



Preliminary Environmental Information Report

Volume 4 Appendix 12.1

Scope of Lighting Impact Assessment

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Scope of Lighting Impact Assessment

1 Introduction

- 1.1.1 This report outlines the scope of works to be followed for the Lighting Impact Assessment of the River Thames Scheme (RTS or the 'project').
- 1.1.2 The methodology used for the production of the Lighting Impact Assessment is derived from ILP PLG04:2013 (ILP, 2013), which provides guidance on the undertaking of Lighting impact Assessments.

2 Description of Potential Effects

2.1 Summary

- 2.1.1 The RTS has the potential to cause several types of obtrusive light if there is inappropriate design of artificial lighting during both construction and operation. These include:
- Effects from light intrusion from exterior lighting on residents (through windows);
 - Effects from sources of luminous intensity on residents and visitors arising from project activities such as construction/maintenance lighting, security lighting, lighting of footpaths/recreational areas including stadium style lighting of sports pitches and bridge lighting recreational uses of the area, and users of active transport provision;
 - Effects from upward light (or sky glow);
 - Effects from disability glare on transport users; and
 - Effects from light on bats roosts and insects, and other protected wildlife.
- 2.1.2 An explanation of these types of obtrusive light, relevant guidance, and how each one will be assessed in the Lighting Impact Assessment is provided in the below sections.
- 2.1.3 Additionally, the effects that the project will have on local amenity and the night sky will be assessed.
- 2.2 Effects of light intrusion from exterior lighting on residents (through windows)

2.2.1 Light intrusion is the term used for the emitting of light into windows of residential property. Guidance notes from the Institution of Lighting Professionals (ILP) in 2021 (ILP, 2021) places a limit on the amount of vertical illuminance which falls upon the centre of a dwelling window dependant on the Environmental Zone the dwelling is located within (the zone being either E0: Protected, E1: Natural, E2: Rural, E3: Suburban or E4: Urban). Examples of lighting conditions for each Environmental Zone are provided in ILP, 2021 and recreated in Table 1.

Table 1: Environmental Zones

Zone	Description of Criteria	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 High district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations Town / City centres with high levels of night-time activity
E4	Urban	High district brightness	

** SQM (Sky Quality Meter) is referenced by the International Dark Skies Association (IDA). SQM is an instrument used to measure the luminance of the night sky. It is typically used by astronomers to quantify skyglow, using units of magnitudes per square arcsecond. the scale is between 16:00 (a bright night sky) and 22:00 (the least light pollution)*

2.2.2 The suggested maximum values will be relative to the amount of light measured as a baseline without the presence of the obtrusive light source.

2.3 Effects from sources of luminous intensity on residents, recreational users of the area and users of active transport provision

2.3.1 Luminous Intensity describes the emitting of light (intensity in cd) on an observer's eye. This has the potential to cause discomfort and glare.

2.3.2 The Lighting Impact Assessment will be informed by the most relevant sections of ILP Guidance Note 01/21: The Reduction of Obtrusive Light (ILP, 2021) to reduce the potential for obtrusive light from a wide range of exterior lighting applications. Depending on the lighting source proposed and receptor sensitivity, effects from lighting will be minimised by a number of measures. These measures could include position, choice of optic, positioning, tilt and the use of luminaire shields if necessary.

2.4 Effects from upward light (or sky glow)

2.4.1 Light emitted above the horizontal either directly from luminaires or indirectly as reflected light from surfaces such as the landscape or buildings, has the potential to cause sky glow. ILP guidance (ILP, 2021) places limits on the percentage of direct upward light emitted from the luminaires, which is dependent upon the Environmental Zone in which the project lies as shown in Table 2 (recreated from ILP, 2021).

Table 2: Maximum values of upward light ratio

Environmental Zone	E0	E1	E2	E3	E4
Upward light ratio (ULR) of luminaires / %	0	0	2.5	5	15

2.4.2 Indirect upward light is subject to surface reflectance properties. It is not easily quantifiable but is not as significant as direct upward light from luminaires, especially in locations classified as being within an Environmental Zone of E3 or higher.

2.5 Effects from disability glare on transport users

- 2.5.1 Disability glare reduces the ability to perceive any visual image and is caused by light scatter in the eye. Glare is a product of two main factors, the first being the direct illumination of the eye and the second being the ratio of luminance between the glare source and the background area.
- 2.5.2 The specification of luminaires with an appropriate G Class (G class is the glare class of a luminaire and is a measure of the luminous output at high angles) is used to mitigate the effect of Disability Glare along with limitations of the % Threshold Increment (the measure of the amount of disability glare using a ratio between luminance and background luminance) allowable for each road lighting class stated within British Standards.
- 2.5.3 Lighting will be designed such that glare is minimised in accordance with ILP guidance, and British Standards (BS EN 5489-1:2020 Code of Practice Design of road lighting - Lighting of roads and public amenity areas, and BS EN 13201-2:2015 Road Lighting, Performance Standards).

2.6 Effects from light on bats roosts and insects, and other protected wildlife

- 2.6.1 Light falling on a bat roost access point will delay some species of bats from emerging and this shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed.
- 2.6.2 In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats. There are two aspects to this - one is the attraction that light from certain types of lamps has to a range of insects; the second is the presence of lit conditions causing bats to exhibit their light adverse behaviours.
- 2.6.3 Limits on the levels of illuminance allowable on ecological buffers are provided within Guidance Note 8 published jointly by the ILP and Bat Conservation Trust (ILP (2023)) and by CIEEM in their UK Bat Mitigation Guidelines (CIEEM, 2023), this guidance will inform the Lighting Impact Assessment.
- 2.6.4 Potential disturbance from both construction and operational lighting to birds, otter, badger, amphibians, water vole and fish will be considered in

the lighting assessment and desk based study as required in accordance with the relevant guidance including:

- Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018); and
- Planning Practice Guidance, Badgers: advice for making planning decisions (Natural England, 2022).

3 Overview of approach and methodology for production of Lighting Impact Assessment

3.1.1 The ILP Lighting Impact Assessment guidance (ILP, 2013) recommends completion of the following to inform the assessment:

- Desk based assessment of the project area and its surrounds. The desk based assessment will comprise a review of relevant legislation and development plan policy to determine the key lighting policy at a regional and local level. The location of light sensitive receptors in and surrounding the project area will be identified with input from the project landscape/visual and ecology teams and will consider both construction and operational lighting.
- A baseline night time (plus daytime survey if required) lighting survey (if required) will be carried out using digital light meters to determine existing light conditions in the vicinity of the project and to classify the relevant Environmental Zone.
- Obtrusive light modelling of the project lighting design or a lighting strategy will be carried out based on the worst-case scenario.
- The modelling results will be used to inform the Lighting Impact Assessment based on the significance criteria presented in section 4 of this document.
- The assessment of the cumulative effects of the project in combination with other relevant developments.

4 Significance criteria to be used

4.1.1 The significance of an effect from artificial lighting will be based upon the sensitivity of the receptor and the magnitude of change at that receptor due to the revised conditions.

4.1.2 The sensitivity of the receptor will be classified as High, Medium, or Low according to the descriptions provided in Table 3 based on the fragility of the receiving environment and receptors within this.

Table 3: Criteria for Receptor Sensitivity

Sensitivity	Description of Criteria
High	<p>The environment is fragile and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.</p> <p>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).</p> <p>Human (Safety) - receptors where a change in the lighting has the potential to either dramatically improve or reduce safety (for pedestrians, drivers or workers).</p> <p>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.</p>
Medium	<p>The 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.</p> <p>Human (Amenity) – receptors which are sensitive to a change in lighting however not such that the quality of life would be affected.</p> <p>Human (Safety) - receptors where a change in the lighting has the potential to either improve or reduce safety (for pedestrians, drivers or workers).</p> <p>Ecological – where a change in the lighting affects the movement or feeding patterns of fauna but the receptor can adapt.</p>
Low	<p>The environment is adaptable and is resilient to change. Nearly all impacts can be absorbed within it without modifying the baseline conditions.</p> <p>Human (Amenity) – receptors which would not noticeably be aware of a change in lighting. (i.e. in areas of medium to high luminance).</p> <p>Human (Safety) - receptors where a change in the lighting has limited potential to affect safety (for pedestrians, drivers or workers).</p> <p>Ecological – area with limited wildlife.</p>

Sensitivity	Description of Criteria
Negligible	Receptor has little or no night-time activity.

4.1.3 The magnitude of change will be determined as being High, Medium, Low or Negligible, a description of the magnitude of change criteria is provided in Table 4. The assessment of magnitude of change will be based on the Environmental Zone requirements of ILP Guidance Note 01/21 (ILP, 2021), ecology guidance within ILP Guidance Note 8 (ILP, 2023), and the results of the baseline lighting survey.

Table 4: Criteria for Magnitude of Change

Magnitude of Change	Description of Criteria
High	A large change compared to the natural variations in background levels. A clear breach of limits and standards may occur. For example, levels of obtrusive light in the form of sky glow, light trespass or glare towards a receptor which exceeds the limits set within the ILP guidance for a higher Environmental Zone might classify as a high magnitude of change.
Medium	Change which is noticeable and may be a breach of limits and standards. In terms of the limits set in the ILP guidance this might equate to exceeding the limit but within the limits set for the next Environmental Zone.
Low	Change which, when compared to background levels, is only just noticeable.
Negligible	Change is not noticeable.

4.1.4 The scale of effect is derived through a matrix (Table 5), matching the sensitivity of the receptor, with the magnitude of the change.

Table 5: Scale of Effect Matrix

	High Sensitivity	Medium Sensitivity	Low Sensitivity	Negligible Sensitivity
High Magnitude of Change	Major	Major	Moderate	Negligible
Medium Magnitude of Change	Major	Moderate	Minor	Negligible
Low Magnitude of Change	Moderate	Minor	Negligible	Negligible
Negligible Magnitude of Change	Negligible	Negligible	Negligible	Negligible

4.1.5 The descriptions that have been adopted for each level of effect are summarised in Table 6, with effects identified as either beneficial or adverse.

Table 6: Likely Effects Description

Likely Effect	Description
Major beneficial	Substantial reduction in obtrusive light at sensitive receptors and/or users of the site such that large scale improvements to visual amenity, human safety or health is delivered. Significantly improves ecological habitats.
Moderate beneficial	Moderate reduction in obtrusive light at sensitive receptors and/or users of the site such that noticeable improvements to visual amenity, human safety or health are delivered. Improves ecological habitats.
Minor beneficial	Minor reduction in obtrusive light at sensitive receptors and/or users of the site such that perceptible improvements to visual amenity,

Likely Effect	Description
	human safety or health is delivered; perceptible improvement to ecological habitats.
Neutral/Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
Minor adverse	Minor increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Effects are reversible or temporary.
Moderate adverse	Moderate increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Requires monitoring and local remedial work. For example, lighting which is visible and causes nuisance to a sensitive receptor outside the site.
Major adverse	Major increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Requires extensive remedial works. For example, a floodlighting installation which directs light into the eyes of oncoming motorists causing disability glare and potential reduction in visual performance leading to an increased risk of collision.

4.1.6 An effect assessed as being greater than Moderate (both beneficial and adverse) is considered significant in terms of the effects of lighting.

4.1.7 If any lighting effects are identified to any of the receptors set out in the project Landscape and Visual Impact Assessment (LVIA), these effects will be considered and assessed as part of the LVIA where deemed relevant. If obtrusive lighting exceeds acceptable thresholds to ecological receptors this effect will be assessed as part of the biodiversity assessment in the Environmental Statement.

References

CIEEM (2023) UK Bat Mitigation Guidelines. [A guide to impact assessment, mitigation and compensation for developments affecting bats](#), accessed 22,09,2023.

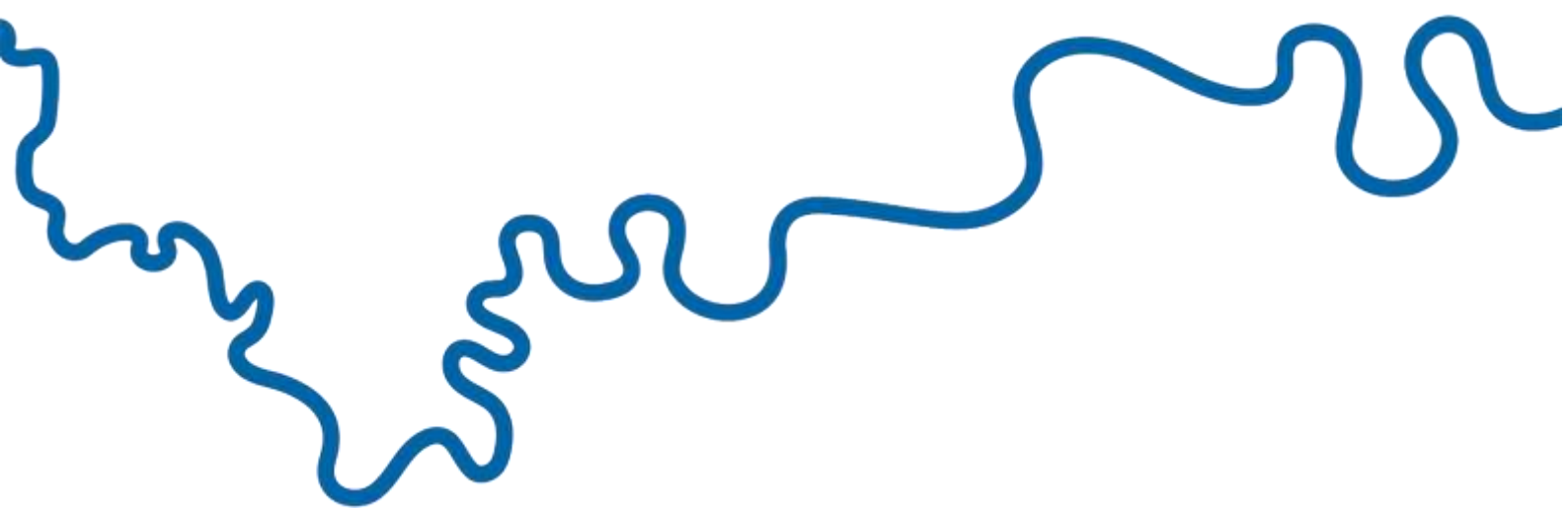
Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018).

ILP (2013) Guidance on Undertaking Environmental Lighting Impact Assessments.

ILP (2021) Guidance Note 01/21: The Reduction of Obtrusive Light. [Guidance Note 1 for the reduction of obtrusive light 2021 | Institution of Lighting Professionals \(theilp.org.uk\)](#), accessed 10,05,2023.

ILP (2023) Guidance Note 8 Bats and Artificial Lighting [Guidance Note 8 Bats and Artificial Lighting | Institution of Lighting Professionals \(theilp.org.uk\)](#), accessed 22,09,2023.

Natural England (2022) Planning Practice Guidance, Badgers: advice for making planning decisions.



The River Thames Scheme represents a new landscape-based approach to creating healthier, more resilient and more sustainable communities by reducing the risk of flooding and creating high quality natural environments.