ARUP

**HDCI Hayes Bridge Limited**

# Bullsbrook Road Substation

## External Lighting Statement

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# Contents

# 1. Introduction

This External Lighting Statement has been prepared on behalf of HDCI Hayes Bridge Limited by Ove Arup & Partners Limited ('Arup'), who are appointed as consultants on the new 'Bullsbrook Road Substation' development at Heathrow Interchange Park, Hayes, London ('Heathrow Interchange').

## 1.1 Location

Bullsbrook Road Substation will be constructed where Heathrow Interchange Park 'Unit 1' is currently located (Figure 1). The main access route to Bullsbrook Road Substation will be the existing northern entrance to Heathrow Interchange on Bullsbrook Road, with the building also bordering Bullsbrook Road on its eastern side. The approximate grid reference for the site is TQ115803.


**Figure 1 Proposed location of Bullsbrook Road Substation Development (in red)**

## 1.2 Proposed Site Description

The proposed Bullsbrook Road Substation will be a 66/11.5kV, 150MW substation. It is located within the London Borough of Hillingdon and the site is primarily commercial/industrial with a mix of industrial buildings, warehouses, and some office spaces. There are also some residential properties located away from the boundary particularly to the north and east of the site.

The surrounding area is relatively flat with some mature trees and hedgerows. Nearby, there is also a mix of street lighting and some private lighting associated with the industrial units. The site includes:

- Substation consisting of two outdoor transformer compounds and a control room/building.
- Two security gates and site entry points, with fencing surrounding the site.
- Inside gate access road, leading to the building's entrance and the transformers.
- Existing parking spaces external to the security gates/fence (to be retained).
- Existing landscaped areas near the parking spaces. (to be retained).
- Perimeter landscaped areas internal to the security gates/fence

All proposed works are contained within this proposed development site plan boundary as illustrated in Figure 2.


**Figure 2. Proposed Bullsbrook Road Substation Development**

## 1.3 Document Scope

This document has been produced to support the project planning application and provides an overview of the principles guiding the external lighting strategy for the development. The external lighting system serving Bullsbrook Road Substation will be designed in accordance with the following applicable codes and guidelines.

- BS 5489 Part 1: 2020 - Lighting of Roads and Public Amenity Areas
- BS EN 13201 Parts 2-5 - Road lighting.
- CIBSE Lighting Guide 6: 2016 - The Exterior Environment
- ILP GN01: 2021 - Guidance Notes for the Reduction of Obtrusive Light
- ILP GN08: 2018 - Bats and artificial lighting in the UK
- ILP / Secured by Design - Lighting Against Crime - A Guide for Crime Reduction
- BS 8300 - Design of Accessible and Inclusive Built Environment
- South Downs National Park, Dark Skies, Technical Advice Note, April 2018

# 2. External Lighting Design

This report outlines the lighting principles for the Bullsbrook Road Substation site, which aims to balance the functional needs of the site with the environmental impacts on the surrounding habitats and communities. The aim is to ensure that the right level of illumination is provided for the visual task to be undertaken and is suitable for the environmental conditions for the system.

The external lighting system will have safety and security as the two main functional objectives which will need to be balanced with the environmental impacts of polluting light (obtrusive light and ecologically light-sensitive areas).

## 2.1 Illumination levels

Illumination levels to be used in the design shall be accordance with Table 1. The illumination values shown are average maintained illuminance figures, and shall be varied as appropriate, to highlight a particular hazard, access way, equipment or sign etc.

| Area/Location | Illumination Level (Lux) FFL |
|---|---|
| Roadways/Access Roads | 20 - 50 |
| Service Yard - General | 50 |
| Main Entrance | 50 |
| Pedestrian Walkways | 10 |
| Pedestrian Crossings | 100 |

**Table 1. Maintained Illuminance Levels**

## 2.2 Key Principles

### 2.2.1 Key Elements – Safety

The safety design shall consider different zones, such as roads and walkways to help improve the safety and convenience of drivers and walkers. All safety lighting is based on the selection of luminaires with zero upward light output ratio and with optic performance to suit their location. The potential glare resulting from light spill due to bulkhead luminaries onto adjacent building walls is recognised and will be minimised by careful selection of the equipment.

- Safety lighting has the highest levels of illumination and therefore the greatest potential to cause obtrusive light pollution.
- Pole mounted luminaires with directional downward light and back shield shall be considered to minimising light spill. Positioning luminaires with light directed away from the site boundaries will ensure that obtrusive light is kept to an absolute minimum and avoid light onto vertical surfaces.
- The operation of the safety light will include photocell operation with time control to provide a curfew between 11.00pm and 7.00am.

### 2.2.2 Key Elements – Security

The security lighting at Bullsbrook Road Substation will be designed to deter unauthorised access and enhance surveillance through strategic placement of lights, optimal illumination levels for CCTV cameras, and integration with other security measures.

Illumination will be focused on key areas such as entry/exit points, fencing, and vulnerable spots, eliminating shadows and hiding places. Lighting levels will typically range from 5 to 10 lux, ensuring adequate visibility for both direct observation by security personnel and CCTV surveillance.

The scheme will also consider motion sensors triggers, that will increase lighting upon detecting movement, conserving energy while acting as a deterrent. It will also consider, dusk-to-dawn operation, providing continuous coverage during nighttime, with dimming capabilities to reduce light output during inactivity.

## 2.3 Lighting Control

### 2.3.1 Flexible Light Output

The proposed scheme will be dimmable as to allow variation of light levels during peak and off-peak night hours responding to anticipated usage and supporting safety whilst minimising energy use.

A photocell and timeclock-based lighting control system with an override switch should be considered as minimum provision. The design will consider an application of a wireless Central Management System to be with motion and dynamic control lighting. Luminaires will be specified with part-night dimming capability, allowing the possibility to reduce light output/turn off after an agreed curfew time or with the use of presence detection.

## 2.4 Maintenance Plan

To maintain the external lighting system's performance and longevity, regular inspections will be conducted to identify and address any issues. These inspections will include visual checks of luminaire condition, functional tests of controls, and electrical checks of wiring.

Cleaning of luminaire surfaces and lenses will be performed regularly. Faulty lamps and ballasts will be promptly replaced. Time clocks will be adjusted seasonally and vegetation around luminaires will be managed. Detailed records of all maintenance activities will be kept.

A qualified lighting contractor will be engaged to carry out routine maintenance and repairs, ensuring the lighting system operates optimally while adhering to safety regulations.

## 2.5 Obtrusive Light

The design criteria for exterior lighting will follow the ILP guidance notes on obtrusive light pollution 2021. The substation location and surrounding access routes are classified as Zone E3 (Suburban) according to Table 2 – Environmental Zones of the ILP guidance notes. The Zone E3 area will generally be lit in accordance section 2.1 of this report and the footpaths will only be lit where there is high night-time use, fear of crime issues and no alternative routes.

| Zone | Surrounding | Lighting environment | Examples |
|---|---|---|---|
| E0 | Protected | Dark (SQM 20.5+) | Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places |
| E1 | Natural | Dark (SQM 20 to 20.5) | Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc. |
| E2 | Rural | Low district brightness (SQM ~15 to 20) | Sparsely inhabited rural areas, village or relatively dark outer suburban locations |
| E3 | Suburban | Medium district brightness | Well inhabited rural and urban settlements, small town centres of suburban locations |
| E4 | Urban | High district brightness | Town / City centres with high levels of night-time activity |

**Table 2. Environmental Zones of the ILP guidance notes.**

The design will comply with the standards in Table 3 – Obtrusive Light Limitations for exterior lighting installations. The light intrusion into windows (Unit 1 Building and Control room/building) will be evaluated later when the receptors are known. The calculation results will verify that the standards are met.

This table will also be considered for the management of spill light once the task performance requirements of adjacent lit areas are known. This will ensure that any spill light does not adversely affect these performance parameters of key elements such as security.

| Environmental Zone | Sky Glow ULR (Max %) | Light Intrusion (into windows) Ev[Lux] | | Luminaire intensity I [candelas] | | Building Luminaire Pre-Curfew |
|---|---|---|---|---|---|---|
| | | Pre Curfew | Post Curfew | Pre Curfew | Post Curfew | Average L cd/m² |
| E3 | 5.0 | 10 | 2 | 10,000 | 1,000 | 10 |

**Table 3. Obtrusive Light Limitations for exterior lighting installations**

## 2.6 Wildlife Around Site

Natural light sources such as the sun and the moon influence the biological activity of plants and microorganisms as well as the instincts of humans and animals. Moonlight helps animals navigate in the dark, especially insects. Artificial light – especially light with high blue light content – has an attractive effect on animals, especially insects and birds. It can severely disrupt life's natural rhythms. To minimise negative influences on the ecosystem, light should not be a disruptive factor to the natural balance. Longer wave lengths of amber and red in light colour are less attractive to insects.

The lighting scheme will consider the use of a flexible colour temperature (warm white at dusk and amber at night). ILP Guidance Note GN08/18 has been referred to as a benchmark for the lighting criteria to the ecologically sensitive areas, which includes:

- Illuminance levels should be as low as possible with 0 lux required at bat roosting locations.
- Guidance on appropriate lighting technology
- General guidance on how to minimise the impact of lighting to bats.

The luminaires will be positioned at low level or be shielded with specific beam angles, so there will be no light spill on the locations with bat presence. The public footpath, along which the bat activity is high, will be kept unlit. Lighting in all areas will be directed downwards to minimise impact on the wildlife sensitive to light.

# 3. Conclusion

The proposed lighting design for Bullsbrook Road Substation will balance the functional needs of the site with the environmental impacts on the surrounding habitats and communities. The design will consider the following key principles:

- **Safety:** Lighting levels will be sufficient to ensure the safety of drivers, pedestrians, and security personnel.
- **Security:** Lighting will deter unauthorised access and support the operation of CCTV cameras.

The design will also minimise the environmental impacts of light pollution by using shielded luminaires, low-blue-light emitters, and dimming controls. The design will comply with the ILP guidance notes on obtrusive light pollution and bat sensitivity.