# Police and Crime Commissioner for Merseyside - OCC

Lighting Design Strategy Report for Planning

Doc No: MP-BDP-XX-XX-RP-E-70\_80-RP08 Issue: For Planning Suitability: S2 Rev: P2 Date: 13/07/2015



## Contents

Performance Objectives & Design Parameters	03
Illuminance Criteria	04
Light Pollution	05
Illuminance Criteria - Area by Area Description	08
Lighting Design Strategy: Masterplan	09
Lighting Design Strategy: Facades	10

# **Performance Objectives & Design Parameters**

The design objectives of the lighting scheme may be summarized as:

- Provide general exterior lighting to the areas defined within the area of scope agreed with the client.
- Identify and illuminate pedestrian and vehicular routes within the site, to secure the health
  and safety of both its users and visitors throughout the hours of darkness. Sufficient
  lighting will be provided for a safe environment whilst limiting light pollution and ingress
  to neighbors to a minimum.
- Feature lighting will be selectively employed to enhance the visual appearance of specific elements of landscape and architecture. Elements will be selected and lit according to their inherent form and material and their relationship to the scheme as a whole.
- Provide effective lighting control to ensure: illuminance levels are suitable for the activities taking place while also maximising lamp life, and minimising energy consumption and maintenance.
- Provide a cost effective, sustainable and energy efficient system, in terms of initial capital costs and continuing operational use. Select lamp types for their efficacy, colour rendition and longevity to provide an efficient lighting solution with a predictable maintenance regime.
- Utilise lamp types appropriate for the character and function of each space while retaining a coherent, rationalized illumination system in terms of lit effect, lamp types and equipment installed.

#### **Design Parameters**

The following mandatory, legislative and regulatory requirements, British Standards, Codes of Practice and Best Practice professional guidance publications will form the parameters of the lighting installation:

- BS EN 5489-1:2013 Code of Practice for the Design of Road Lighting Part 1: Lighting of roads and public amenity areas, BSI, 2013
- BS EN 12464-2:2014 Part 2 Outdoor work places, BSI, 2014
- Guidance Notes for the Reduction of Obtrusive Light GN01:2011, Institution of Lighting Professionals, 2011
- Code of Lighting 2012, SLL
- The Workplace (Health Safety and Welfare) Regulations, HMSO, 2011
- DDA BS 8300:2009 Design of buildings and their approaches to meet the needs of disabled people - Code of practice (+A1:2010) BSI, 2009

## **Illuminance Criteria**

Exterior illuminance criteria as set out in BS EN 5489-1:2013 is dependent upon the district brightness where the lighting is to be deployed. The district brightness is determined according to criteria set out in ILP publication Guidance Notes for the Reduction of Obtrusive Light and requires knowledge of the local area.

There are no known issues with regard to the proposed lighting scheme and CAA criteria following a review of document CAP 168 Licensing of Aerodromes, Civil Aviation Authority.

#### Institute of Lighting Professional (ILP) recommendations

Refer to Guidance Notes for the Reduction of Obtrusive Light GN01:2011, Institution of Lighting Professionals, 2011 for further information.

This area has been classified E3:

E3 represents areas of low district brightness: Outer urban and rural residential areas. Refer to table below for obtrusive light limitations.

Table 2 – Obtrusive Light Limitations for Exterior Lighting Installations – General Observers							
Environmen al Zone	t Sky Glow ULR [Max %] <sup>(1)</sup>	Light Intrusion (into Windows) E <sub>v</sub> [lux] <sup>(2)</sup>		Luminaire Intensity I [candelas] <sup>(3)</sup>		Building Luminance Pre-curfew	
		Pre- curfew	Post- curfew	Pre- curfew	Post- curfew	Average, L [cd/m <sup>2</sup> ]	
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 = pe E <sub>v</sub> = th	<ul> <li>Upward Light Ratio of the Installation is the maximum permitted percentage of luminaire flux that goes directly into the sky.</li> <li>Vertical Illuminance in Lux - measured flat on the glazing at the centre of the window.</li> </ul>						
I =	= Light Intensity in Candelas (cd)						
L = Luminance in Candelas per Square Metre (cd/m <sup>2</sup> )							
Curfew = ol lo	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						

## **Light Pollution**

Light pollution, or obtrusive light, can create serious physiological and ecological problems. It takes various forms:

the brightening of the night sky above our towns and cities.
the uncomfortable brightness of a light source in contrast to the background.
the spilling of light beyond the boundary of the property on which the light source is located.
the passage of light into buildings from an external source(s). Obtrusive light is a nuisance to both humans and wildlife; it is a waste of energy and contributes to greenhouse gas emissions. The problems of unnecessary, obtrusive light can and should be reduced or eliminated at the design

During the design phase of a lighting installation, consideration of the following measures to reduce the occurrence of obtrusive light is taken.

**Over-lighting.** This is avoided by conducting thorough calculations and carefully selecting the most appropriate lighting equipment and lamp types.

Lighting Control to ensure luminaires are only switched on when necessary, a lighting control performance specification is produced.

**Luminaire Technology.** When specifying luminaires, careful consideration is given to minimising upward light and the use of optical units with precise light intensity distribution: thus ensuring that spill and glare are minimised.

The lighting scheme is designed to have minimal impact on the surrounding environment. Lighting is only installed where a visual task requires it for safety, comfort and wellbeing. Light levels are kept to the minimum levels needed to meet the requirements. Luminaires with a controlled light distribution will be specified in order to ensure that light falls only where it is required. A combination of lighting controls and precise optics will help minimise any impact on the surrounding environment.

# **Light Pollution (continued)**



**Luminaire positioning** and direction except in specific locations, where it is desired that elements of the design are uplit for aesthetic reasons, all general lighting luminaires are positioned to avoid uplighting where possible. Where practical, directional luminaires are utilised to enable the precise projection of light. Proper commissioning will ensure directional luminaires perform as intended.



# Light Pollution (continued)



Sample calculation showing minimal spill light afjacent to site boundary.

## Illuminance Criteria - Area by Area Description

#### Pedestrian Pathways (10lx average, 0.3 uniformity)

Bollard luminaires of 1000mm high to be utilized to provide generous vertical illumination and ensure good facial recognition between pedestrians.

#### Car Park (10lx average, 0.25 uniformity)

Car park and vehicular routes require good illumination in order to deter vehicle crime; ensure users feel safe and ensure good driving conditions and minimise conflict with vehicles and pedestrians. A combination of single and twin head luminaires, on 6m poles, will form the basis of the car park lighting strategy.

#### Cycle Stands (75lx average)

Covered cycle racks shall be lit with weather proof luminaires surface mounted onto the underside of the canopy.

#### Main Entrance Soffit & Low Level Facades (751x average, 0.6 uniformity)

Discreet recessed linear luminaires underneath the soffit, to provide uniform functional lighting to the area below. Additional recessed luminaires to be utilized where needed.

#### Entrance Security Gates (75lx average, 0.6 uniformity)

Entrance gate lighting is intended to enable security guards to detect anybody suspicious outside the perimeter and proceed to security check to visitors. Lighting should be in accordance with the CCTV positions and offer sufficient light levels for good facial recognition.

#### Feature Lighting to Landscape Elements (Lighting Criteria: N/A)

Feature lighting elements shall consist of inground uplighting to selected trees. All feature lighting shall be independently switched to enable a separate curfew time, determined by the client.

#### Feature Lighting to High Level Facade (Lighting Criteria: N/A)

High level facade lighting shall be via integrated linear LED luminaires mounted across the building's parapet.

## Lighting Design Strategy: Masterplan



- [1] Car Park Column mounted single/double head luminaires 6m high
- [2] Soffit Canopy Downlights to be recessed into soffit
- [3] Pedestrian Pathway Bollards 1000mm to be utilized for ambient lighting
- [4] Main Entrance Soffit Recessed linear lighting and downlights at the edge of the canopy
- [5] Feature Lighting to Landscape Elements Tree and Flagpoles Uplighting
- [6] Security Entrance Column mounted single head luminaires 6m high
- [7] Feature Lighting to High Level Facade Integrated linear lighting on the parapet

# Lighting Design Strategy: West Facade



[1] Main Entrance Soffit - Recessed linear lighting and downlights integrated within the canopy

[2] Feature Lighting to High Level Facade - Linear lighting integrated at high level on the parapet



# Lighting Design Strategy: South Facade



[1] Main Entrance Soffit - Recessed linear lighting and downlights integrated within the canopy

[2] Feature Lighting to High Level Facade - Linear lighting integrated at high level on the parapet



# Lighting Design Strategy: East Facade



[1] Ops Entrance Soffit - Recessed downlights under the canopy

[2] Feature Lighting to High Level Facade - Linear lighting integrated at high level on the parapet



# Lighting Design Strategy: North Facade



[1] Feature Lighting to High Level Facade - Linear lighting integrated at high level on the parapet

