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#### Technical Report.

#### **Introduction**

#### James Brunt BSc (Hons) – Abacus Lighting Ltd

This statement considers the impacts of the proposed floodlighting on the nearest properties and eastern and south eastern boundary hedgerows in light of ecological considerations.

Site Location

Sully Sport and Social Club

Proposal

Arturus and Abacus Lighting Ltd are proposing the installation of purpose built floodlighting to the 3G, training pitch and car park / access road lighting

# **Methodology**

Abacus Design Outline.

In designing as suitable floodlighting solution for the sports pitch at Sully Sport and Social Club key specification issues had to be considered. These included the illuminance level required, the environmental zone category for the site, the minimum mast height & the number type of floodlights. Details of how these issues were resolved are as follows:-

- 1. To ascertain the 3G Pitch illuminance level required we referred to the Football Associations minimum requirements for Football on an artificial pitch. This requires a maintained illuminance level of 200 Lux over the whole 3G pitch.
- 2. To ascertain the training pitch illuminance level required we referred to the Football and Rugby Associations minimum requirements for Football / Rugby at training levels. This requires a maintained illuminance level of 75 Lux over the whole pitch.
- 3. To ascertain the Car Park illuminance level required we referred to the British Standard minimum requirements for safe public parking and access. This requires a maintained illuminance level of 20 Lux.
- 4. For the relevant environmental zone reference was made The Institution of Lighting Engineers: *Guidance Notes for The Reduction of Light Pollution, 2000.*(as attached). This document categorises the environment into four zones ranging from National Parks to City Centres. The site would fall into Zone E3 for an Urban location.
- 5. The mast height for the training pitch was calculated using the method detailed in the CIBSE guide LG4 "Sports Lighting". This uses angles projected from the centre of the pitch & the touch line to produce a head frame location zone. When applied to this project the optimum mast height ranged from 8m to 12m for the training Pitch. A 10 m mounting height was chosen as it would allow the floodlights to be mounted horizontally. This will result in low vertical overspill & good uniformity on the playing surface, without compromising cost. The 10m







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HL250 mast will offer a slimline profile which will minimise daytime impact. If the mounting height was reduced to 8m the floodlights would be elevated above the horizontal consequently increasing overspill.

- 6. In order to meet the requirements of The Institution of Lighting Engineers: Guidance Notes for The Reduction of Light Pollution, 2000, the Abacus AL5760 Challenger 1 floodlight, using Flat Glass Technology was chosen as being suitable. Details of the main features of this product are highlighted below.
- 7. The mast height for the 3G pitch was calculated using the method detailed in the CIBSE guide LG4 "Sports Lighting". This uses angles projected from the centre of the pitch & the touch line to produce a head frame location zone. When applied to this project the optimum mast height ranged from 12m to 18m for the 3G Pitch. A 15 m mounting height was chosen as it would allow the floodlights to be mounted to ensure the peak output of the floodlights is aimed just over the halfway line. This will result in low vertical overspill & good uniformity on the playing surface, without compromising cost. The 15m mast will offer a slimline profile which will minimise daytime impact. If the mounting height was reduced to 12m the floodlights would be elevated above the horizontal consequently increasing overspill.
- 8. With regards to the Amenity Lighting, Abacus are offering a flat glass, zero upwards light Orion fitting along with the Trivium fitting at 8m high. 8m has been chosen to keep the number of lighting points to a minimum and ensuring that light pollution is kept to a minimum. There is also to be 6 low level bollard lights and 12 light fittings mounted to the building to provide low level lighting.

Abacus AL5760 Challenger 1 Floodlight.

The Abacus AL5760 series floodlight has been specifically designed to fulfil the requirements of sports area lighting. It is particularly suited to applications were low light pollution is essential. The floodlight incorporates the **Abacus Light Control** system to ensure that light pollution is minimised.

The AL5760 series floodlight features a **Double Asymmetric** reflector which a produces full flow of light over the application area. The main beam of light is emitted at an angle of 60 degrees forward when the front glass is horizontal. This results in a flat floodlight appearance & as a consequence reduces the area of reflector visible to residents outside the site.

The **Internal Baffle** re-directs upward waste light back into the floodlight beam, providing increased efficiency. At angles above the beam it also shields the view of the lamp, thus reducing glare to participants.

By using **Flat Glass Technology** overspill & upward light is therefore reduced in the surrounding environment.

The AL5760 series has been designed to accept many lamp types from several manufactures, including the latest metal halide & high pressure sodium, double-ended lamps. The use of double-ended lamps ensures that the light source is always located precisely in the optical system, further improving light control & installation accuracy. Rear lamp access also allows ease of maintenance.

Further features of the Challenger 1 include the following:-

- Compact wind area, this allows smaller mast & foundations to be used.
- High quality, high pressure die cast body, finished polyester powder coated grey.
- High purity polished reflector system.
- Toughened front glass.
- IP66 ingress protection (floodlight housing & ignitor box).







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For full details of dimensions & specification please see the colour brochure enclosed.

Please see pictures below of recent installations using the above floodlight.



Abacus AL4001 Orion and AL6310 Trivium Luminaries

Benefits

- Another flat glass lantern for mounting heights of between 5m and 8m
- Thanks to the Optimum Reflector System you'll need fewer lighting points meaning you'll save on installation and maintenance costs there'll be less cable, gear, lamp replacement, power consumption and waste

#### Features

- High performance Optimum Reflector System is highly polished and anodised
- aluminium, producing a square illuminance distribution at ground level
- UV stabilised clear polycarbonate bowl
- Canopy in ABS plastic, available in white as standard
- 76mm entry diameter spigot in cast aluminium, available in colours to match the canopy
- Two lamp type options: high pressure sodium or metal halide, with

# integral gear

- Four lamp size options: 150W up to 450W (metal halide)
- Option of an internal shield to give asymmetric distribution and backward overspill control

Please see pictures below of recent installations using the above Lantern.







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# **Impact on Development**

Abacus Lighting Design

The Abacus lighting proposals are detailed on the design, these show the mast locations, floodlight orientations, illuminance levels on the pitch & projected overspill values.

For the 3G pitch the design achieves a maintained minimum illuminance value of 201 Lux with a uniformity in excess of 0.70 which meets the requirements of The FA. For the Training pitch the design achieves a maintained minimum illuminance value of 116 Lux with a uniformity in excess of 0.50 which meets the requirements of The FA /RFU. For the car park areas the design achieves a maintained minimum illuminance value of 22 Lux with a uniformity in excess of 0.25 which meets the requirements of The British Standard. The maintained illuminance values are calculated using a maintenance factor of 0.77. This takes into account light losses due to dirt accumulation on the floodlight front glass & lamp lumen depreciation, ensuring that the minimum requirements for safe play are achieved along with safe walking and car park access.

The use of the Challenger series floodlight and Orion / Trivium Lantern ensures that horizontal & vertical overspill containment is excellent. As less than 2 Lux illuminance will be projected towards any residential property windows the system will exceed the requirements for an environmental zone E3 location. Upward waste light will also be minimised & at the floodlight elevations used 0% will be projected into the atmosphere. This will meet the recommendations of The Campaign For Dark Skies, an organisation who lobby for low light pollution systems & recommend the use of Abacus Challenger systems.

All design calculations have been undertaken using an open, unobstructed site, the values of overspill will be further reduced any existing mature trees or natural screening.







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### **Mitigation Measures**

Obtrusive light, whether it keeps you awake through a bedroom window or impedes your view of the sky, is a form of pollution and can be substantially reduced without detriment to the lighting task.

How can I minimise the problem?

Do not "over" light. This is a major cause of obtrusive light and is a waste of energy. There are published standards for most lighting tasks, adherence to which will help minimise upward reflected light.

Dim or switch off lights when the task is finished. Generally a lower level of lighting will suffice to enhance the night time scene than that required for safety and security.

Use specifically designed lighting equipment that minimises the upward spread of light near to and above the horizontal. Care should be taken when selecting luminaries to ensure that appropriate units are chosen and that their location will reduce spill light and glare to a minimum. Remember that lamp light output in LUMENS is not the same as lamp wattage and that it is the former which is important in combating the problems of obtrusive light.

Ideally there should be no surface illuminance at the façade of any residential property. Illuminance levels of less than 5 are normally considered to be acceptable for residential properties and the acceptable illuminance level for roads varies depending on the existing levels of lighting of the road in question.

Consideration also has to be given to the issue of glare. The asymmetric distribution of the floodlights allows for a lower tilt angle from the horizontal, hiding the lamp and therefore reducing glare not only to players and spectators but also to any surrounding residents, motorists and wildlife. The maximum tilt angle for any floodlighting should ideally be no more than 6 degrees from the horizontal plane.

### **Monitoring Programme**

Following the results of the assessment no monitoring is proposed following the completion of the installation other than a lighting check to each area to ensure the lighting levels meet the requirement of each individual classification along with the check to ensure that the installation meets the requirements set out in our lighting design.

These include:

Lighting Levels to each individual area Overspill levels

# **Robustness of Analysis**

In our design calculations, the use of the model is based on the land being flat and has not taken into account the topographical survey, or any blockages that could have an impact on the lighting plan.

The results provided are the worst case in design format.







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#### Summary and Conclusion.

The proposed system would be suitable for installing in an environmental zone E3, meeting the most stringent of light control parameters whilst maintaining the specified illuminance levels for the sports pitch.

The impact on the boundary hedgerow and the residential properties will be minimised as overspill values into gardens will be no more than moonlight & vertical illuminance into windows before curfew are below the values recommended by the ILE. Daytime visual impact will also be minimised by using slimline masts & light grey floodlights which do not stand out against the skyline.

To improve further the impact on the neighbours and reduce light spill into the hedgerow for ecological purposes, it is possible to include rear shielding to the floodlights / Lanterns. Abacus can confirm that the addition of a back shield will significantly reduce the amount of spill indicated on our drawing. However, we do not hold any photometric data that enables us to indicate the reduced spill on a lighting design indicating lux values.

I have enclosed a drawing of a back shield that we have designed in the past that can be attached to the fitting, the shield is manufactured to order and designed to a specified size to appease any planning/ecological concerns, but we can't incorporate its effect on light spill to a design.









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For reference please see below a description of lighting levels.

Light Source	Horizontal Lux
Full Moon	0.3 to 0.5
Street Lights – Footpath	3 to 10
Street Lights – Residential Area	5 to 15
Typical City Centre Car Park(non retail)	20 to 30
Office/Classroom	250 to 750
Professional Stadium	800 to 2500
Sunny Day	80,000 to 120,000

As you can see from the above results, the impact on the gardens of the properties adjacent to the pitch will be less than street light, with the impact on the properties itself being less than moonlight.

Once installed the Challenger series light control system will provide the optimum sports lighting solution, ensuring that light reaches the sports surface & not into the sky or polluting the environment.







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For and on behalf of Abacus Lighting Ltd

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![](_page_7_Picture_8.jpeg)

![](_page_7_Picture_9.jpeg)