



**LIGHTING CONSULTANCY**  
Exterior Lighting Design Specialists

## **Jacks Lane, Takeley – S38 Public Right Of Way**

### **Lighting Impact Assessment**

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## 1.0

### INTRODUCTION

- 1.1 This lighting impact assessment and strategy document has been prepared for the proposed highway improvements located at Jacks Lane, in Takeley, Essex. The land is proposed for the improvement of a public right of way (ProW)/byway leading to a proposed residential development from the existing local centre in Priors Green.
- 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 lighting along the route of the existing public right of way running to the east of the site towards the Burgattes Road, Priors Green. The safety of the pedestrians and users of the byway from within this new development should be considered as one of the priorities along with minimising the impact of the artificial lighting on the 'Dark Skies' local wildlife and heritage assets. 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 has been carried out by a competent person governed by the Institution of Lighting Professionals.
- 1.5 MMA Lighting Consultancy Ltd has been commissioned by Weston Homes, to provide a lighting impact assessment for the proposed development at the Jacks Lane site in Takeley.
- 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 The development is located on Jacks Lane in Takeley which is located between Stansted Airport and the market town of Great Dunmow. A site location plan is shown below in Figure 1:



**Figure 1: Aerial Photograph of Site Location**

### Proposed Development

- 2.2 The proposed development subject to this assessment is the improvement of an existing well-established PROW/byway by replacing the wearing course with an all-weather surface and the installation of suitable lighting columns.
- 2.3 Latest development layout shown below in Figure 2:



**Figure 2: Latest 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 September 2023, 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)**

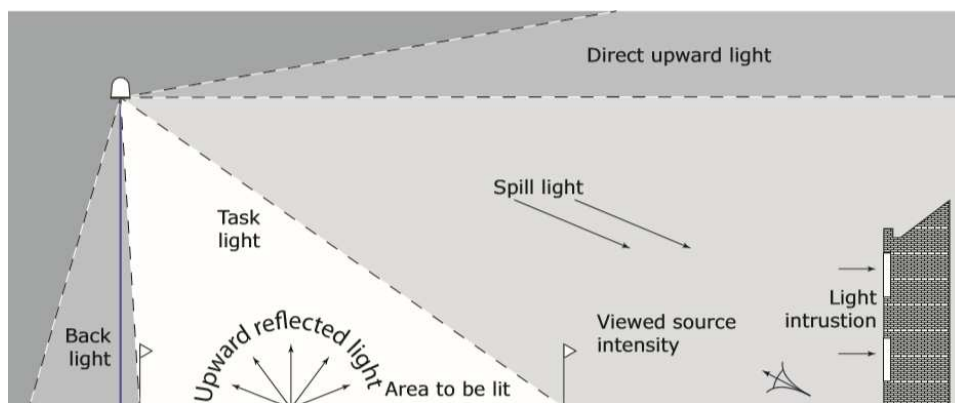
- 3.4 The Bat Conservation Trust and the ILP produced a paper in 2018, "Bats and Lighting in the UK", and more recently Guidance Note 08/23 (GN08) discussing the appropriate lighting levels, types of lamps, colour temperatures etc. which are suitable for lighting areas adjacent to bat houses.

#### **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 cause 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 PLG04 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.
  - To limit the effect of artificial light on local wildlife.

## 5.0 BASELINE CONDITIONS

- 5.1 The application site is an existing PRow/byway starting at Burgattes Road in Priors Green, Takeley.
- 5.2 The route is accessed via Burgattes Road and runs west to Jacks Lane, then north to tie into the proposed development. Burgattes Road is owned and maintained by Essex County Council (ECC) and is currently lit as shown in figure 4:



**Figure 4:** Burgattes Road.

- 5.3 The existing lighting surrounding the development along Burgattes Road consists mainly of 8m high lamp columns with light-emitting diode (LED) luminaires.
- 5.4 The existing lighting at the access point appears to be designed and installed to comply with BS5489-1:2020 & BS EN 13201-2:2015.
- 5.5 The environment surrounding the application site is 'Low District Brightness', categorised as an E2 Environmental Zone in accordance with the ILP Guidance Notes.
- 5.6 Existing lighting in the surrounding area has been designed using the Essex County Council standard specification document.
- 5.7 It is assessed that the existing lighting in surrounding streets and the location of Stansted Airport just over 1 mile to the northwest will already produce a certain level of Sky Glow in the locality. This should be taken in consideration when assessing the overall impact of the proposed lighting on this site.



## 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 (Section 8) 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. In doing so the findings of Ecology Solution in their report has been considered as detailed below. 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.
- 7.2 The ecological consultant, Ecology Solutions Ltd deployed static detectors in two locations along the byway over a period of 5 days that detected a total of 308 registrations from positions 1 and 1060 registrations from position 2.
- 7.3 Static detectors found significant Common Pipistrelle presence overall, constituting 95% of recordings. Some Soprano Pipistrelle presence and minor Noctule presence was also noted. Early (pre-sunset) Common Pipistrelle recordings indicate that this species is roosting within or near to the site, possibly within the trees along the byway identified as having suitable roost features.
- 7.4 No notable species were recorded / observed. However, previous reports of Brown Long-eared Bat and Barbastelle presence within the wider Warish Hall Farm site suggests that these species may be present in the locality. Owing to the relatively minimal loss to vegetation that will occur during the development of the byway, including the retention of all trees, it is considered that adverse effects on bats will be minimal.
- 7.5 Within the proposed lighting scheme it is recommended by the Bat Conservation Trust, together with guidance documents from the Institution of Lighting Engineers, a correlated colour temperature (CCT) of 3000k should be used across the site to ensure minimum impact on the sensitive ecology areas.
- 7.6 In order to minimise the impact of light spill onto the site boundary and any ecologically sensitive areas, black painted rear light shields should be fitted on lighting units where appropriate.
- 7.7 Any proposed luminaires for this site should come with the option of a side shield so to ensure flexibility and further control of light spill onto the ecologically sensitive areas across the site.
- 7.8 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 shall be installed on 6m street lighting columns. Generally lighting shall be selected to provide safety and security without polluting the site boundary.
- 7.9 Dimming and trimming the street lighting output at strategic times of the evening allows for a reduction in the overall lighting impact on ecologically sensitive areas and will help to reduce the general evening 'sky glow' from the site. It is recommended that an appropriate 'Stepped Dimming' profile be considered for this site and that should look similar to the example profile that is set out below: -

Suggested Stepped Dimming profile: -

Dusk – 21.00 – 100% output \*  
21.00 – 00.30 – 75% output \*  
00.30 – 05.30 – 0% output \*  
05.30 – 06.00 – 75% output \*  
06.00 – Dawn – 100% output \*

## 8.0 LIGHTING DESIGN REQUIREMENTS

- 8.1 The lighting design of this site should be carried out by a competent person governed by the Institution of Lighting Professionals.
- 8.2 It is recommended that the street lighting design proposals for this site shall be designed in accordance with BS5489-1:2020 & BS EN 13201-2:2015.
- 8.3 Institution of Lighting Professionals Guidance Notes for the Reduction of Obtrusive Light (GN01: 2021) should be adhered to. This will ensure that lighting designs produced are suitable and sensitive to their surroundings.
- 8.4 External street lighting should be designed to ensure that it is focused in the appropriate areas, preventing upward light above the horizontal plane. Design proposals should aim to reduce unnecessary light pollution, energy consumption and nuisance light spill onto neighbouring properties.
- 8.5 It is assumed that all street lighting will be positioned to avoid light spill beyond the PRow in order to avoid and minimise effects on sensitive ecological habitats.
- 8.6 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.
- 8.7 As part of this assessment we consider the use of 6m columns for all adoptable and non-adoptable routes to be suitable.
- 8.8 All luminaires shall have a 3000 Kelvin Correlated colour temperature (CCT) to minimise impact of the artificial lighting on ecologically sensitive areas.
- 8.9 The site shall be classed as a "P Class" in accordance with BS5489-1:2020, BS EN 13201-2:2015.
- 8.10 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 this site 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

- 8.11 Essex County Council have a number of luminaires currently approved for use on residential roads on their network. The current DW Windsor Kirium Pro Mini luminaires provide a wide range of optics suitable for this sensitive site, so it is recommended for use on this site. Figure 6 shows image of the luminaire:



**Figure 6 - Kirium Pro Mini LED luminaire.**

- 8.12 Any lantern specified for the new development / scheme will be supplied with DALI enabled drivers to enable dimming to be undertaken at set times.
- 8.13 All proposed luminaires should have a minimum IP rating of IP65 which is the recommended minimum requirement for Ingress Protection.
- 8.14 Luminaires will need to have the facility to enable shields or internal baffles to be fitted to prevent the back / sideways spill of light. A luminaire with a deflector is shown in Figure 7:



**Figure 7 – Example Luminaire fitted with rear light deflector.**

- 8.15 Proposed luminaires should be designed to fit 'post top' without an outreach bracket.
- 8.16 Five-degree tilts should **NOT** be applied to the lantern in the lighting design calculations, as tilting the lantern encourages light to spill above the horizontal plane and other light ingress issues.
- 8.17 Roads being offered for adoption shall have a Central Management System (CMS) or SMART Lighting, so that any installed lighting in sensitive areas can be significantly reduced during the hours of darkness or lights switched off entirely. 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.

- 8.18 Final CMS dimming or trimming profiles should be as directed by the local authority lighting engineer.
- 8.19 As directed by the local authority and general street lighting design guidance, all external lighting shall produce only UV-free, narrow spectrum, low-intensity light output, with a wavelength of 550nm or more.
- 8.20 Until such times that constant lumen output systems become the 'norm', deterioration of light source flux over time, together with dirt accumulation on fittings, must be taken into account in the design by using the appropriate Maintenance Factor (MF). Where obtrusive lighting calculations are required a MF of 1.0 should always be used in order to present a worst-case scenario perspective.

## 9.0 LIGHTING LEVELS

- 9.1 Artificial lighting will be required as part of amenity, safe passage, security 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 and technical approval by the adopting local authority where required.
- 9.3 For the purposes of this assessment the PRoW route has been identified as a 'subsidiary access road', with the development deemed to be within an 'E2' Environmental Zone (Figure 5 above) with normal usage by pedestrians and cyclists. Therefore, in accordance with BS 5489-1:2020 Table A.5 a 'P5' lighting class has been deemed to be suitable as seen in Figure 7 below:

*Lighting classes for subsidiary roads*

Traffic flow	Lighting class		
	E1 to E4 <sup>A)</sup>	E1 to E2 <sup>A)</sup>	E3 to E4 <sup>A)</sup>
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy <sup>B)</sup>	P5	P4	P3
Normal <sup>C)</sup>	P5	P5	P4
Quiet <sup>D)</sup>	P6	P5	P4

*NOTE 1* Table A.5 assumes no parked vehicles; see risk assessment in [A.3.3.2](#).

*NOTE 2* An EV lighting class using vertical illuminance, from BS EN 13201-2:2015, Table 6, can be specified in addition to the general lighting class when there are particular concerns about crime and personal safety. EV is calculated at the typical height of a human face (1.5 m) and in relevant viewing orientations.

*NOTE 3* To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

*NOTE 4* The actual overall uniformity of illuminance,  $U_o$ , needs to be as high as reasonably practicable (see [7.2.6](#)).

*NOTE 5* The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N2].

*NOTE 6* The illuminance classes are suggested minimum levels. A risk assessment needs to be carried out to ensure that the light levels are adequate, particularly for pedestrians and cyclists.

**Figure 7 Table A5 – Lighting classes for subsidiary roads.**

- 9.4 Where the proposed lighting Class of 'P5' has been selected for the footpath, horizontal lighting illuminance levels are set out in the British Standards, these would be required as a minimum and are detailed below: -

### **P5**

Average maintained illuminance (Eav) = 3.00 Lux – 4.50 Lux

Minimum illuminance (Emin) = 0.60 Lux

Overall Uniformity = 0.20 Uo

## 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.
- 10.3 Any and all temporary lighting installed within the site should meet all requirements set out in the above 'Section 8.0 Lighting Design Requirements'.

### Post Construction

- 10.4 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.

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**

- 10.5 **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.
- 10.6 The effect of artificial light associated with the site is predicted to have a minor adverse effect on the environment if unmitigated. 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.
- 10.7 Any and all temporary lighting installed within the site should meet all requirements as set out in the above 'Section 8.0 Lighting Design Requirements'.



## 11.0

### MITIGATION MEASURES

#### During Construction

- 11.1 Mitigation of the effects of the lighting installation during construction phase will include the following:
- During construction, 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 satisfy the requirements of the ecologist 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 suitably installed, 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 6 metres to all adoptable and non-adoptable roads. It should be noted that if the mounting height is reduced there may be the requirement for the number of luminaires to be increased.

- 11.6 Lighting would need to be provided in the form of column mounted luminaires. Luminaires would be pointed directly into the development and away from the adjacent sites. The optics in the lanterns would be specified to control the distribution of light avoiding overspill, sky glow and glare. Black painted back shields shall be fitted to columns where appropriate.
- 11.7 Where lighting is installed within the site it should meet all the requirements as set out in the above 'Section 8.0 Lighting Design Requirements'.

## **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 PRow is bounded by an existing lit environment with the local centre adjacent to the route and the site is close to Stansted Airport 1.2 miles to the north west.
- 12.2 Although the introduction of artificial lighting at the site along the route could have an effect, the mitigation measures incorporated into the lighting strategy would mean that the significance of the overall impact is reduced and the resultant impact would be negligible.

### **Residual during construction**

- 12.3 It is considered that following the implementation of the mitigation measures outlined in Section 8.0 and 11.0 of this document. Overall, there will be minor adverse residual effect of lighting during the construction phase of the development site. Subject to sensitive lighting design, the effects on key areas of wildlife habitat identified in the ecology report is expected to be negligible.

### **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 Takeley as a whole. 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**

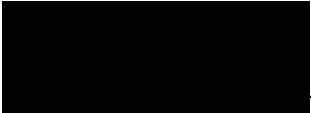
### **EXPLANATION ON THE OUTLINE DESIGN**

- 13.1 The initial design provided is demonstrated by the production of a drawing in PDF format. The drawing is showing horizontal illuminance with values ranging from 2 Lux down to 0.1 Lux. This is to demonstrate the light falling at the site boundary at ground level.
- 13.2 Any lantern in the design shown as backing on to a dark corridor, boundary or sensitive area is proposed to be fitted with a factory fitted black painted rear shield.
- 13.3 All luminaires across the site have been proposed using a 3000 Kelvin Correlated colour temperature (CCT) to minimise impact of the artificial lighting on ecologically sensitive areas.
- 13.4 3000K lanterns meets the requirements as set out in the Institution of Lighting Engineers Guidance Note Bats and artificial lighting in the UK and meets the requirements of the Bat Conservation Trust.
- 13.5 The use of 3000K lanterns will need to be agreed with Essex County Council before any works commence.
- 13.5 The client has indicated that there is no existing underground or overhead HV lines present or MP/IP/HP Gas Services. Current statutory service record plans should be obtained by the contractor/overseeing organisation before commencement of any street lighting installation or removal works.

**14.0 CONCLUSION AND SUMMARY**

- 14.1 In conclusion, subject to the implementation of the above proposals and agreements with the adopting Highway Authority, a compliant lighting scheme can be designed and installed with an acceptably low impact on the surrounding residential properties, sensitive boundaries, and wildlife. The likely cumulative effect of artificial lighting may be a slight increase in sky glow. However, given the baseline situation in the surrounding area to the development overall effects are not likely to be visual.
- 14.2 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.
- 14.3 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 and will serve to ensure that the safety and security of all areas of the development can be effectively maintained.
- 14.4 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.
- 14.5 The effects on sensitive receptors will be mitigated through following all the principles set out in this document and by the implementation of a stringent final detail lighting design.
- 14.6 Suitable detailed designs should meet all standard criteria as set out in the current local authority standard specification documents, current guidance documents from all appropriate and relevant institutes and all relevant British Standards that are appropriate to lighting.
- 14.7 All final detailed designs should be subject to a design check by the adopting local authority. Once detailed designs are checked and agreed then technical approval will be provided by the local authority. No lighting should be installed on site unless technical approval has been granted by the local authority.
- 14.8 This report has been prepared to the best of our knowledge, any lighting designs proposed shall be carried out by a competent lighting person in accordance with the Institution of Lighting Professionals guidance and recommendations.

Prepared by:  (Signed) ..... Simon Winch (Print Name) ..... 22<sup>nd</sup> September 2023 (Date)

Reviewed By: -  (Signed) ..... Mark Chandler (Print Name) ..... 22<sup>nd</sup> September 2023 (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 [REDACTED]

**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/m<sup>2</sup>).

**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