

Highlights Floodlighting Ltd

Specialist Floodlighting Installation Contractors

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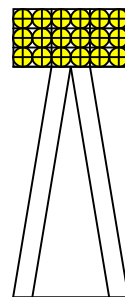


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Spillage Impact Report: Gravesend Rugby Football Club LED Floodlighting Solution.

Highlights Floodlighting Ltd have been invited to design a suitable LED Floodlighting scheme for Gravesend Rugby Football Club. The club is located off Donald Biggs Dr in Gravesend, Kent. The 100 Lux LED Lighting Design was submitted as part of planning application 20221327 in December 2022, and was granted permission by Gravesham Borough council. However, condition 5 of the planning permission states the following:

No development approved by this permission shall commence until a suitable report detailing and explaining the lighting impact of the lights on neighbouring light sensitive properties surrounding the site until a lighting impact assessment has been carried out submitted to and approved in writing by the Local Planning Authority. The report shall confirm compliance with The Institution of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light such that its impact on existing and permitted residential properties is not greater than those referred to in Environmental Zones found in Table 2 of the ILP guidance notes. The report shall include suitable predictions of light intrusion on the vertical plane demonstrating and explaining:

- *The source intensity at predicted and existing light sensitive properties' windows (the maximum source intensity to be seen by looking at any of the development's lights);*
- *The vertical illuminance at light sensitive properties' windows (how much light falls onto a window).*

To satisfy condition 5, the following pages of this report are to verify that the proposed Floodlighting is of a suitable specification to perform to relevant Rugby Football Union lighting requirements for the 2022-2023 Season, and is compliant with the Institute of Lighting Professional's Guidance Notes for the Reduction of Obtrusive Light GN01-2021; regarding an "E2 Zone".

- The Lux values and uniformity level stipulations for the proposed Floodlighting to perform to, are as follows: - The RFU 100 Lux Match play standard requires an overall average of 100 Lux, and a minimum to average uniformity ratio of 0.50; to ensure safe competitive play to the end user.



To ensure compliance to the Institute of Lighting Professional's Guidance Notes for the Reduction of Obtrusive Light GN01-2021; regarding an "E2 Zone." the following measures are proposed within the 100 Lux LED Lighting Design:

- Luminaire selection - Every effort has been taken in to consideration when designing the proposed lighting installation, to minimise potential glare and light spillage. This includes implementing state of the art Philips LED 1500 watt Luminaires. The floodlights perform with an internal integral louvre to each of the LED diode light sources. This new advanced measure of control, mitigates unnecessary levels of light spillage and glare away from the adjacent residential properties, unlike any other LED Floodlighting product in the market place.
- The least number of Luminaires possible have been selected to achieve the 100 Lux Match play standard lighting.
- 8 No. Lighting columns have been utilised to ensure the 8 No. LED Luminaires are located in optimum positions for lighting performance, whilst still focussed away from residential properties.
- Attention has been given at the design level to the tilt angle of the proposed LED luminaires, to ensure an absolute maximum tilt angle of 70 degrees. This fact is a key requirement from the ILP guidance notes:

"Keep glare to a minimum by ensuring that the main beam angle of all luminaires directed towards any potential observer no greater than 70°."

- The above measures ensure the proposed Lighting Installation emits zero upward Light / Sky glow.

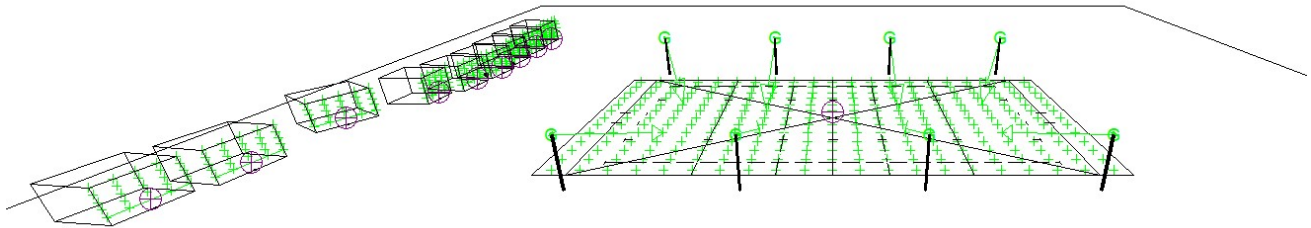
The 100 Lux LED Lighting Design considers 9 No. residential properties situated adjacent to the Rugby ground. The properties are listed within the Lighting Design as "Vertical Properties 1-9." The properties concerned are located as per the google earth shot below:



To assist in satisfying the requirements of the 2021 ILP guidance notes, light spillage calculation application fields, of a Horizontal and Vertical orientation have been inserted into the lighting design. To ensure the accurate positions of the calculation application fields, Google Earth imagery has been scaled accordingly via AutoCAD 2021 software prior to import to the Calculux Lighting Design software. The horizontal light

spillage application field calculation named “Spillage Horizontal” is situated at ground level, and spans 260 metres long by 260 metres wide, with the centre of the Rugby pitch situated as the central datum point.

The “green walls” applied to the houses pictured below, represent the boundaries of the residential properties to which the 9 No. vertical lighting calculations are based on. The vertical calculation grid points start at 1.5 metres above ground level. This is to simulate the height of the centre of ground floor windows of the properties. The calculation grid points occur every three metres horizontally and every metre vertically, up to six metres high. It is the described high frequency of grid points, that ensures correct examination to the adjoining properties for vertical light spillage. Please note; large natural barriers such as trees and fencing have not been considered whilst carrying out the lighting calculations.



The 9 No. “purple circles with crosses” in the diagram above represent “observer points” used with the lighting design software to calculate the expected glare intensity to be experienced at the 9 No. individual residential properties at 1.5 metres from ground level.



The picture above was taken at dusk at a recent similar project using the same state of the art Philips LED lighting technology proposed to be implemented in this instance.

SOURCE INTENSITY RESULTS:

The proposed LED lighting design has been created in accordance with guidance notes recommended by the ILP (Institute of Lighting Professionals) for the reduction of obtrusive light (2021), which advises that within a Rural E2 (Low district brightness) you should achieve the following:

- 1) Source intensity (Glare) should not be above 7500 Candelas (cd)
- 2) Vertical Illuminance should not be above 5 Lux on windows
- 3) Upward Light Ratio should not be above 2.5%

To aid proof of compliance to the above criteria, within the lighting design, “observer points” have been inserted to the lighting design to demonstrate the luminaire intensity (glare) to the nearest neighbouring properties to the Rugby Club. The calculations are on page 7 of the 100 Lux Lighting Design document and are as follows: -

Property Observer 1 Result = 901 cd
Property Observer 2 Result = 1147 cd
Property Observer 3 Result = 1247 cd
Property Observer 4 Result = 911 cd
Property Observer 5 Result = 856 cd
Property Observer 6 Result = 770 cd
Property Observer 7 Result = 610 cd
Property Observer 8 Result = 723 cd
Property Observer 9 Result = 873 cd

The results are below the guidance notes recommendation of 7500 cd.

VERTICAL CALCULATION RESULTS:

Within the proposed LED lighting design dated 25-05-2022 Vertical lighting calculations have been carried out to demonstrate the predicted vertical illuminance (Light Intrusion) on to the surrounding residential properties. The maximum predicted readings are on page 7 of the 100 Lux Lighting Design document, and have been calculated as follows:

Property Grid 1 Result = 0.13 Lux
Property Grid 2 Result = 0.19 Lux
Property Grid 3 Result = 0.21 Lux
Property Grid 4 Result = 0.33 Lux
Property Grid 5 Result = 0.35 Lux
Property Grid 6 Result = 0.34 Lux
Property Grid 7 Result = 0.23 Lux
Property Grid 8 Result = 0.21 Lux
Property Grid 9 Result = 0.17 Lux

The results are below the guidance notes recommendations of 5 Lux.

The proposed Upward Light Ratio (ULR or Sky Glow) is 0.00 %

This complies with the guidance notes recommendation of 2.5 %.

The predicted horizontal light spillage is demonstrated below, which will be emitted from the proposed LED Floodlighting solution. The horizontal light spillage footprint plots are shown below as “distorted ring” shapes known as *iso contours*. The iso contour lines are measured in terms of Lux, with each ring decreasing in value the further the distance increases from the light source. The 4 No. predicted iso contour lines are shown in yellow, with the closest ring to the lighting installation possessing a value of 10 Lux, followed by a 5 Lux ring, a 2 Lux ring, concluding finally with a 1 Lux ring.



CONCLUSION

This report confirms the proposed LED floodlighting solution by Highlights Floodlighting is in full compliance with the ILP guidance note conditions; for an E2 Environmental Zone criteria. The LED lighting proposals consequential effect to the relative surrounding area to the Rugby Club will be minimal. A significant reduction in source intensity and obtrusive light emitted from the Philips LED Lighting system is possible, due to the highly effective internal integral louvres, when compared to the typical light spillage projected from alternative existing traditional HID/LED Floodlighting solutions.