with a maximum resolution of 0.01 lux. The survey was undertaken with a meter resolution of 0.01 lux.

4.1.2 Existing Light Sources

The main sources of light surrounding the site include street lighting on the roundabout to the west and lighting from the park and ride to the south of the site.

4.1.3 Survey Locations

Light monitoring was undertaken at a number of survey locations to determine variations in baseline light levels within the site. Reference should be made to Figure 2 for an illustrative site map of the monitoring locations.

The purpose of the survey is fourfold:

- The survey enables quantified light levels at (or as near as possible to) local sensitive receptor locations to be measured;
- The site survey also provides an understanding of any significant landforms and vegetation that can potentially provide a pathway screen between light sources and receptors;
- The survey enables the ILP environmental zone to be determined based on sound, quantified evidence; and,
- The survey enables existing significant sources of artificial light and natural screens to be accounted for outside of the quantified model predictions.

The survey therefore provides a robust understanding of the current artificial lighting illuminance levels currently experienced on the development site. The locations of all the light monitoring locations are

summarised in Table 3 below and the results from the survey are contained in Table 4.

A series of measurements were taken at key points; a horizontal ground level measurement and four vertical measurements at 1.5m facing north east, south and west in general accordance with the recommended monitoring method in the statutory guidance issued by the ILP. Illuminance levels at a resolution of 0.01 lux can vary quite significantly over relatively small distances and even with slight changes in the plane of the lens. Therefore, the range of measurements taken over a monitoring length was recorded, in order to determine minimum and maximum illuminance at receptor façades.

Table 3. Baseline Light Monitoring Locations

Reference	Monitoring Location	Key Local Sources of Light
L1	South west boundary of the site	Street Lighting from the adjacent roundabout
L2	Western Boundary of the site	Street Lighting from the adjacent roundabout
L3	North west boundary of the site	No Key Local sources of light
L4	North east boundary of the site	Lighting from Bicester Avenue Retail Park
L5	Eastern boundary of the site	No Key Local sources of light
L6	South eastern boundary of the site	Street Lighting from the adjacent roundabout and Park and Ride
L7	Southern boundary of the site	Street Lighting from the adjacent roundabout and Park and Ride

4.1.4 Survey Results

The results of the monitoring are displayed in Table 4.

Table 4. Light Monitoring Results-

Reference	Recorded Illuminance (Lux)				
	Facing Up	Facing North	Facing East	Facing South	Facing West
L1	0.18	0.02	0.04	0.09	0.18
L2	0.05	0.01	0.02	0.04	0.09
L3	0.01	0.02	0.00	0.01	0.02
L4	0.00	0.01	0.00	0.02	0.01
L5	0.02	0.02	0.01	0.01	0.00
L6	0.04	0.01	0.03	0.02	0.00
L7	0.09	0.03	0.02	0.01	0.09

Following the environmental lighting survey, it was concluded that as the development is in a suburban location, relatively close to the town centre in a well-lit area, the proposed development site should be classified as '**Environmental Zone E2** – Medium district brightness area , in accordance with the ILP guidance limits outlined within Table 2. Therefore, the worst case permitted light trespass limit at an offsite receptor in the pre-curfew period (typically considered to be 07:00-23:00) is **5 lux** and in the post curfew period (typically considered to be 23:00-07:00) is **1 lux**

4.2 Receptors

The term 'receptors' includes any persons, locations or systems that may be susceptible to changes in environmental factors as a consequence of the development.

4.2.1 Residential Receptors

There are no existing residential properties within 150m of the low level lights used within this assessment therefore residential receptors have been scoped out of this assessment.

4.2.2 Ecological Receptors

Lighting associated with the operational phase of the proposed development has the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation (Natural Habitats, &c.) Regulations (1994) and subsequent amendments require competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Areas of Conservation).

Following consultation with WYG Ecology, it was determined that there was a risk for a number of bat species to utilise the retained hedgerow to the east of the site for commuting/foraging purposes. In order to represent worst case scenario, the assessment has assumed that potential bat species on site will be highly sensitive to artificial light.

For the purposes of the assessment, ecological receptor locations have been included at a number of points along the length the hedgerow line to the east of the proposed site, at heights of 3m. Table 5 below provides a reference for these locations whilst a full spatial illustration of modelled ecological receptors is included in Figure 3.

Table 5. Ecological Receptors

ID	Description
Eco 1	Eastern boundary
Eco 2	Eastern boundary
Eco 3	Eastern boundary
Eco 4	Eastern boundary
Eco 5	Eastern boundary
Eco 6	Eastern boundary
Eco 7	Eastern boundary
Eco 8	Eastern boundary
Eco 9	Eastern boundary

5.0 Lighting Assessment

Potential impacts associated with the proposed lighting design at locations in the vicinity of the site were assessed as described in the following sections.

5.1 Obtrusive Light Modelling

A proposed lighting design detailed in Appendix A was used to develop a model within DIALux of the proposed development. Reference should be made to Figure 4 for a 3D representation of the proposed model.

The model is only able to accurately represent the effects of solid structures such as buildings and walls on light obtrusion. Non solid barriers such as trees and hedges cannot be accurately modelled and therefore the effects of these are dealt with qualitatively outside the model calculations.

The assessment has looked at the effect of the proposed residential development in the pre-curfew and post-curfew periods. Both scenarios are based on the lighting scheme associated with the proposed development being turned on.

The ULR of the proposed development has been calculated and referenced to the maximum permitted limitations for the relevant Environmental Zones of the receptor locations, as detailed in Table 2.

5.1.1 Model Results

Ecological Receptors

When determining the likely impacts of lighting associated with the proposed development on sensitive ecological receptors, the assessment has considered the effect of lighting pre-mitigation. Table 6 presents the modelled proposed light trespass values along sections of potential bat commuting/foraging routes. Impacts are considered potentially significant where predicted illuminance exceeds 1 lux at ecological receptors. If this is the case, further consideration should be given to mitigation measures.

While some bat species, such as Pipistrelle are more tolerant with light levels above this criterion, it reflects worst case assumptions concerning the sensitivity of those species present to background illuminance levels. It is believed that most bat emergence requires light levels below 1 lux for late emerging species, up to 14 lux for those that emerge earlier (Noctule and Pipistrelle). These lighting levels of 1 lux are required to ensure that bat commuting and foraging routes are not impacted and that dark corridors to the south of the site are retained.

As such, the assessment criteria represents worst case scenario in terms of impacts on emergence, commuting and foraging (Bat Conservation Trust, 2011).

Table 6 Ecological Receptor Assessment Results

ID	Predicted Model Illuminance
Eco 1	0.71
Eco 2	0.57
Eco 3	0.89
Eco 4	0.95
Eco 5	0.88
Eco 6	0.95
Eco 7	0.74
Eco 8	0.63
Eco 9	0.71

As illustrated by Table 6, light trespass associated with the proposed development does not exceed 1 lux at any of the modelled locations adjacent to the site boundary. As such the proposed development is not predicted to result in any significant adverse impacts with respect to local sensitive ecological receptors along the site boundary features

5.1.2 Dark Sky Assessment

The model has been used to calculate the predicted Upward Light Ratio (ULR) of the proposed external lighting scheme. Model outputs predict a sky glow figure (ULR) of 2%. As illustrated in Table 2, the ILP sky glow limitation for an area classified as Environmental Zone E3 is 2.5% ULR. As such the proposed lighting scheme meets the ILP sky glow limitations and is therefore not considered to result in detrimental impacts on the dark sky landscape.

6.0 Conclusions

London and Regional Properties commissioned WYG Environment Planning Transport Limited to prepare a Lighting Assessment for a reserve matters application for a proposed hotel at Bicester Gateway, Oxford Road, Bicester.

The risk of the proposed development resulting in significant exceedances of 1 lux along potential bat foraging/commuting routes is considered to be low. As such, dark corridors beyond the limits of the site are expected to be retained.

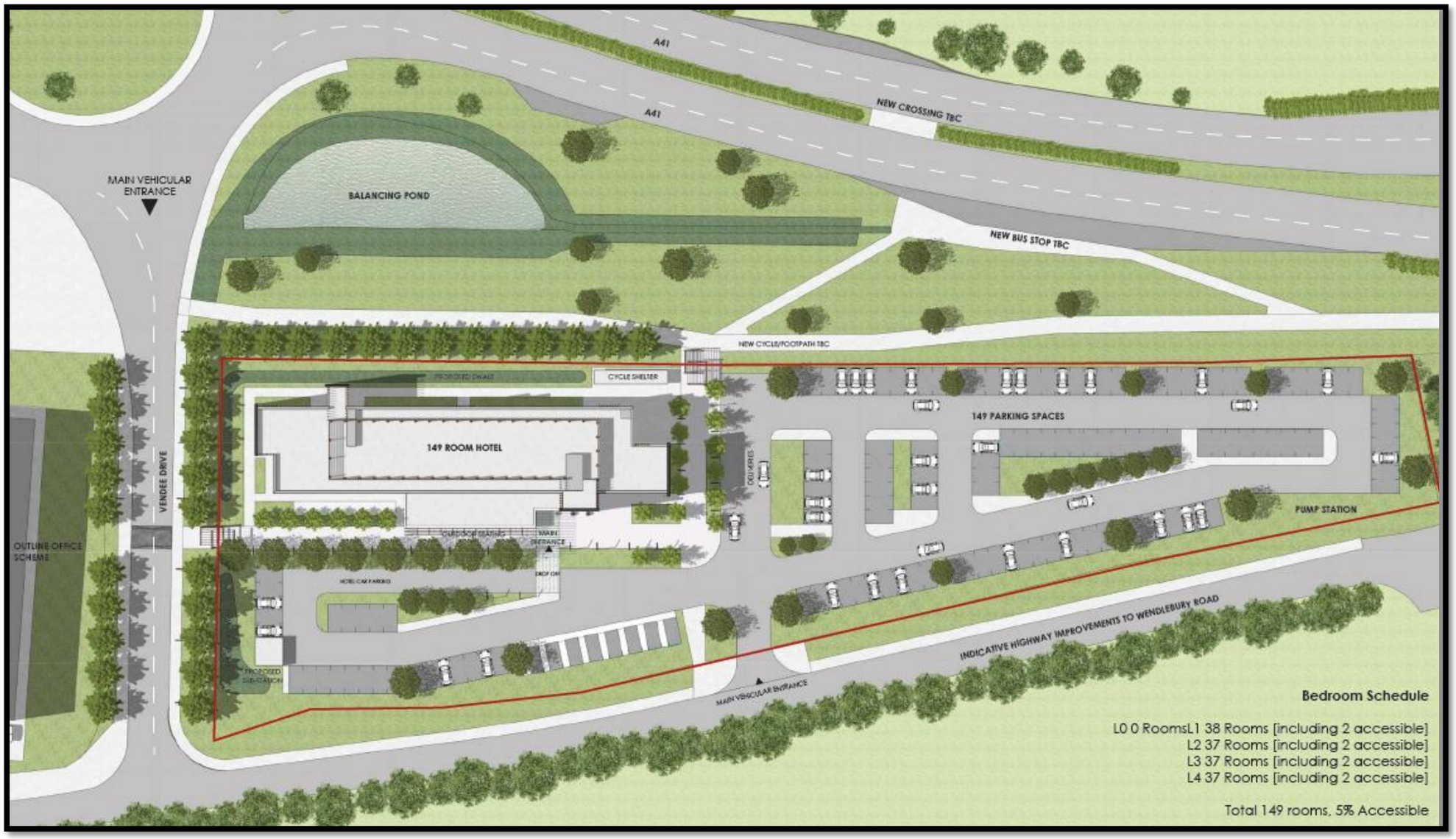
The assessment has concluded that, provided the specified lighting design is implemented, the sky glow levels associated with the development will not have a significant effect on the surrounding dark sky landscape.

The assessment demonstrates that the proposed development does not conflict with any national or local planning policies.

Units and Abbreviations Used

CIBSE	Chartered Institute of Building Services Engineers
CIE	Commission on Illumination
ILP	Institution of Lighting Professionals
LDF	Local Development Framework
LP	Local Plan
CS	Core Strategy
DPD	Adopted Development Plan Documents
SPD	Adopted Supplementary Planning Documents
SG	Endorsed Supplementary Guidance Documents
NGR	National Grid Reference
PPS	Planning Policy Statement
NPPF	National Planning Policy Framework
Lx	Lux
ULR	Upward Lighting Ratio
WYG	WYG Planning and Environment

Figures



Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Bicester Gateway

Client:

London and Regional Properties

Drawing Title:

Figure 1: Site Boundary

creative minds safe hands

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NA	DC	05.12.17	A

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Bicester Gateway

Client:

London and Regional Properties

Drawing Title:

Figure 2: Monitoring Locations

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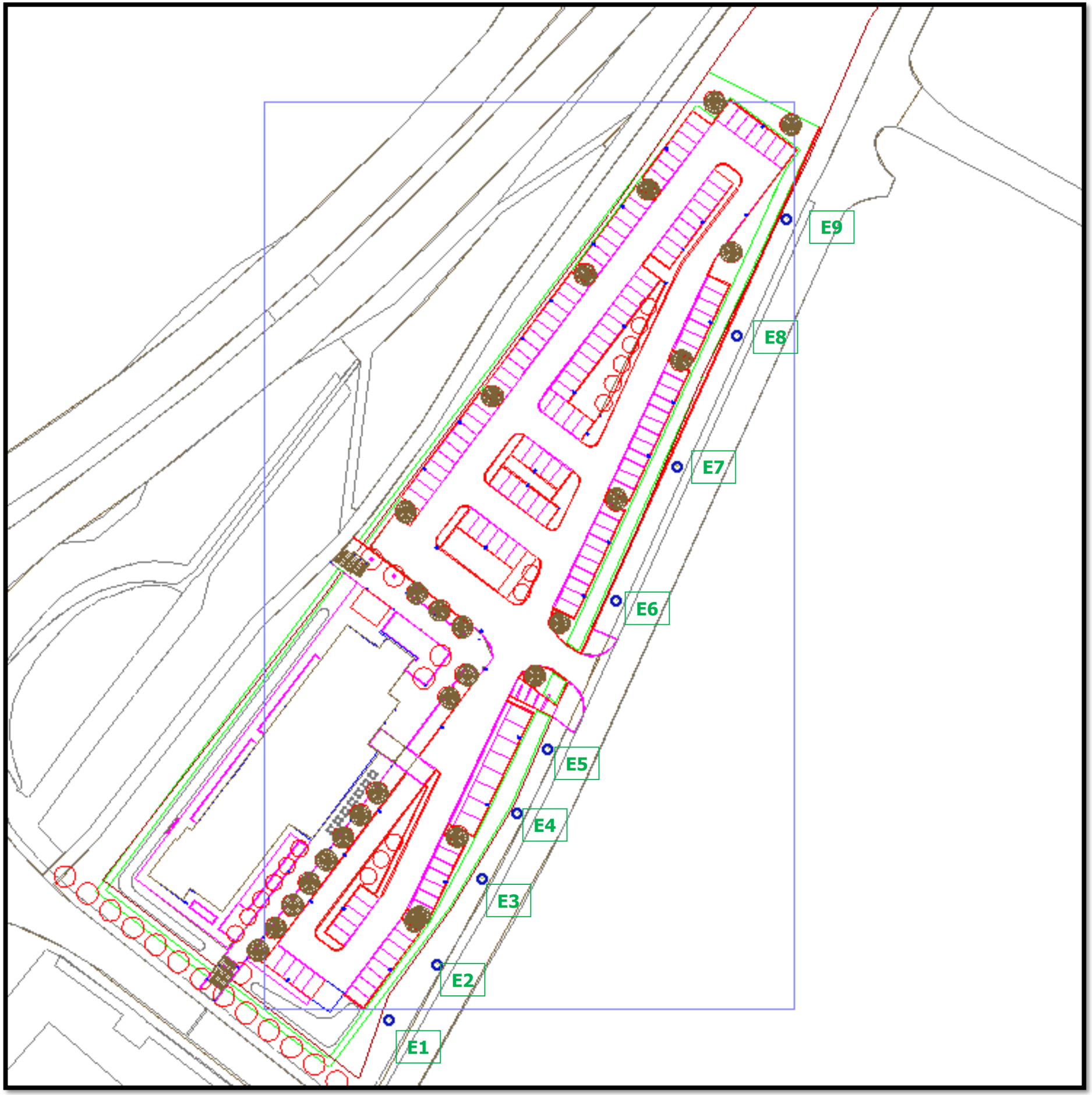

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Bicester Gateway

Client:

London and Regional Properties

Drawing Title:

Figure 3: Existing Ecological and Glare Receptors

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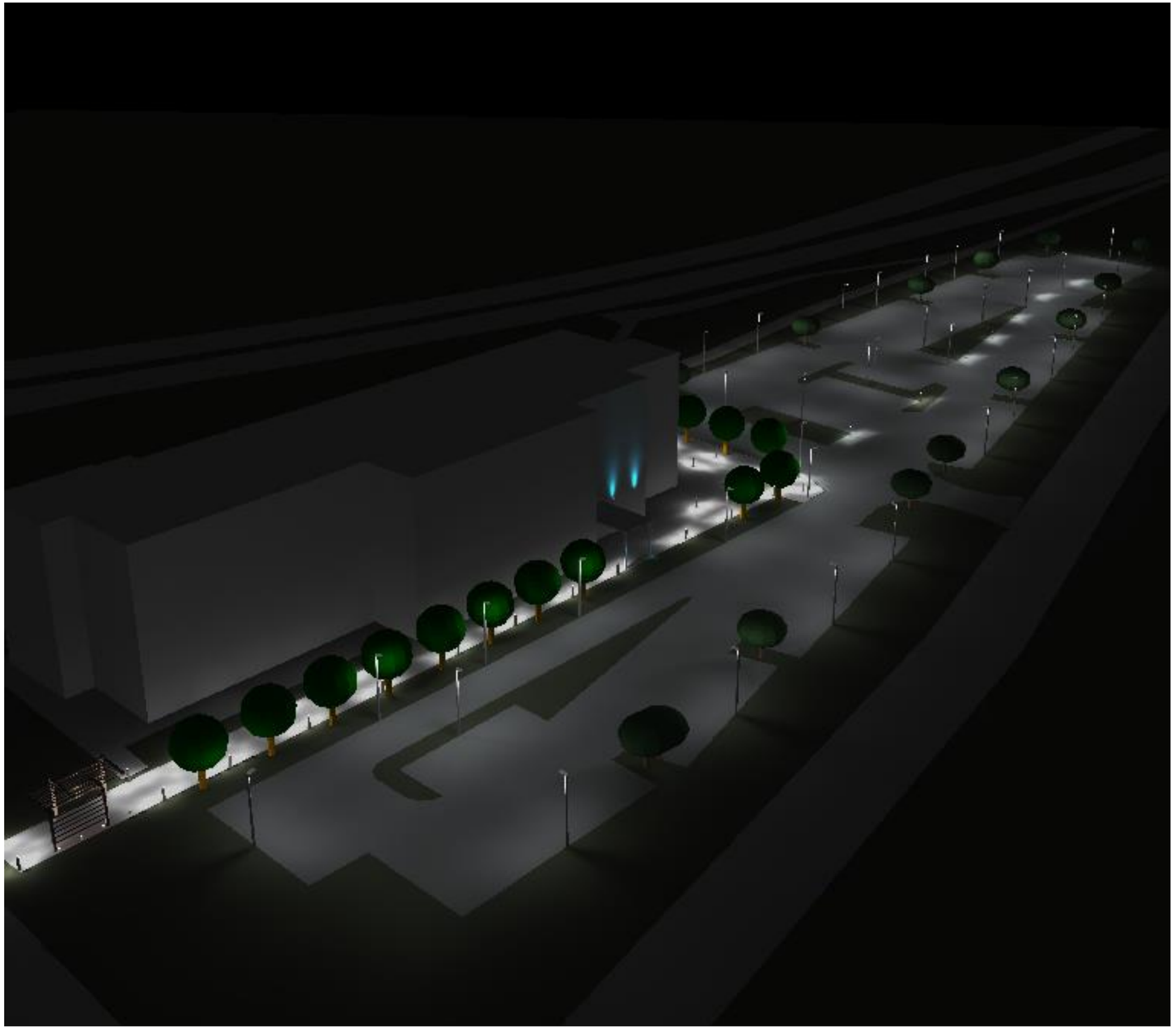

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Bicester Gateway

Client:

London and Regional Properties

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Figure 4: 3D Representation of Proposed Model

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NA	DC	05.12.17	A

Appendix A Lighting Layout and Contour Plots

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

N

1	Thorn 96231435 CESAR 1 CIRC 1X3L35 10D 760 [STD] (257 lm; 3.0 W)
2	Thorn 96257239 D-CO R LED MAXI 6L50 840 CL [STD] (608 lm; 12.0 W)
3	Thorn 96263224 CONTRAST 2 LED M 12L105 R/S 24° 840 [STD] (2829 lm; 43.0 W)
4	Thorn 96264232 THOR B S 10L25 730 RGB ASY CL1 MPL [STD] (739 lm; 11.0 W)
5	Thorn 96268396 R2L2 S 12L35 EWSC 740 CL1 [STD] (1670 lm; 15.0 W)

Isolines

- 0.1 lx
- 0.2 lx
- 0.5 lx
- 1.0 lx
- 2.0 lx
- 5.0 lx

REV	DESCRIPTION	BY	CHK	APP	DATE

London and Regional Properties

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

Bicester Gateway

Drawing Title:

PROPOSED LIGHTING LAYOUT

Scale @ A2	Drawn	Date	Checked	Date	Approved	Date
1:500	NA	14.12.17	DC	14.12.17	NM	14.12.17

Project No.	Office	Type	Drawing No.	Revision
A103271	35	34	001	3

2017 11:42:09

Cesar

96231435 CESAR 1 CIRC 1X3L35 10D 760

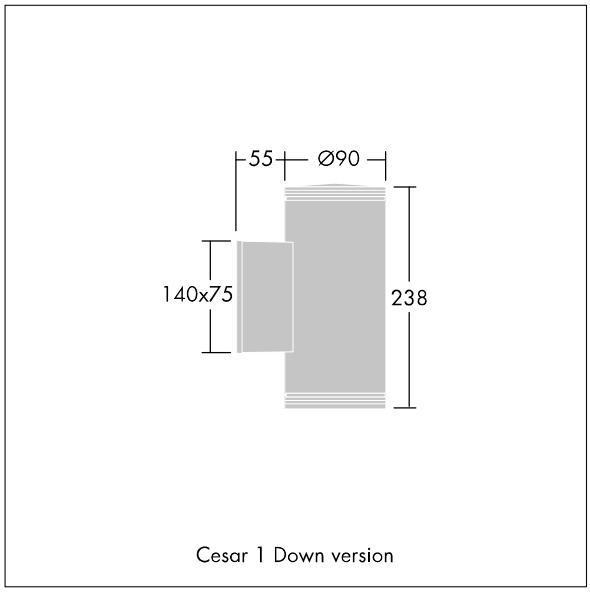
LED 3W LED_257	IP65	IK08		CE

Cesar's simple, cylindrical style, available in four sizes, offers a choice of adjustable light sources and superior highlighting

A robust, wall-mounted downlight with 1 x 3W white LED_257s. The grey aluminium body, with integral gear and sealed to IP65, offers an aesthetic design both by day and by night.

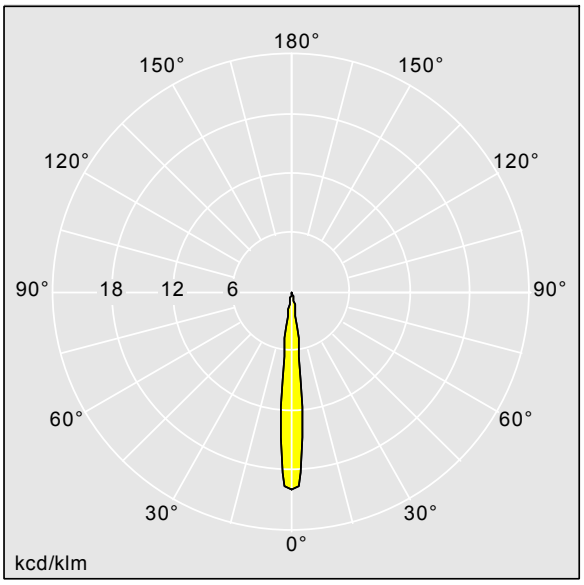
Dimensions: 145 x 235 x 90 mm
Total power: 3 W
Weight: 1.72 kg

TLG_CESA_F_LED1.jpg



Cesar 1 Down version

TLG_CESA_M_LD1D.wmf



TLLA_C1CIH0_DC.ldt

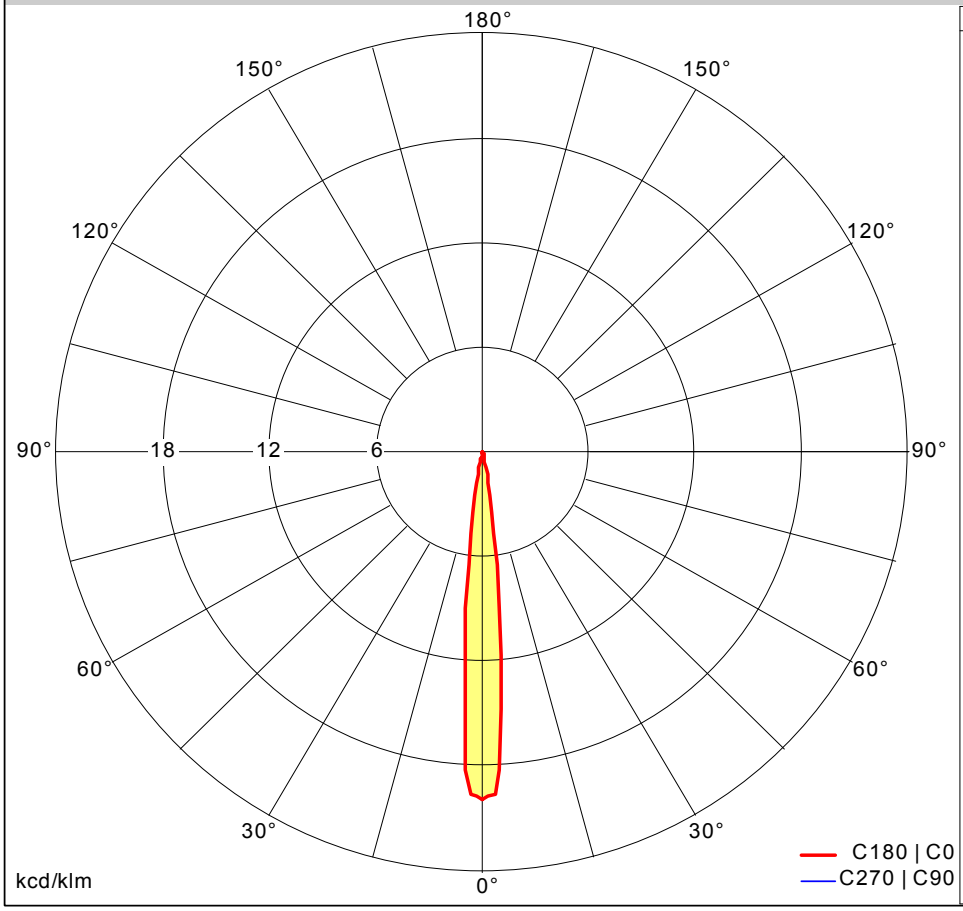
Lamp position: STD - standard
Light Source: LED
Luminaire luminous flux*: 257 lm
Luminaire efficacy*: 86 lm/W

Lamp efficacy: 86 lm/W
Ballast: 1x LED_Con
Luminaire input power*: 3 W
LOR: 1,01 ULOR: 0,00 DLOR: 1,01

All values marked with an * are rated values. Thorn uses tried and tested components from leading suppliers, however there may be isolated instances of technology-related failures of individual LEDs during the rated product lifetime. International standards set the tolerance in initial flux and connected load at ±10%. Colour temperature is subject to a tolerance of up to +/-150 Kelvin from the nominal value. Unless stated otherwise, the values apply to an ambient temperature of 25°C.
In most products the failure of one LED point causes no functional impairment to the lighting performance of the luminaire and is therefore no reason for complaint. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1).

Cesar

96231435 CESAR 1 CIRC 1X3L35 10D 760



	C0	C90	C180	C270
0°	19828	19828	19828	19828
5°	11665	11665	11665	11665
10°	2521	2521	2521	2521
15°	339	339	339	339
20°	70	70	70	70
25°	47	47	47	47
30°	27	27	27	27
35°	23	23	23	23
40°	20	20	20	20
45°	16	16	16	16
50°	8	8	8	8
55°	4	4	4	4
60°	4	4	4	4
65°	0	0	0	0
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90°	0	0	0	0
95°	0	0	0	0
100°	0	0	0	0
105°	0	0	0	0
110°	0	0	0	0
115°	0	0	0	0
120°	0	0	0	0
125°	0	0	0	0
130°	0	0	0	0
135°	0	0	0	0
140°	0	0	0	0
145°	0	0	0	0
150°	0	0	0	0
155°	0	0	0	0
160°	0	0	0	0
165°	0	0	0	0
170°	0	0	0	0
175°	0	0	0	0
180°	0	0	0	0

Light output ratio

LOR	101 %
ULOR	0 %
DLOR	101 %
FFR	0.00 (0:100)
BLF	1.00

Glare Evaluation

X = 4 H, Y = 8 H	S = 1.00 H
Reflection factors	70/50/20
UGR transversal	<13
UGR axial	<13

Classification

LiTG	A80
EN	55°<1000cd/m² 65°<1000cd/m²
BZ	BZ1
UTE	
CIE Flux Codes	99 100 100 100 100

Utilization Factors

Room Reflectance Ceiling/Walls/Floor	Room Index 0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00	5.00
70 / 50 / 20	106	106	108	109	110	111	112	113	114
70 / 30 / 20	102	104	105	106	108	109	110	112	113
70 / 10 / 20	101	102	104	105	107	108	109	111	112
50 / 50 / 20	104	105	106	106	108	108	109	109	110
50 / 30 / 20	102	103	104	105	106	107	107	108	109
50 / 10 / 20	100	101	102	103	105	106	106	108	108
30 / 50 / 20	103	103	104	104	105	105	106	106	106
30 / 30 / 20	101	102	103	103	104	104	105	105	106
30 / 10 / 20	100	101	101	102	103	103	104	105	105
0 / 0 / 0	99	99	99	100	100	100	100	100	100

According to CIBSE Technical Memorandum No. 5 1980

SHR Nom = NA
SHR Max = NA
SHR Max TR = NA

Photometric data file: TLLA_C1CIH0_DC.ldt

D-CO LED Recessed

96257239 D-CO R LED MAXI 6L50 840 CL

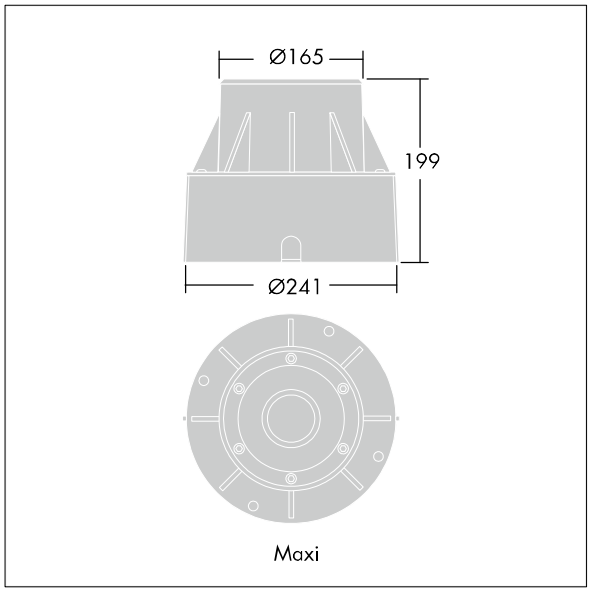
LED 12W LED_D-CO_606	IP67	IK10	⏚	CE	

D-CO LED Recessed

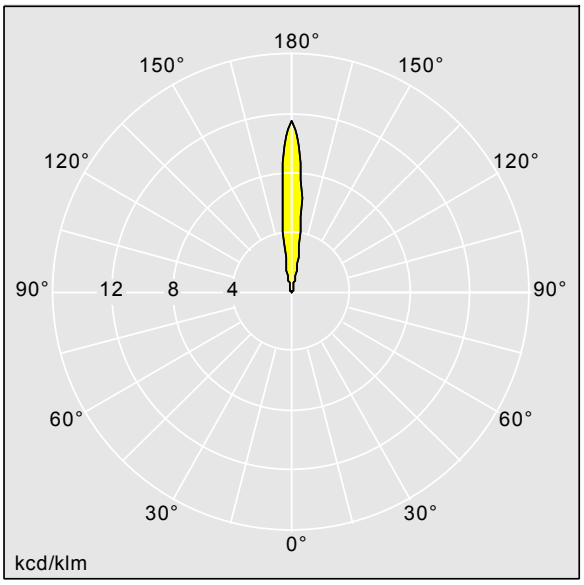
A large size, ground recessed luminaire with 6 x 1.2W white LEDs for indoor or outdoor applications. Body in aluminium with ABS plastic recessed housing. Front glass, toughened with clear finish, stainless steel frame. Static load bearing 500kg. Complete with 5m cable.

Dimensions: Ø241 x 199 mm
Total power: 12 W
Weight: 3 kg

TLG_DCOL_F_LEDMAXIANGL.jpg



TLG_DCOL_M_ODL-165GZ.wmf



TLG_LA_DCOM2N_DC.ldt

Lamp position: STD - standard
Light Source: LED
Luminaire luminous flux*: 608 lm
Luminaire efficacy*: 51 lm/W
Lamp efficacy: 51 lm/W

Correlated colour temperature*: 4000 Kelvin
Rated median useful life*:
50000h at 25°C
Ballast: 1x LED_Con
Luminaire input power*: 12 W
LOR: 1,00 ULOR: 1,00 DLOR: 0,00

All values marked with an * are rated values. Thorn uses tried and tested components from leading suppliers, however there may be isolated instances of technology-related failures of individual LEDs during the rated product lifetime. International standards set the tolerance in initial flux and connected load at ±10%. Colour temperature is subject to a tolerance of up to +/-150 Kelvin from the nominal value. Unless stated otherwise, the values apply to an ambient temperature of 25°C.
In most products the failure of one LED point causes no functional impairment to the lighting performance of the luminaire and is therefore no reason for complaint. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1).

Contrast 2 LED

96261333 CONTRAST 2 LED M 12L105 R/S 24° 830

LED LED 43W CON2_CM31MS	IP66	IK08	☐	CE

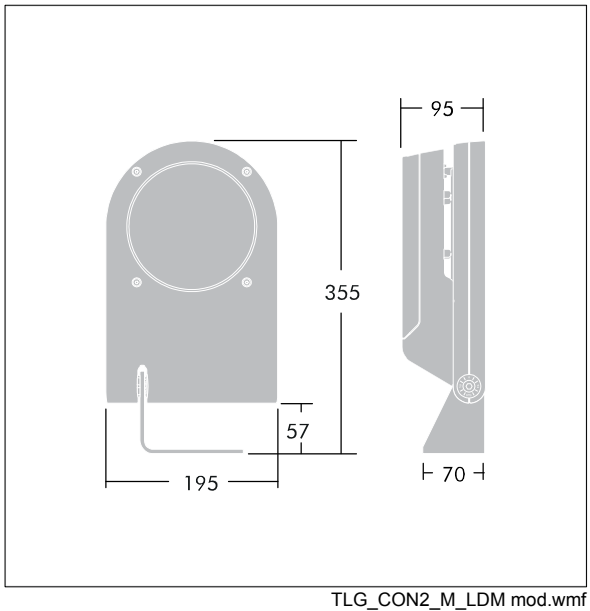
Contrast 2 LED

A compact architectural LED floodlight with 24° light distribution. Class II electrical, IP66, IK08. Body and Frame: aluminium die casting alloy, sanded silver grey 150. Glass: tempered 4mm thick. Gasket: EPDM. Complete with 3000K LED

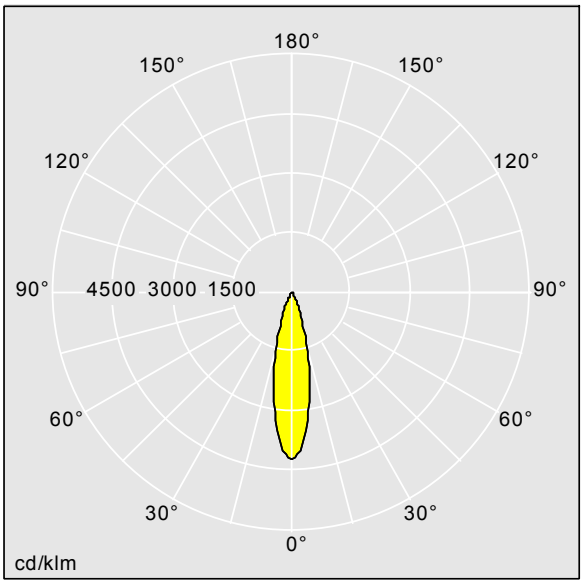
With integral power supply.

Dimensions: 355 x 195 x 95 mm
Total power: 43 W
Weight: 3.91 kg

TLG_CONL_F_M26X26PDB.jpg



TLG_CON2_M_LDM mod.wmf



TLLA_CM31MS_33_DC.ldt

Lamp position: STD - standard
Light Source: LED
Luminaire luminous flux*: 2635 lm
Luminaire efficacy*: 61 lm/W
LOR: 1,00 ULOR: 0,00 DLOR: 1,00

Lamp efficacy: 61 lm/W
Correlated colour temperature*: 3000 Kelvin
Rated median useful life*:
50000h L90 at 25°C
Luminaire input power*: 43 W Lambda = 0.95

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Thor Bollard

96264232 THOR B S 10L25 730 RGB ASY CL1 MPL

LED 11W ADLB_S_10L25_ASY_3K	IP66	IK10	⏚	CE	T_a25	

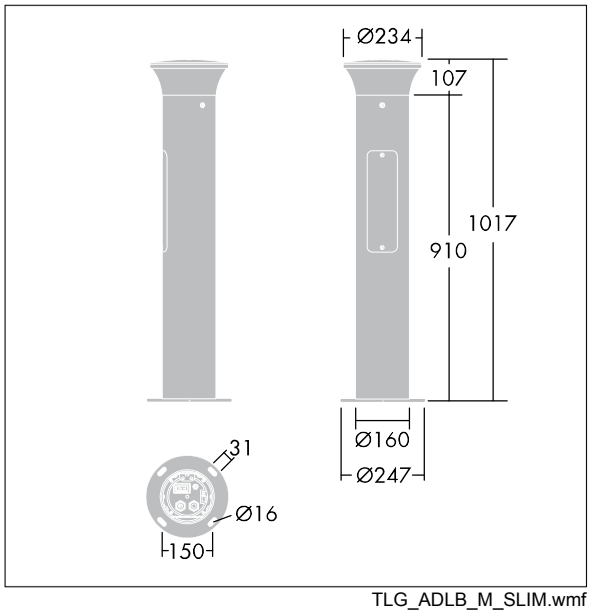
Thor Bollard

An elegant vandal resistant asymmetrical slim bollard with high performance optic. For Electronic, fixed output control gear. IP66 Electrical Class I. Column and Base: aluminium (EW AW 6060). Canopy: die-cast aluminium (EN AC 47100). Diffuser: Clear anti UV polycarbonate. Gear Box: polycarbonate. Canopy and Column colour: powder coated dark grey (close to RAL7043). RGB decorative lit band at the base of the head to be easily set at installation. Ready to install prewired luminaire. Connection box required, to be ordered separately. Complete with 3000K LED

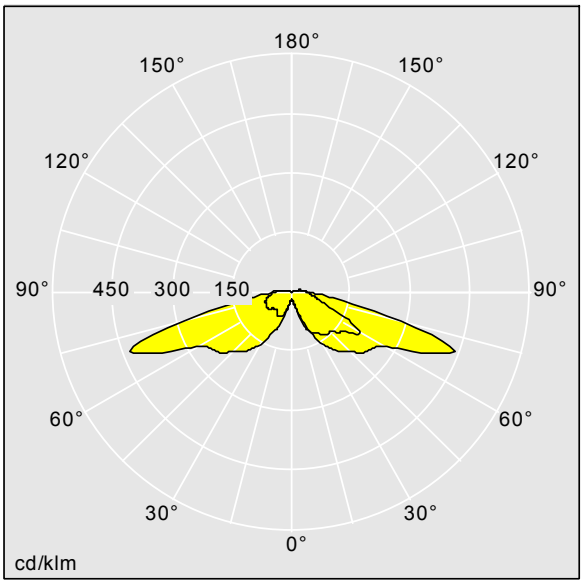
Flange mounting: 4 x anchor bolts M14 (to be ordered separately), spacing: 150mm

Dimensions: 160 x 160 x 1017 mm
Total power: 11 W
Weight: 7.66 kg

TLG_ADLB_F_SLIMR.jpg



TLG_ADLB_M_SLIM.wmf



TLLA_ADBS10L25ASY3KG32_DC.ldt

Lamp position: STD - standard
Light Source: LED
Luminaire luminous flux*: 739 lm
Luminaire efficacy*: 67 lm/W
Lamp efficacy: 67 lm/W
Colour Rendering Index min.: 70
LOR: 1,00 ULOR: 0,07 DLOR: 0,93

Correlated colour temperature*: 3000 Kelvin
Chromaticity tolerance (initial MacAdam)*: 5
Rated useful life (B10)*:
100000h L90 at 25°C
Ballast: 1x EL2
Luminaire input power*: 11 W
Dimming: TLD0

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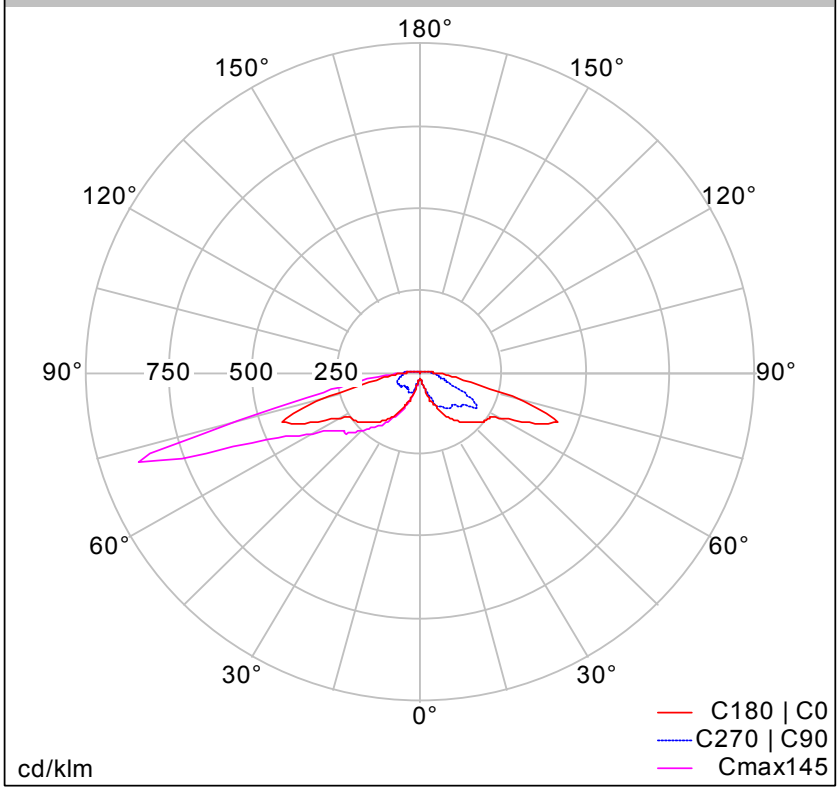
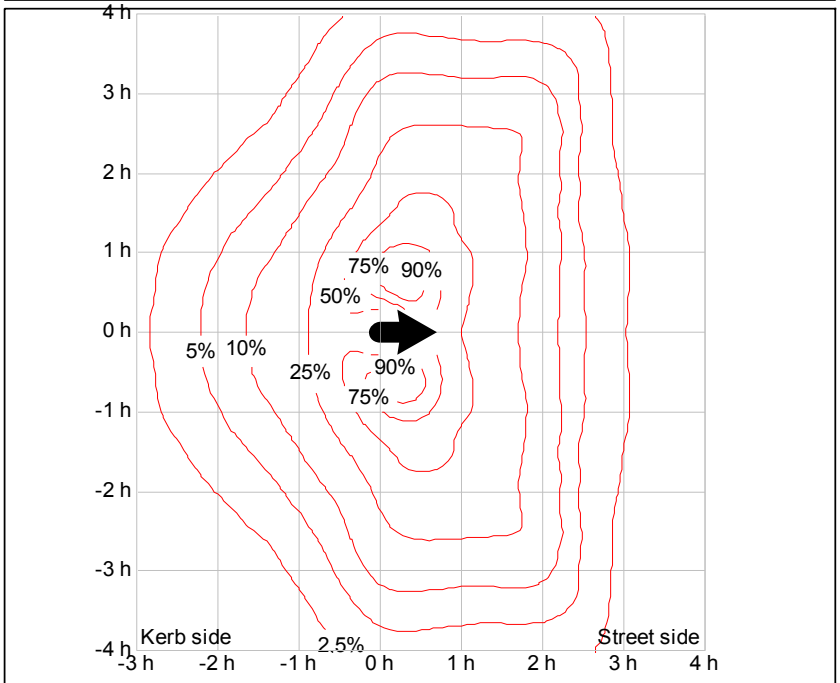
Thor Bollard

96264232 THOR B S 10L25 730 RGB ASY CL1 MPL



Measurement	ADBS10L25ASY3KG32
Catalogue number	ADELIE B S 10L25 730 ASY MGR
Lamps	1 x LED
Lamp adjustment	
IP	

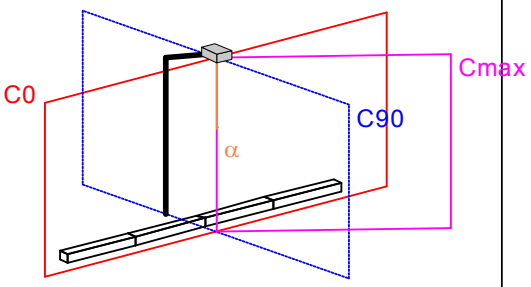


$$E\ (lux) = \frac{Emax \times E\% \times F}{h^2 \times 1000}$$

Emax = 102,0 / m / klm
luminous flux for the chosen lamp (lm)
Mounting height (m)

Luminaire design attitude

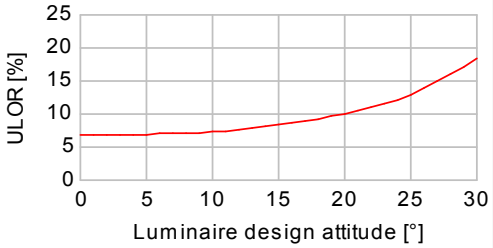
Tilt: α = 0.0 °



Maximum intensity	
Imax	880 cd/klm
Cmax	145 °
γ max	72 °
Light Output Ratio	
Luminaire design attitude	0.0 °
LOR	100.00
ULOR	7.00
DLOR	93.00

Upward light output ratio

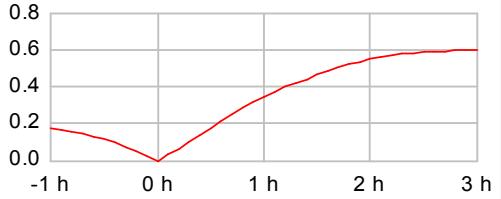
3% for a tilt = N/A	5% for a tilt = N/A
10% for a tilt = 20°	15% for a tilt = 27°
20% for a tilt = 31°	25% for a tilt = 36°



Utilization Factors

0.5H = 0.18 1H = 0.35 2H = 0.55

Kerb side Street side



Glare restriction Obtrusive light

Luminous intensity class

γ	Meas. Data Imax in cd/klm	Specified in EN 13201-2
70 °	880	
80 °	243	
90 °	54	
>95 °	43	

Photometric data file: TLLA_ADBS10L25ASY3KG32_DC.ldt

R2L2

96268395 R2L2 S 12L35 EWS 740 CL1

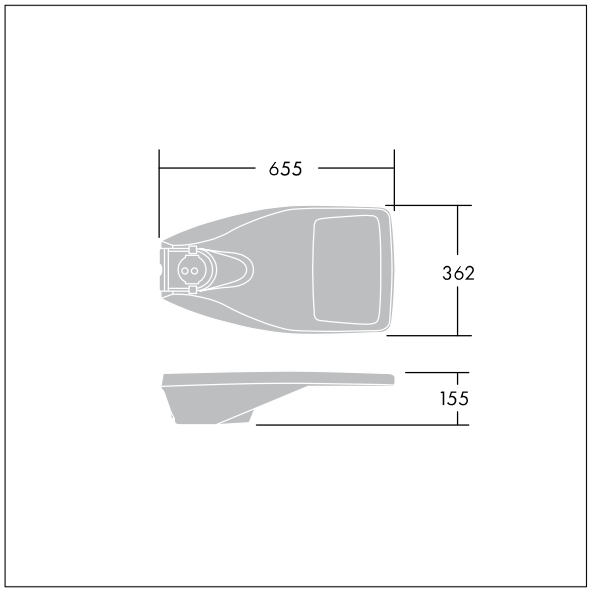
LED 15W R2L2_12L35EWS4K		IP66	IK08		CE	T_a50	

R2L2

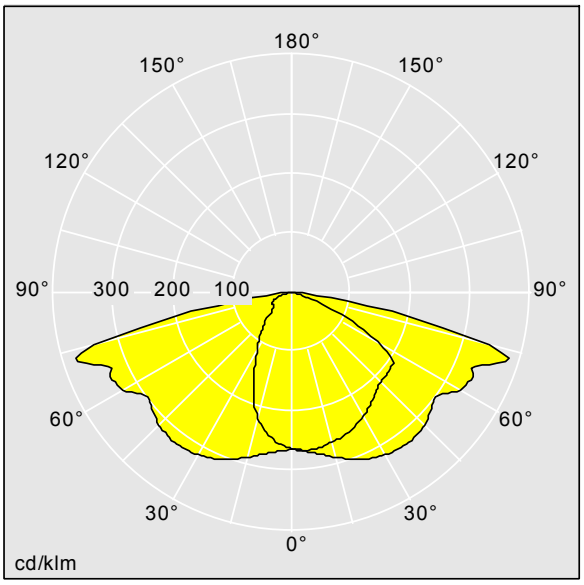
A small size LED road lighting lantern with 12 LEDs driven at 350mA with Extra Wide Street optic. Electronic, fixed output control gear. Class I electrical, IP66, IK08. Housing: die-cast aluminium, powder coated textured light grey. Diffuser: tempered flat glass. Screws: stainless steel, Ecolubric® treated. Post top (Ø60/76mm, tilted 0°/5°/10°) or lateral (Ø34/42/49/60mm, tilted 0°/-5°/-10°/-15°) mounting. Complete with 4000K LED.

Dimensions: 655 x 362 x 155 mm
Total power: 15 W
Weight: 9.08 kg
Scx: 0.05 m²

TLG_R2L2_F_SPDB.jpg



TLG_R2L2_M_LDS.wmf



TLLA_RS12L35EWS4KG33_DC.ldt

Lamp position: STD - standard
Light Source: LED
Luminaire luminous flux*: 1650 lm
Luminaire efficacy*: 110 lm/W
Lamp efficacy: 110 lm/W
Colour Rendering Index min.: 70
LOR: 1,00 ULOR: 0,00 DLOR: 1,00

Correlated colour temperature*: 4000 Kelvin
Chromaticity tolerance (initial MacAdam)*: 5
Rated median useful life*:
100000h L90 at 25°C
Ballast: 1x EL2
Luminaire input power*: 15 W Lambda = 0.95
Dimming: TLD0

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