



LIGHTING CONSULTANCY
Exterior Lighting Design Specialists

Church Lane, Ashington, MUGA

Lighting Strategy

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Church Lane, Ashington, MUGA
LIGHTING STRATEGY

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1.0

INTRODUCTION

- 1.1 This lighting strategy document has been prepared for the Multi Use Games Area (MUGA) within the proposed development located at Church Lane, Ashington. The land is proposed for the construction of a residential development including amenity areas and MUGA's.
- 1.2 The report has been prepared to assess, in terms of artificial lighting, the likely effects of the proposed development. The lighting assessment includes information on the baseline lighting conditions within the area and considers possible mitigation measures to reduce potential light spill into neighbouring properties and ecology receptors, upward light (which can create sky glow), and visual source intensity (glare). Lighting class proposals will be included as part of this assessment.
- 1.3 This new development will require external none adoptable lighting for one of the proposed the MUGA's, the safety of the users of the MUGA along with minimising the impact of the artificial lighting on the 'Dark Skies' and the local wildlife. As such a good quality sustainable external lighting solution will be required to ensure the safety and security of users whilst very carefully considering ecological restraints and local residents.
- 1.4 The lighting design of this site should be carried out by a competent person governed by the Institution of Lighting Professionals.
- 1.5 MMA Lighting Consultancy Ltd has been commissioned by Ardent Consulting Engineers, to provide a lighting impact assessment for the proposed MUGA within the proposed development at Church Lane, Ashington.
- 1.6 MMA Lighting Consultancy Limited accepts no responsibility or liability for:
 - a) The consequence of this documentation being used for any purpose or project other than that for which it was commissioned.
 - b) The issue of this document to any third party with whom approval for use has not been agreed.

2.0

SITE DESCRIPTION

Existing site

- 2.1 Ashington is a town and civil parish in West Sussex. The site is located to the West of the A24. A site location plan is shown below in Figure 1:



Figure 1: Site Location

Proposed Development

- 2.2 The proposed development comprises of the construction of circa 230 residential dwellings, aiming for high energy efficiency and ecological design. In addition, there are proposed to be two MUGA's within the site; one of which shall be illuminated.
- 2.3 Development layout shown below in Figure 2:



Figure 2: Development Layout

3.0

POLICY & GUIDANCE

Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

- 3.1 Light pollution was introduced within the Clean Neighbourhoods and Environment Act (2005) as a form of statutory nuisance under the Environmental Protection Act (the 'EPA', 1990), states: "artificial light emitted from premises so as to be prejudicial to health or nuisance."

National Planning Policy Framework

- 3.2 The National Planning Policy Framework (NPPF), published in July 2021, sets out the governments planning policies for England and how they are expected to be applied and provides a framework for local plans. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
- Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Relevant British Standards

- 3.3 The most applicable British Standards for lighting that relates to the proposed development are:
- BS5489-1:2020 Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas
 - BS EN 13201 2015 – Road Lighting. Performance Lighting
 - BS EN 12464-2:2014 – Light and Lighting. Lighting of Work-Places. Outdoor Lighting.

Institution of Lighting Professionals, Bat Conservation Trust Lighting Guidance (August 2018)

- 3.4 The Bat Conservation Trust and the ILP produced a paper in 2018, "Bats and Lighting in the UK", discussing the appropriate lighting levels, types of lamps, colour temperatures etc. which are suitable for lighting areas adjacent to bat houses.

Bat Conservation Trust 2014 Interim Guidance

- 3.5 The Bat Conservation Trust 2014 interim guidance provides recommendation to help minimise the impact of artificial lighting.

Guidance Notes for the Reduction of Obtrusive Light; 2021 Institution of Lighting Professionals (ILP)

- 3.6 Guidance notes produced by the Institution of Lighting Professionals are among the most commonly referenced guidance notes for good practice within the lighting design industry.
- 3.7 Obtrusive light (or sometimes referred to as light pollution) refers to any light emitted in a direction in which it is not required or wanted and as such is detrimental to other users. The assessment has been carried out in accordance with the published guidance documents from the ILP.
- 3.8 Light intrusion refers to the spilling of light beyond the boundary of the area to be lit. This includes the intrusion of light into bedroom windows.
- 3.9 Sky glow refers to the brightening of the sky above towns caused by direct or reflected upward light.
- 3.10 Glare refers to the uncomfortable brightness of a light source when viewed against a dark background. Figure 3: illustrates the different types of intrusive light taken from Guidance Notes for the Reduction of Obtrusive Light; 2021 Institution of Lighting Professionals (ILP).

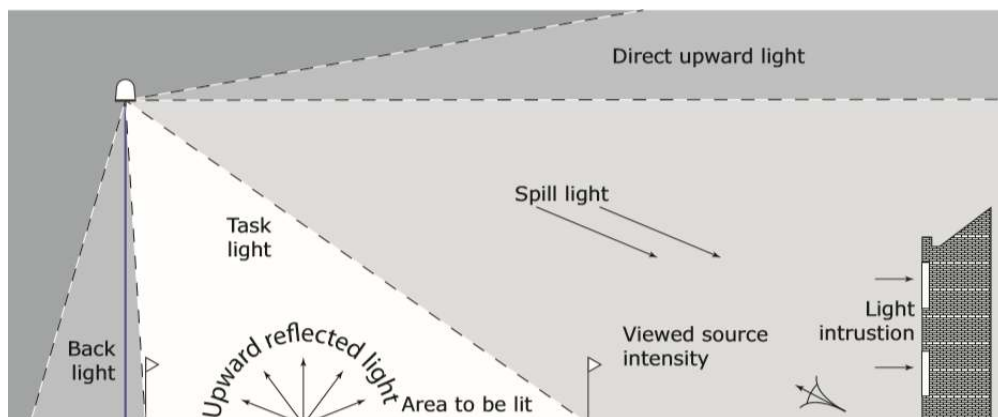


Figure 3: Light Obtrusion characteristics

4.0 ASSESSMENT METHODOLOGY

- 4.1 A desk-top study has been undertaken to identify relevant legislation, planning policy and good practice guidance in relation to lighting. The methodology takes guidance from the Institution of Lighting Professionals PLG 04 document "Guidance on Undertaking Environmental Lighting Impact Assessments". This sets out good practice which was followed during the assessment.
- 4.2 The scope of the assessment shall cover the effects of artificial lighting as a result of the proposed development. The assessment will consider the following:
- Assess the existing baseline lighting conditions on the immediate surroundings.
 - Assessment of the proposed lighting performance requirements for the various components of the proposed development site, with reference to the Environmental Zone Criteria set out in the Guidance Notes for the Reduction of Obtrusive Light (ILP, 2021)
 - To limit light pollution and sky glow

- To limit obtrusive light, spill light and glare to neighbouring land and properties.
- To limit potential light spill to vegetation and wildlife.

5.0 BASELINE CONDITIONS

- 5.1 The application site was a former field West of the A24.
- 5.2 The proposed development is accessed via Church Lane that runs East of the site. Church Lane is owned and maintained by West Sussex County Council (WSCC) and is currently lit see figure 4:



Figure 4: Church Lane, Ashington

- 5.3 Upgrades to the existing lighting may be required but this would be subject to a design brief from WSCC.
- 5.4 The proposed street lighting for the MUGA within the development off Church Lane will require a complete new lighting system. The surrounding area to the proposed development is situated in a rural location.
- 5.5 The new lighting installation shall consider all aspects of the surrounding area and environment and shall comply with BS5489-1:2020 & BS EN 13201-2:2015.
- 5.6 The environment surrounding the application site is 'Low District Brightness', categorised as an E2 Environmental Zone in accordance with the ILP Guidance Notes.

6.0 RECEPTOR SENSITIVITY

- 6.1 There are currently no specific guidance documents or papers available to determine the sensitivity of a receptor in terms of lighting impact. When considering natural resources/ receptors such as the effect on an area in terms of sky glow, it is deemed appropriate to assign sensitivity based on the current baseline conditions and Environmental Zone as detailed in the GN01: 2021 Table 2 - Environmental Zone and the ILP 'Guidance Notes for the Reduction of Obtrusive Light' GN01. This document defines the highest sensitivity being applied as an E0 intrinsically dark zone, and the lowest sensitivity to an E4 urban zone. The Environmental Zones are defined in figure 5 below and the classification of sensitivity of natural resources / receptor will correspond to each Environmental

zone as detailed below. For other receptors such as residential receptors the description will be used to determine sensitivity.

- 6.2 For the purpose of this assessment receptor sensitivity descriptions and criteria have been based on the descriptions shown below.

High Sensitivity

The receptor/ environment is fragile and has limited capability to accommodate change in artificial light conditions without fundamentally altering its present state or character or is of international or national importance. Recovery would be difficult or impossible.

Human (Amenity) – receptors which are sensitive to a change in lighting such that the quality of life would be affected (i.e. lighting is designated a statutory nuisance)

Human (Safety) - receptors where a change in the lighting has the potential to either dramatically improve or reduce safety (for pedestrians, drivers, or workers).

Natural Receptors i.e., Artificial Sky Glow – Sensitivity of receptor based on assigned Environmental Zone – E0 or E1

Ecological – where a change in the lighting affects the habitats, breeding or feeding of fauna (e.g. protected habitats or other special areas) or growth patterns of fauna / crops.

Medium Sensitivity

The receptor/ environment has moderate ability to accommodate change in artificial light conditions without significantly altering its present state/ character. The receptor/ environment has a degree of adaptability and resilience and is likely to accommodate the changes caused by an impact, although there may still be some residual modification as a result.

Human (Amenity) – receptors which are sensitive to a change in lighting however not such that the quality of life would be affected.

Human (Safety) - receptors where a change in the lighting has the potential to either improve or reduce safety (for pedestrians, drivers, or workers).

Natural Receptors i.e., Artificial Sky Glow – Sensitivity of receptor based on assigned Environmental Zone – E2

Ecological – where a change in the lighting affects the movement or feeding patterns of fauna but the receptor can adapt.

Low Sensitivity

The receptor/ environment is tolerant of and can accommodate change in artificial light conditions without detriment to its character or is of low or local importance. The receptor/ environment is adaptable and is resilient to change. Nearly all impacts can be absorbed within it without modifying the baseline conditions.

Human (Amenity) – receptors which would not noticeably be aware of a change in lighting. (i.e. in areas of medium to high luminance)

Human (Safety) - receptors where a change in the lighting has limited potential to affect safety (for pedestrians, drivers, or workers).

Natural Receptors i.e., Artificial Sky Glow – Sensitivity of receptor based on assigned Environmental Zone – E3 or E4 Ecological – area with limited wildlife.

7.0 ECOLOGY

- 7.1 MMA Lighting Consultancy Ltd has taken ecology into consideration for this development site and considers sensitive receptors to any proposed lighting to be extremely important. Maintaining flight paths, feeding patterns, nesting and mating areas should also be considered when proposing any street lighting to ensure that wildlife continues to flourish in this area.
- 7.2 No ecological report has been received at the time of writing this report.
- 7.3 It is presumed that due to the rural location of the development and adjacent wood to the MUGA, there will be some ecological aspects to consider during the detailed design.
- 7.4 In order to minimise the impact of light spill onto the site boundary and any sensitive areas, rear light shields should be specified on lighting units where appropriate.
- 7.6 It is important that the lighting can be minimised by using accepted methods of lighting control, essentially limiting illuminance and controlling light spill. It is proposed that the external lighting surrounding the MUGA shall be installed on 15m raise and lower columns. Generally lighting shall be selected to provide safety and security without polluting the site boundary.

8.0 DESIGN PROPOSALS

- 8.1 Church Lane, Ashington MUGA proposals shall be designed in accordance with Sport England recommendations and designed to ensure that external lighting is focused in the appropriate areas, preventing upward light. Design proposals should aim to reduce unnecessary light pollution, energy consumption, nuisance light spill onto neighbouring properties, as well as reducing negative impacts on surrounding local wildlife. Selected luminaires shall prevent upward light spill and should have a colour rendering index (Ra) greater than or equal to 60Ra. Colour rendering index relates to the accuracy of colours perceived, relative to daylight.
- 8.2 As part of this assessment we considered the use of 15m columns for the MUGA's. All luminaires shall have a 4000 Kelvin Correlated colour temperature (CCT).
- 8.3 The MUGA within the Church Lane development shall be classed as a hockey pitch suitable for competition in accordance with Sport England Design Guidance Note Artificial Sports Lighting Appendix 3 & GN01: 2021 Table 2 - Environmental Zone and the ILP 'Guidance Notes for the Reduction of Obtrusive Light' GN01.
- 8.4 Guidelines for the environmental zones published by the Institution of Lighting Professionals, provides Guidance Notes for the Reduction of Obtrusive Light (GN01: 2021). The environmental zone for Church Lane is considered to be an E2 Zone as shown in Figure 5 below:

Table 2: Environmental zones			
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

Figure 5: Environmental Zone Table from ILP GN01/21

8.5 Based on an Environmental Zone classification of E2, the likely effects of the proposals are as follows:

- A slight increase in sky glow, in the absence of avoidance or mitigation measures, such as any lighting exclusion zones or luminance design this may result in the alteration of wildlife patterns in the area.
- A possible increase in the light 'glare' which may have an effect on the visual comfort of local residents.

8.6 The specified luminaire currently for use to illuminate the MUGA is the Schreder Ecoblast LED floodlight. Figure 6 shows image of the luminaire:



Figure 6 Schreder Ecoblast LED Floodlight

8.7 The Schreder Ecoblast LED Floodlight offers a Ra value of ≥ 70 . The correlated colour temperature (CCT) ranges from 3000 Kelvin and the luminaires have an IP rating of IP66. For the MUGA all luminaires shall be mounted on 15m raise and lower columns for ease of maintenance.

8.8 The correlated colour temperature (CCT) is 3000 kelvin warm white LED. The specified optic has a maximum glare rating of 55 which is suitable for illuminating sports pitches, thus minimising the spread of light above horizontal. All luminaires are to have dimmable electronic control gear, which could be controlled for part-night dimming regimes to limit sky glow and minimise any potential impact on surrounding wildlife.

8.9 The Schreder Ecoblast luminaire has good light control and cut off angles to reduce light spillage. Where possible luminaires are orientated towards the site, away from the land outside the site to make them less intrusive.

- 8.10 Similarly, street lighting will be positioned to avoid light spill into the boundary hedgerows in order to avoid and minimise effects on sensible ecological habitats.
- 8.11 The lighting proposed for the MUGA shall have a Central Management System (CMS) or SMART Lighting, so that any installed lighting can be significantly reduced to suit the required activity and switched off entirely when not in use. This type of solution could further assist with minimising the potential impact of any proposed lighting on the local wildlife in the surrounding area to the site. Other advantages of CMS or SMART Lighting is the financial gain in reducing the electricity consumption across times when lighting systems are dimmed or switched off.

9.0 LIGHTING LEVELS

- 9.1 Artificial lighting will be required to allow for MUGA use and health and safety requirements during periods of darkness. The associated potential obtrusive light effects toward surrounding light-sensitive receptors would be minimised through the controlled application of lighting in accordance with current best practice.
- 9.2 The indicative lighting criteria adopted for the purposes of this assessment are taken from relevant British Standards and recognised national guidance documentation. All criteria adopted for the final scheme of lighting shall be subject to appropriate risk assessment.
- 9.3 It has been assessed that the lighting levels shall be as per the Sport England Design Guidance Note recommendations: -

MUGA - Lighting Class

Hockey

Average maintained illuminance (Eav) = 350 Lux

Uniformity (Emin/Eav) = Min 0.70 Lux

Hockey Training / Football

Average maintained illuminance (Eav) = 200 Lux

Uniformity (Emin/Eav) = Min 0.70 Lux

- 9.4 The MUGA has been identified to require lighting suitable for both hockey and football, therefore, in accordance Sport England Design Guidance Note Artificial Sports Lighting Appendix 3 'Hockey' has been selected as shown below in Figure 7:

Hockey			
Table A.1 BS EN 12193:2007			
Note that England Hockey recommends a minimum of 350 lux for competition			
www.englandhockey.co.uk/			
I	750	0.7	60
II	500	0.7	60
III	300	0.7	20

Figure 7 Appendix 3 - Hockey.

It shall be noted that hockey has been selected as this is the higher average lux level required. The specified luminaires are dimmable in order to reduce the average to suit other sports. For example, if the lights are dimmed to 60% output the Eav reduces to that suitable for either hockey training or a category II football pitch in accordance with BS EN 12193:2018.

10.0 IMPACTS

During Construction

- 10.1 During construction phase, it is likely that the site will be affected through the use of temporary site lighting either for health and safety purposes, site security, or both. It is assumed that the main impacts will be spill light and luminous intensity. These levels relate to residential areas.
- 10.2 Lighting for health and safety will be needed where work is required to take place during the hours of diminishing ambient lighting levels which is likely to occur if the construction works are carried out in the winter months or if night-time working is required. Security lighting is often required to deter crime in both compounds and in areas where plans and materials are stored overnight.

Post Construction

- 10.3 The site is classified as Environmental Zone E2, with the proposed lighting for the site being assessed in accordance with the limiting criteria for that zone, Figure 8 illustrates GN01:2021 Table 2 – Obtrusive light limitations for exterior installations.

Table 3 (CIE 150 table 2): Maximum values of vertical illuminance on properties.						
Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

Figure 8 GN01:2011 Table 3 – Obtrusive light limitations for exterior installations

- 10.4 **Notes to table:**
- E_v is Vertical illuminance in Lux measured flat on the glazing at the centre of the window.
 - Curfew = the time after which stricter requirements (for the control of obtrusive light) will apply subject to the conditions of the local planning authority.
- 10.5 The effect of artificial light associated with the site is predicted to have a minor adverse effect on the environment. Modern road lighting luminaires, when mounted with 0° tilts, do not typically produce significant upward light, therefore the effects of upward light/ULR (upward light ratio) are predicted to be negligible.

11.0 MITIGATION MEASURES

During Construction

- 11.1 Mitigation of the effects of the lighting installation during construction phase will include the following:
- Specifying working hours, use of lighting, location of temporary floodlights in the construction compound and agreeing these with the local council.

Lighting to be switched off when not required specifically for construction activities or required health and safety or security.

- Adhere to best practice measures as recommended by the Institution of Lighting Professionals (ILP), Health & Safety Executive (HSE) and CIE (International Commission on Illumination) guidance. Lighting solutions will be selected to reduce light pollution.
- Specifically, designed luminaires will be selected to minimise upward spread of light. The optics in the lanterns will control the distribution of light to avoid overspill, sky glow and glare.
- Glare will be kept to a minimum by ensuring the main beam angle of all lights directed towards any potential observer is not more than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare.
- Restrict lighting to the task area using horizontal cut-off optics and zero tilts.
- Operate curfew and minimise the duration of any lighting (switch off or part-night dimming).

Post Construction

- 11.2 The detailed lighting design will be designed to use current best practice and technology. The impacts of external lighting will be minimised by the installation of lighting to the minimum specification required to provide a safe night-time environment for residents, therefore lighting will be designed to comply with the minimum illuminance levels given within the appropriate guidance. The detailed lighting design will be in keeping with the ecology report in order to maintain the integrity of habitats for wildlife around the site.
- 11.3 Designing out and minimising the need for lighting to be installed is always the best method of reducing light pollution. However, where this is not possible, the careful choice of illuminance and luminance criteria is key to successfully limiting the impact that light may have on its surrounding environment.
- 11.4 Care should be taken to minimise glare from all luminaires installed, by ensuring the correct luminaires are selected and installed correctly, in line with the recommendations within the ILP Guidance Notes for the Reduction of Obtrusive Light.
- 11.5 Restriction of luminaire mounting heights would be one of the key means of mitigating the environmental impact of external lighting. Luminaires that are column mounted can be restricted to a maximum height of 15 metres to the MUGA . It should be noted that as the mounting is reduced the number of luminaires would have to be increased.
- 11.6 Lighting would need to be provided in the form of column mounted lanterns. Where possible, lanterns would need to be pointed into the development and away from the adjacent sites. The optics in the lanterns would need to be specified to control the distribution of light avoiding overspill, sky glow and glare. Back shields shall be fitted to columns where appropriate.

12.0 CUMUATIVE EFFECTS AND RESIDUAL EFFECTS

Cumulative

- 12.1 The appearance of sky glow was considered as part of the assessment of the external lighting conditions. During the lighting assessment, it was noted that the area of the MUGA is not surrounded by an existing lit environment and is within a proposed housing development.
- 12.2 Although the introduction of artificial lighting at the site could have an effect, the mitigation measures incorporated into the lighting strategy would mean that the significance of the overall impact is reduced.

Residual during construction

- 12.3 It is considered that following the implementation of the mitigation measures outlined in Section 10.0, overall, there will be minor adverse residual effect of lighting during the construction phase of the development site on sensitive habitats for wildlife. Subject to sensitive lighting design, the effects on key areas of wildlife habitat identified in the ecology report is expected to be negligible. The development area is assumed to currently fall into Environmental Zone E2 in accordance with a rural location with low district brightness.

Residual post construction

- 12.4 It is considered that there will be overall minor negative effects from the lighting of the proposed scheme on residential receptors and road users. The use of well located, modern light fittings, will minimise glare, light spill and reduce sky glow contributions to the existing sky glow above Ashington. Subject to sensitive lighting design, including positioning and design of luminaires and use of remote monitoring systems, the effects on key areas of wildlife habitat identified in the ecology report is expected to be negligible.

13.0 CONCLUSION AND SUMMARY

- 13.1 In conclusion, subject to the implementation of the above proposals and agreements with the Highway Authority and Ardent Consulting Engineers, a compliant lighting scheme can be designed and installed and an acceptably low impact on the residential properties and wildlife can be achieved. The likely cumulative effect of artificial lighting may be a slight increase in sky glow.
- 13.2 During the construction phase, the lighting impacts are likely to be associated with the requirements for temporary lighting to illuminate the contractor's compound and work areas. Installed lighting will involve the use of well located, modern light fittings which are directionally controlled and will be in accordance with current best practice standards and the developers' requirements. Overall, where an effect arises the effect on sensitive receptors during the construction phase will be short term and temporary in nature and considered to be of minor negative significance. However, as lighting would be temporary and mobile, units can and should be relocated if recognised as having a negative impact on sensitive receptors.
- 13.3 During the operational phase, the likely impacts include the introduction of artificial light sources as part of the proposed development, which will result in changes to the current baseline conditions. The proposed lighting scheme will comply with all relevant British Standards and the Institution of Lighting Professionals lighting guidelines, Sport England lighting guidelines and will serve to ensure that the safety and security of all areas of the MUGA can be effectively maintained.
- 13.4 Potential effects would be managed such that the potential increase in the general ambience of the area would be balanced against the overall existing illuminance in order to minimise sky glow.
- 13.5 The effects on sensitive receptors will be mitigated through the implementation of a stringent lighting design, which will include the use of low light pollution fittings which retain light spill within the development area, minimising the loss of light to the night sky and glare discomfort to on-site or neighbouring receptors.
- 13.6 This report has been prepared to the best of our knowledge, any lighting designs proposed shall be carried out by a competent lighting consultant in accordance with Sport England Design Guidance Note Artificial Sports Lighting, the Highway Authority & Ardent Consulting Engineers requirements.

Prepared By: -



Ben Tavill 03rd March 2023
.. (Signed) (Print Name) (Date)

Reviewed By: -



Mark Chandler 03rd March 2023
(Signed) (Print Name) (Date)

APPENDIX A LIGHTING TERMINOLOGY

Glossary of terms

For the purpose of this report, the definitions given below apply. For further definitions the International Lighting Vocabulary (ILV), published by the CIE, can be found at <http://eilm.cie.co.at/>

Colour Rendering Index (CRI): A scale of the colour appearance of an object under a particular light source compared to its colour appearance under a reference light source. Expressed on a scale of 1 to 100 Ra, where 100 Ra represents the colour rendering of natural daylight i.e. perfect colour.

Curfew: The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by a government controlling authority, usually the local government (CIE, 2003).

Disability Glare: Glare which impairs the vision of objects but may not cause discomfort.

Discomfort Glare: Glare causing discomfort which may not impair the ability to see objects.

Environmental Zones: Area where specific activities take place or are planned and where specific requirements for the restriction of obtrusive light are recommended. Zones are indicated by the zone rating (E1... E4) (CIE, 2003).

Illuminance: Illuminance is the quantity of light, or luminous flux, falling on a unit area of a surface. It is designated by the symbol E. The unit is the lux (lx). One lux equals one lumen per square metre (lm/m²).

Horizontal Illuminance: Illuminance incident on a horizontal surface or calculation plane.

Vertical Illuminance: Illuminance incident on a vertical surface or calculation plane.

Isolux Diagram: A diagram showing lines joining points of equal illuminance. Sometimes also referred to as Isolines.

Light Pollution: The spillage of light into areas where it is not required.

Light Intrusion: Light that impacts on a surface outside of the area designed to be lit by a lighting installation.

Obtrusive Light: Spill light which because of quantitative, directional or spectral attributes in a given context, gives rise to annoyance, discomfort, distraction or a reduction in the ability to see essential information (CIE, 2003).

Photocell: A unit which senses light to control luminaires.

Residential Property: Land upon which a dwelling exists (CIE, 2003).

Sky Glow: The brightening of the night sky caused by artificial lighting resulting from the reflection of radiation (visible and non-visible), scattered from the constituents of the atmosphere (gas molecules, aerosols and particulate matter), in the direction of observation. It comprises two separate components as follows:

(a) Natural sky glow - That part of the sky glow which is attributable to radiation from celestial sources and luminescent processes in the Earth's upper atmosphere.

(b) Man-made sky glow - That part of the sky glow which is attributable to man-made sources of radiation (e.g. outdoor electric lighting), including radiation that is emitted directly upwards and radiation that is reflected from the surface of the Earth (CIE, 2003).

Spill Light (Stray Light): Light emitted by a lighting installation which falls outside the boundaries of the property for which the lighting installation is designed (CIE, 2003).

Upward Light Ratio: The maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.

Abbreviations

CIBSE Chartered Institute of Building Services Engineers

CIE International Commission on Illumination

CNEA Clean Neighbourhoods and Environment Act

ILP Institute of Lighting Professionals

SLL Society of Light and Lighting



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