

13 LIGHTING

Introduction

- 13.1 This Chapter has been prepared by Mott MacDonald and assesses the potential lighting effects of the Proposed Development.
- 13.2 The Proposed Development will include changes to current lighting levels and additional lighting provisions during both the construction and operation phases; these lighting elements have the potential to increase obtrusive light levels surrounding the Site. Therefore, an Environmental Lighting Impact Assessment (ELIA) has been prepared for the Proposed Development. This Chapter will present information to enable statutory consultees, members of the public and stakeholders to understand, identify and assess the likely significant effects of obtrusive light from the Proposed Development on human receptors.
- 13.3 For the purposes of this assessment the Proposed Development is considered as two elements as follows:
1. Stadium Proposals: All works taking place within the land known as the triangle up to the existing boundary of this area, and;
 2. Transport Works: All supporting works proposed to take place on the surrounding highway to support the Proposed Development.
- 13.4 The description of the Site and the surrounding area are detailed in Chapter 3 with the description of the Proposed Development being found in Chapter 4.
- 13.5 This Chapter details the following:
1. The relevant legal and policy framework that has informed the undertaking of this assessment,
 2. The methodology used to identify and assess likely significant effects,
 3. The baseline environmental conditions against which the effects of the Proposed Development are predicted;
 4. The proposed lighting elements, lighting standards, lighting levels used for the Proposed Development, mitigation embedded into the lighting design, and any additional mitigation (the lighting management plan),
 5. The likely significant effects that could result from the Proposed Development during the construction and operation of the Proposed Development, with measures that have been adopted (embedded mitigation), and to be adopted (additional mitigation) as part of the Proposed Development are described.
 6. Residual effects taking into account any additional mitigation, and a summary of the residential effects after mitigation of the Proposed Development is provided.

Legislation and Policy

Introduction

13.6 The following section identifies national and local planning policies along with guidance relevant to lighting for the Proposed Development.

Legislation

13.7 The Clean Neighbourhoods and Environment Act (CNEA) 2005 amended Section 79 of the Environmental Protection Act 1990 to include “artificial light emitted from premises so as to be prejudicial to health or a nuisance”.

13.8 The CNEA states that this does not apply to defence infrastructure, airports, harbour premises, railway premises, tramway premises, bus stations and any associated facilities, public service vehicle operating centres, goods vehicle operating centres, lighthouses and prisons. Additional guidance is provided by the government website GOV.UK, “Guidance on Artificial light nuisances: how councils deal with complaints”, and states that street lighting is also excluded.

13.9 Local Authorities are provided with powers to serve abatement notices to premises with artificial lighting installations deemed to be causing a nuisance. There is however no definition provided on the levels of artificial lighting which could be considered as a statutory nuisance.

13.10 Section 103 of CNEA allows the defence of best practicable means where artificial lighting is emitted from industrial, trade or business premises or where lighting is used for an outdoor relevant sports facility.

National Policies

13.11 The Department for Communities and Local Government, Revised National Planning Policy Framework (NPPF), December 2023 provides guidance on the Government’s planning policies.

“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: c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation”. (NPPF, Section 15, Paragraph 171, December 2023).

National Guidance

13.12 The Department for Communities and Local Government Planning Practice Guidance (2021) sets out planning policies and the governments expectations of how these should be applied. The guidance provides a section on Light Pollution (2019) and provides guidance on the following:

1. What light pollution considerations does planning need to address?
2. What factors can be considered when assessing whether a development proposal might have implications for light pollution?
3. What factors are relevant when considering where light shines?
4. What factors are relevant when considering when light shines?
5. What factors are relevant when considering how much light shines?
6. What factors are relevant when considering possible ecological impacts of lighting?
7. What other information is available that could inform approaches to lighting and help reduce light pollution?

Local Policies

13.13 The relevant local authority for the Proposed Development is the Cherwell District Council. Planning policy detailed within Cherwell District Council – The Cherwell Local Plan 2011 – 2031 Part 1 (adopted 20 July 2015) and the saved policies retained from the Cherwell Local Plan 1996 will inform this Chapter (**Table 13.1**).

Table 13.1: Local policies relevant to the lighting of the Proposed Development

| Policy Document | Policy Title | Relevant Text |
|---|---|---|
| Cherwell District Council – The Cherwell Local Plan 2011 – 2031 Part 1 (adopted 20 July 2015) | ESD 15: The Character of the Built and Historic Environment | Successful design is founded upon an understanding and respect for an area’s unique built, natural and cultural context. New development will be expected to complement and enhance the character of its context through sensitive siting, layout and high quality design. All new development will be required to meet high design standards. Where development is in the vicinity of any of the District’s distinctive natural or historic assets, delivering high quality design that complements the asset will be essential. New development proposals should: ... Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation, ... The Council will provide more detailed design and historic environment policies in the Local Plan Part 2. The design of all new development will need to be informed by an analysis of the context, together with an explanation and justification |

| | | |
|--------------------------|------|---|
| | | of the principles that have informed the design rationale. This should be demonstrated in the Design and Access Statement that accompanies the planning application. The Council expects all the issues within this policy to be positively addressed through the explanation and justification in the Design & Access Statement. Further guidance can be found on the Council's website. |
| Cherwell Local Plan 1996 | ENV1 | Development which is likely to cause materially detrimental levels of noise, vibration, smell, smoke, fumes or other type of environmental pollution will not normally be permitted. |

Design Standards and Guidance Documents

13.14 The proposed lighting will be assessed in accordance with the following European and British standards and guidance documents.

1. BS 5489-1:2020, Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas (2020),
2. BS EN 13201-2:2015, Road lighting – Part 2: Performance requirements (2015),
3. BS EN 12464-1:2011 - Light and Lighting – Lighting of work places Part 1: Indoor work places (2021),
4. BS EN 12464-2:2014 - Light and Lighting – Lighting of work places Part 2: Outdoor work places (2014),
5. BS EN 12193:2018 - Lighting and Lighting – Sports Lighting (2018),
6. BS 8300-1:2018 - Design of an accessible and inclusive built environment – Part 1: External environment – Code of practice (2018),
7. CD 109:2020 – Design Manual for Roads and Bridges (DMRB) – Highway Link Design March 2020,
8. TD 501:2020 – DMRB – Road Lighting Design March 2020,
9. CIE 150:2017 - International Commission on Illumination, Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, 2nd Edition (2017),
10. ILPGN01:2021 – Guidance Note The Reduction of Obtrusive Light, GN01 (2021),
11. ILP PLG04:2013 - Professional Lighting Guide 04, Guidance on Undertaking Environmental Lighting Impact Assessments (2013),
12. ILP PLG05:2014 - Professional Lighting Guide 05, the Brightness of Illuminated Advertisements (2014),
13. ILP GN08:2023 - ILP and Bat Conservation Trust Guidance Note 08/23 Bats and Artificial Lighting in the UK, Bats and the Built Environment series (2023),
14. ILP GN10:2019 – ILP Guidance Note 10/19 Night-Time Photography (2019),
15. ILP TR12:2007 – ILP Technical Report 12 Lighting of Pedestrian Crossings (2007),
16. Bats and Lighting – Overview of Current Evidence and Mitigation. Stone, Emma (2014),

17. CIBSE/SLL LG06:2016 – Chartered Institution of Building Services Engineers (CIBSE) and The Society of Light and Lighting (SLL), LG06 Lighting Guide 6: The exterior environment (2016),
18. CIBSE/SLL LG04:2023 – CIBSE and SLL, Lighting Guide 4: Sports Lighting (2023),
19. The Society of Light and Lighting (SLL) Code for Lighting (2022),
20. SLL – Lighting Guide 12 – Emergency Lighting Design Guide (2022),
21. SLL Lighting Guide 21: Protecting the night-time environment (2021),
22. Premier League Stadium Fund – LED Floodlighting Specification (2023),
23. Sport England Design Guidance Note: Artificial Sport Lighting (2012)
24. The Football Association – The FA Guide to Floodlighting (2013),
25. English Football League (EFL) Handbook 2023-2024.
26. BS EN 1838: 2013 Emergency Lighting – Lighting Applications (2013), and
27. BS 5266-1:2016 Emergency lighting. Code of practice for the emergency lighting of premises (2016).

13.15 The remainder of this Chapter considers that these documents are current. However, prior to carrying out further assessment or design work these documents should be verified as current and, if superseded, the standards and lighting levels discussed in this Chapter should be reassessed.

Assessment Methodology and Significance Criteria

Introduction

13.16 This section outlines the methodology adopted in the writing of this Chapter.

Scope of Assessment

13.17 The Proposed Development will incorporate various elements of artificial lighting. This Chapter will evaluate the impacts of the proposed lighting installation and will:

1. Identify and describe the baseline lighting conditions surrounding the Site and the conditions at the identified receptor locations,
2. Identify and describe the artificial light currently affecting the Site and surrounding identified lighting receptors,
3. Provide a description of the proposed lighting standards and associated lighting design information that will be utilised to inform the assessment of obtrusive light (sometimes referred to as light pollution),
4. Provide the limitations of obtrusive light for the environmental zone in accordance with the guidance provided in ILP GN01:2021,
5. Identify design interventions and provide guidance on mitigation measures, with a view to reducing potential impacts to a negligible magnitude,
6. Identify predicted impacts of obtrusive light using qualitative assessment techniques.

- 13.18 The guidance provided in the ILP PLG04:2013 will be used to undertake the lighting assessment in conjunction with ILP GN01:2021.
- 13.19 Due to the level of development in the lighting design, a qualitative assessment will be used to assess the potential effects of the Proposed Development. This assessment is based on the proposed lighting levels and equipment specifications where these are available.
- 13.20 The assessment of the overall effects on bats and other species, landscape and cultural heritage do not form part of this Chapter. These will be assessed by other relevant specialists as required, with the assessment detailed within the relevant Chapter with these Chapters using information present in this Chapter to inform their assessments.
- 13.21 The effects of obtrusive light on the identified human receptors will be assessed in this Chapter.

Baseline Assessment Methodology

- 13.22 Receptors in the vicinity of the Proposed Development were identified through an initial desk based study of the area, this involved a review of ordnance survey maps, plans, aerial photography, street view photography, Campaign for the Protection of Rural England (CPRE) Night Blight interactive mapping and GIS datasets (Residential properties, statutory designations, local environmental designations, biodiversity, heritage, community and design data) to identify likely receptor locations. This was further informed by a study of potential lighting receptors. For example, residential properties, rail lines, and road users that are in proximity to areas identified as being lit as part of either the construction or operational phase of the Proposed Development. Receptor sites were then chosen to allow the identification of baseline lighting conditions and an assessment of potential impacts on people and the environment in which they live, work or travel.
- 13.23 The receptor locations were confirmed through liaison with other specialist (Landscape and Visual (Chapter 7), Ecology and Nature Conservation (Chapter 8) and Cultural Heritage and Archaeology (Chapter 9)).
- 13.24 A Scoping Report was submitted (2023)ⁱ and a scoping opinion received which stated agreement with the approach presented.
- 13.25 Receptor locations were chosen to allow the identification of baseline lighting conditions, and an assessment of potential impacts on people and the environment in which they live. Refer to Lighting Receptor and Environmental Zone Plans provided within **Figure 13.1** (100111993-MMD-00-XX-GIS-Y-0003) and **Figure 13.2** (100111993-MMD-00-XX-GIS-Y-0004) for further details.

- 13.26 An assessment of each receptor location within **Table 13.2** was undertaken during the day and at night. These were evaluated in terms of their direct and intermittent views towards the Proposed Development, and whether existing screening is likely to prevent spill light, views of luminous intensity or sky glow. Day and night-time photographs were taken from each location at a height of 1.7m (representative of adult eye height).
- 13.27 To record the baseline lighting levels at each receptor location, four vertical readings of illuminance were taken with the sensor of the light meter pointed north, east, south, and west at a height of approximately 2m. One horizontal reading was taken at ground level. Some contextual measurements were also recorded and these are noted within the relevant tables. This provides information on the levels of ambient light at each receptor location.

Equipment Utilised

- 13.28 A Konica Minolta T-10A illuminance meter (Serial Number 20017001) was used for all on site light readings in lux (lumen/m²). The hand-held meter is maintained and calibrated in accordance with the manufacturers' instructions (the Certificate of Calibration can be found in **Appendix 13.1**).
- 13.29 The camera utilised for the on-site photography was a Nikon D3200 SLR with 35mm fixed focal length lens and a tripod.

Summary of Receptor Locations

- 13.30 The lighting receptors identified during the desk-top study were reviewed and further receptors have been advised by biodiversity, landscape, and heritage specialists.
- 13.31 A summary of the locations and a description of each lighting survey receptor are shown in **Table 13.2**. Refer to Lighting Receptor Plan (100111993-MMD-00-XX-GIS-Y-0003) provided within **Figure 13.1** for further details.

Table 13.2: Summary of lighting survey receptor locations

| Receptor Location No. | Easting | Northing | Description of Receptor Location | Receptor Designation |
|------------------------------|----------------|-----------------|---|-----------------------------|
| LR01/L01 | 449930 | 212152 | Oxford Road – Lit Traffic Route (40mph) East of the Site | Human-Safety |
| LR02/L02 | 449881 | 212259 | Kidlington Roundabout – Roundabout North of the Site | Human-Safety |
| LR03/L03 | 450045 | 211930 | West Eaton Bridge / Oxford Parkway Station – Traffic Route (40mph) East of the Site, and Rail Route | Human-Safety |
| LR04/L04 | 449764 | 212181 | Frieze Way (A4260) – Partially Lit Traffic Route (60mph) West of the Site | Human-Safety |

| Receptor Location No. | Easting | Northing | Description of Receptor Location | Receptor Designation |
|-----------------------|---------------|-----------------------------|--|----------------------------|
| LR05/L05 | 449845 | 212414 | Residential Dwellings on Oxford Road | Human-Amenity |
| LR06 / H01 | 449666 | 212325 | Stratfield Farm – Grade 2 listed building. Currently used as a residential dwelling. | Human-Amenity and Heritage |
| LR07 / H02 | 449356/449155 | 211316/211279 ⁱⁱ | Frieze Farm – Grade 2 listed building. Currently used by Versantus as an office space. | Human-Amenity and Heritage |
| E01 | 449864 | 212164 | Northern Boundary Apex – Planted Boundary of the Site | Ecology |
| E02 | 449979 | 211963 | Southeast Boundary Corner – Planted Boundary of the Site | Ecology |
| E03 | 449752 | 211949 | Southwest Boundary Corner – Planted Boundary of the Site | Ecology |

Source: Mott Macdonald Ltd 2023

Environmental Zone

13.32 To define the maximum permissible levels of obtrusive light, an objective appraisal to classify the Proposed Development in terms of its 'environmental zone', which equates to the district brightness of the surroundings (see **Table 13.3** for environment zone information) has been carried out.

13.33 In the case of a Site being between two possible environmental zones, ILP guidance recommends that the most stringent environmental zone of the two options to achieve is assigned for assessment purposes. In this case it could be argued that the environmental zone is either E2 or an E3 zone (as outlined in **Table 13.3**), therefore in line with ILP guidance, the E2 zone has been assigned for assessment purposes.

Table 13.3: Environmental zone

| Zone | Surroundings | Lighting Environment | Examples |
|------|--------------|---|--|
| E0 | Protected | Dark (SQM 20.5+) | Astronomical Observed 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 or suburban locations |
| E4 | Urban | High District Brightness | Town/city centres with high levels of night time activity |

Source: ILP GN01:2021

Notes to **Table 13.3**:

Note 1 – Where an area to be lit lies close to the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.

Note 2 – Rural zones under protected designations should use a higher standard of policy.

Note 3 – Zone E0 must always be surrounded by an E1 Zone.

Note 4 – Zoning should be agreed with the local planning authority. Due to local requirements a more stringent zone classification may be applied to protect special / specific areas.

Note 5 – 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). The criteria for zone E0 was revised in mid 2019, with the new requirements not being made retrospective.

Note 6 – Astronomical Observable Dark Skies will offer clearer views of the Milky Way and of other objects such as the Andromeda Galaxy and the Orion Nebula.

Note 7 – Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their own relative intrinsic value in the UK.

Obtrusive Light Limitations

13.34 A lighting installation located in an area deemed to be more sensitive will understandably equate to greater constraints with regards to obtrusive light. **Table 13.4** to **Table 13.9** detail the maximum permissible levels of each light parameter for an E2 Zone.

Table 13.4: Limits for upward light ratio and spill light

| Environmental Zone | Maximum values of upward light ratio (ULR)/% of luminaires*1 | Illuminance in the vertical plane (E _v) (Lux)*2 | |
|--------------------|--|---|-------------|
| | | Pre-curfew | Post-curfew |
| E2 | 2.5 | 5 | 1 |

Source: ILP GN01:2021

Notes to **Table 13.4**:

*1 Table 5 CIE 150:2017

Note 1 (ULR) – This is the primary approach to limit skyglow and is suitable to compare different single luminaires and mitigate the contribution of each luminaire within an installation.

Note 2 (ULR) – This does not take into account the effect of light reflected upwards from ground that also contributes to skyglow.

Note 3 (ULR) – Some lighting schemes will require the deliberate and careful use of upward light, e.g., ground recessed luminaires, ground mounted floodlights and festive lighting, to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments.

*2 Table 2 CIE 150:2017

Note 1 (light intrusion) – Limits apply to nearby dwellings / premises or potential dwellings / premises and specifically windows. The values are the summation of all lighting installations.

Note 2 – Curfew refers to the time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied the local planning department. Depending upon application curfew times often commence between 21:00 to 23:00 and may run until 07:00. However, exact curfew hours should be carefully applied to ensure the reduction of obtrusive light is prioritised within the immediate environment and towards sensitive human as well as fauna and flora receptors.

Table 13.5: Limits for the luminous intensity of bright luminaires

| Light technical parameter*1 | Applicable Conditions | Luminaire group (projected area A _p in m ²) | | | | | |
|---|-----------------------|--|----------------------------|---------------------------|---------------------------|---------------------------|----------------------|
| | | 0<A _p ≤0.002 | 0.002<A _p ≤0.01 | 0.01<A _p ≤0.03 | 0.03<A _p ≤0.13 | 0.13<A _p ≤0.50 | A _p > 0.5 |
| Maximum luminous intensity emitted by luminaire (I in cd) | E2 | | | | | | |
| | Pre-curfew | 0.57 d | 1.3 d | 2.5 d | 5.0 d | 10 d | 7,500 |
| | Post-curfew | 0.29 d | 0.63 d | 1.3 d | 2.5 d | 5.1 d | 500 |

Source: ILP GN01:2021

Notes to **Table 13.5**:

*1 Table 3 CIE 150 2017

Note 1 – d is the distance between the observer and the glare source in metres.

Note 2 – A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions.

Note 3 – A_p is the apparent surface of the light source seen from the observer position.

Note 4 – For further information refer to Annex C of CIE 150:2017.

Note 5 – Upper limits for each zone shall be taken as those with column $A_p > 0.5$.

Table 13.6: Maximum values of threshold increment and viewing direction in the path of travel

| Light technical parameter*1 | Road classification | | | |
|-----------------------------|--|--|--|--|
| | No road lighting | M6/M5 | M4/M3 | M2/M1 |
| Veiling luminance (L_v) | 0.037 cd/m ² | 0.23 cd/m ² | 0.40 cd/m ² | 0.84 cd/m ² |
| Threshold increment (TI) | 15% based on adaption luminance of 0.1 cd/m ² | 15% based on adaption luminance of 1.0 cd/m ² | 15% based on adaption luminance of 2.0 cd/m ² | 15% based on adaption luminance of 5 cd/m ² |

Source: ILP GN01:2021

Notes to **Table 13.6:**

*1 Table 4 CIE 150:2017

Note 1 – Road classifications as given in CIE 115:2010.

Note 2 – The veiling luminance values specified in this table are based upon permissible TI value of 15%.

Table 13.7: Maximum values of threshold increment for residential roads

| Light technical parameter | Road classification | | | | | | |
|---------------------------|---------------------|----|----|----|----|----|----|
| | P7 | P6 | P5 | P4 | P3 | P2 | P1 |
| Threshold increment | Not Determined | 35 | 30 | 30 | 25 | 25 | 20 |

Source: BS EN 13201-1:2015

Table 13.8: Maximum permitted values of average surface luminance (cd/m²)

| Light technical parameter*1 | Application conditions | Environmental Zones |
|-------------------------------------|---|-----------------------|
| | | E2 |
| Building façade luminance (L_b) | Taken as the product of the design average illuminance and reflectance divided by n. | 5 cd/m ² |
| Sign luminance (L_s) | Taken as the product of the design average illuminance and reflectance divided by π (π), or for self-luminous signs, its average luminance. | 400 cd/m ² |

Source: ILP GN01:2021

Notes to **Table 13.8:**

*1 Table 7 CIE 150:2017

Note 1 – The values apply to both pre- and post-curfew, except that in Zones 0 and 1 the values shall be zero post curfew. The values for signs do not apply to signs for traffic control purposes.

Table 13.9: Maximum permitted recommended luminance of illuminated advertisements (cd/m²)

| Illuminated Area (m ²) | Zone E2 |
|------------------------------------|-----------------------|
| Up to 10 | 400 cd/m ² |
| Over 10 | 200 cd/m ² |

Notes to **Table 13.9:**

Note 1- For digital signs when the content may change then the rate of change should be limited to once every five seconds. Moving images, animation, video, or full motion images should not be displayed at locations where they could present a hazard for example if they could be seen by driver in moving traffic. During the daytime sign luminance should never exceed 5000cd/m².

Note 2 – LPAs may wish to impose additional controls by setting limit on the times when the illuminated advertisements may be lit.

Note 3 – The above recommendations for maximum luminance may not apply to recognised display centres, such as Piccadilly Circus, which must be considered as special cases. Recognised display centre usually exhibit the following features:

- a) Concentration of illuminated advertisements, some of which do not relate to the business premises on which they are erected.
- b) Extensive use of animation.

Note 4 – Mounting of illuminated advertisements well above the building frontage height. In such instances an approach based on advertisements with an illuminated area greater than 10m² having a maximum luminance of 1000cdm² would be a reasonable starting point, depending on the precise nature and extent of the installation.

Assessment Methodology

13.35 The ELIA will consider each identified receptor and the potential impacts from the lighting associated with the Proposed Development and will evaluate whether the limitations detailed in **Table 13.4** to **Table 13.9** and visualised in **Figure 13.3** will be exceeded in terms of the following:

1. Sky Glow – The brightening of the sky at night by artificial light sources including light emitted directly upward from the light source and reflected from the ground or surface;
2. Spill Light – Light that falls beyond the boundary of the area being lit;
3. Building and Sign Luminance – The overly bright appearance of buildings facades and/or illuminated signs and advertisements;
4. Luminous Intensity – The measure of the amount of light that a source radiates in a given direction;
5. Discomfort/Disability Glare – The measure of the uncomfortable brightness of a light source when viewed against a darker background for highway users; and
6. Light Intrusion (into Windows) – Light intrusion is a level of illuminance emitted onto dwelling windows that has the potential to disrupt the amenity of those living within the dwelling. Levels of light intrusion are defined based on the environmental zone a receptor (dwelling) is located within.

13.36 The impacts of artificial lighting for the Proposed Development will have varying levels of significance and will be assessed based on the changes in obtrusive light experienced by each identified receptor. The level of effect is presented on a scale of Minor, Moderate, Major, or None/Negligible. The resulting overall effect can be described as beneficial, neutral, or adverse.

13.37 The effects of lighting evaluated from the criteria detailed within GN01:2021 and PLG04:2014 is assessed using the effects table provided within ILP PLG04:2013, as shown in **Table 13.13**. This guidance provides no methodology for assessing the environmental value (or sensitivity) of receptors in terms of lighting, or the magnitude of effect experienced by such receptors. Therefore, a standard EIA method has been adapted for lighting (**Table 13.10** and **Table 13.11**), and professional judgement will be used to assess receptor sensitivity and magnitude of effect.

13.38 The sensitivity of a receptor is based on the environmental zone the receptor is located within, the baseline lighting conditions experienced by the receptor, and the likelihood of the receptor experiencing changes from the Proposed Development (**Table 13.10**).

Table 13.10: Value/Sensitivity of Receptor

| Sensitivity | Criteria for Assessing Sensitivity |
|--------------------|---|
| High | The receptor has little ability to absorb change without fundamentally altering its present character, is of high environmental value, or is of international or national importance (e.g., SPA, AONB). For example: Receptors which are sensitive to a change in lighting such that the quality of life would be affected, or receptors where a change in the lighting has the potential to either dramatically improve or reduce safety. This could be a receptor located within a E0/1 environmental zone, and/or with a baseline that is assessed as being close to the limits of obtrusive light for the identified environmental zone, and that is in close proximity to the proposed lighting and has unobstructed views. |
| Medium | The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance. For example: receptors which are sensitive to a change in lighting however not such that the quality of life would be affected, or receptors where a change in the lighting has the potential to either improve or reduce safety. This could be a receptor located within a E2 environmental zone, and/or with a baseline that is assessed as being moderately close to the limits of obtrusive light for the identified environmental zone, and has semi obstructed views of the proposed lighting. |
| Low | The receptor is tolerant of change without detriment to its character, is of low environmental value or is of low or local importance. For example: receptors which would not noticeably be aware of a change in lighting. (i.e., in areas of medium to high luminance) or the lighting has limited potential to affect safety. This could be a receptor located within a E3 environmental zone, or with a baseline that is assessed as being noticeably below the limits of obtrusive light for the identified environmental zone, and has largely obstructed views of the proposed lighting. |
| Negligible | The receptor is resistant to change or is of little environmental value. For example: Receptor has little or no night-time activity. This could be a receptor located within a E3/4 environmental zone, or with a baseline that is assessed as being significantly below the limits of obtrusive light for the identified environmental zone, and has obstructed views of the proposed lighting. |

Source: Mott MacDonald Ltd 2023 and Environmental Statement Chapter 2

13.39 The effects of lighting are evaluated based on the limitations (for each environmental zone) provided within ILP – Guidance Notes for the Reduction of Obtrusive Light, GN01:2021 which will result in a magnitude of effect assessment as detailed within **Table 13.11**. The assessment of magnitude of effect will include mitigation that is embedded into the lighting design and is informed by the baseline conditions of the receptor.

Table 13.11: Magnitude of Effect

| Magnitude of Effect | Criteria of assessing the Magnitude of Effects |
|----------------------------|---|
| High | Total loss or major alteration to key elements or features of the baseline (pre-development) conditions such that the post development character/composition will be fundamentally changed. For example: A clear breach of obtrusive lighting limits and/or lighting standards may occur. Levels of obtrusive light in the form of sky glow, spill light or glare towards a receptor which exceeds the limits set within the ILP guidance for a less stringent Environmental Zone may classify as a high magnitude of change in combination with the baseline. |

| | |
|------------|--|
| Medium | Loss or alteration to one or more key elements or features of the baseline conditions such that post development character/composition of the baseline will be materially changed. For example: May be a breach of obtrusive lighting limits and/or lighting standards. In terms of the limits set in the ILP guidance this may equate to exceeding the limit of the environmental but in a way that is only just within the limits set for the next least stringent environmental zone in combination with the baseline. |
| Low | A minor shift away from the baseline conditions. Change arising will be detectable but not material. The underlying character/composition of the baseline condition will be similar to the baseline conditions. For example: Levels of obtrusive light are within the requirements of the environmental zone and will not result in an exceedance of the environmental zone in combination with the baseline, but is resulting in a change. |
| Negligible | Very little change from the baseline conditions. Change barely distinguishable, approximating to a 'no change' situation. For example: Levels of obtrusive light experienced by a receptor are below the requirements for the next most stringent environmental zone, as to be barely distinguishable from the baseline conditions. |

Source: Mott MacDonald Ltd 2023 and Environmental Statement Chapter 2

13.40 The sensitivity of a receptor combined with the magnitude of the effect upon the receptor is then compared within the significance of effect matrix to define the overall effect (**Table 13.12**).

Table 13.12: Significance of Effect

| Magnitude of Effect | Sensitivity of Receptor | | | |
|---------------------|-------------------------|----------------|------------------|------------|
| | High | Medium | Low | Negligible |
| High | Major | Major/Moderate | Moderate/Minor | Negligible |
| Medium | Major/Moderate | Moderate | Minor | Negligible |
| Low | Moderate/Minor | Minor | Minor/Negligible | Negligible |
| Negligible | Negligible | Negligible | Negligible | Negligible |

Source: Environmental Statement Chapter 2

13.41 Where an effect is classified as falling into one of two levels of significance (Major/Moderate, Moderate/Minor or Minor/Negligible) professional judgement is used to define which of the levels of significance is most applicable.

13.42 Effects classified as Moderate or above are considered to be significant effects, and secondary mitigation may be required to reduce these effects. Effects classified as Minor are not considered significant, but it may be prudent to implement secondary mitigation. Negligible effects equate to no perceptible change and secondary mitigation will have no measurable or perceptible effect.

13.43 Once the significance of an effect is defined using the matrix in **Table 13.12** taking account of embedded and secondary mitigation, the nature of the effect is then confirmed using **Table 13.13** to confirm whether the effects is beneficial, neutral or adverse and if remedial measure or additional mitigation is appropriate.

Table 13.13: Effects Table

| Nature | Ref | Level | Description | Remedial Needs |
|------------|-----|-----------------------------|---|--|
| Beneficial | 1 | Major beneficial effects | Significant improvements in night environment and/or reductions in glare, spill light and sky glow etc. | No remedial/mitigation measures required. |
| | 2 | Moderate beneficial effects | Noticeable improvements in night environment and/or reductions in glare, spill light and sky glow etc. | |
| | 3 | Minor beneficial effects | Slight improvements in night environment and/or reductions in glare, spill light and sky glow etc. | |
| Neutral | 4 | None / negligible | No significant impact or overall impacts balancing out. | No remedial/mitigation measures required. |
| Adverse | 5 | Minor adverse effects | Slight increase in visibility of site, glare, and sky glow etc. | Develop appropriate levels and types of mitigation |
| | 7 | Moderate adverse effects | Noticeable increase in visibility of site, glare, and sky glow etc. | |
| | 8 | Major adverse effects | Significant problems with increase in visibility of site, glare, and sky glow etc. | |

Source: ILP PLG04:2013 Table 12

Assumptions and Limitations

- 13.44 The Environmental Health Department for Cherwell District Council was contacted on the 26/09/2023 and 11/10/2023 regarding the assessment of the environmental zone, the assessment of lighting receptors, and the curfew times for obtrusive light that are proposed. No response was received, and it is assumed that the information provided to them and that is detailed within this Chapter is acceptable.
- 13.45 A Scoping Report was submitted (2023) and the scoping opinion received did not request any revision to the environmental zone assessment that was provided within the scoping report, and did not provide a curfew for obtrusive light.
- 13.46 It is currently assumed that dimming curfew times will apply from 23:00 on non-match days and 00:00 on match days – subject to the hours of use and further consultation with Cherwell District Council during the detailed design.
- 13.47 Projects in the earlier stages of design often do not have fixed lighting designs for all elements of the proposal; this is the case with the Proposed Development, with no detail of locations, orientations, mounting angles, photometry etc. available for illuminated signage (including advertising), external building lighting (façade), field of play lighting, internal building lighting, projectors, car park lighting, road lighting, pedestrian walkway lighting, loading bay lighting, and wayfinding lighting. For further details of lighting proposals refer to **Appendix 13.3** and **Figure 13.5**.

When a detailed lighting design is not available it is not possible for the proposed lighting to be modelled within lighting simulation/calculation software. Therefore, simulated results of calculations cannot be provided or reported. Instead, a qualitative assessment of the likely effects has been provided based upon professional judgement and experience, along with a framework of limitations and mitigation measures to set the basis for all future lighting design for Proposed Development which can be subject to planning conditions.

- 13.48 When lighting design calculations are carried out site constraints often limit the most efficient position of light fittings. Often in these situations slight over lighting of areas is a result of a designer's need to compromise ideal positions or spacing between luminaires. As such, the qualitative assessment of lighting impacts assumes that the achieved levels of lighting for each application would be slightly beyond the minimum required levels discussed within this Chapter.
- 13.49 Baseline survey lighting measurement results are ground based or at 2m above ground and are not taken at the windows of the identified receptors.
- 13.50 The assessment of the overall effects on bats and other species do not form part of this Chapter.
- 13.51 Upward flux ratio has also been de-scoped from this assessment as this is only required where there is a defined performance requirement, specialised fauna growth lighting systems (such as those used to promote grass growth) and proximity to optical observatories or lies within an E1 environmental zone which abuts a dark sky protected E0 environmental zone. The Hanwell Community Observatory is located near Banbury, approximately 32 km from the Site (as the crow flies). This observatory focuses on community engagement and education and the built up areas of Banbury and Kidlington are located between the community observatory and the Site. Therefore, the Proposed Development is not predicted to be a visible addition to the night time scene when the obscuring nature of the Banbury and Kidlington lighting are considered. As such, upward flux ratio is de-scoped with upward light ratio being used to assess effects on sky quality.
- 13.52 Trees and all other vegetation have been ignored for the purpose of this assessment to provide a 'worst case' assessment, i.e. in winter when vegetation is minimal, or to allow for vegetation to be removed in the future.
- 13.53 It is assumed that detailed obtrusive light calculations will be conducted at a later stage of the design process, and that the limitations and mitigation detailed within this Chapter will be implemented within the development of the lighting design.
- 13.54 A maintenance factor is a luminaire and lamp specific de-rating factor applied to lighting calculations to allow for lumen depreciation of a light source over time and a predicted amount of dirt build up on the glazing of the lantern given its height and the pollution category of the area. Maintenance

factors are utilised within the design calculations to prove that an installation will have compliant lighting levels on a worst-case basis. In these situations, worst case would be at the end of the maintenance cycle when the light source has depreciated the most and the glazing of the lantern is the dirtiest.

- 13.55 For the purpose of obtrusive light assessment, a maintenance factor of 1 (no de-rating) will be included as this accounts for the worst-case scenario for obtrusive light. This considered the effects of the installation on the first day of its use or immediately after it has been maintained. As such, the qualitative assessment of lighting impacts assumes that the achieved levels of lighting for each application would exceed the minimum required levels discussed within this Chapter by 25%.
- 13.56 If any significant changes are implemented during design development, or as a consequence of value engineering, that have potential to increase the levels of obtrusive light, it is recommended that the lighting assessment is re-performed.
- 13.57 Due to adverse weather conditions including high wind and associated prolonged exposure times required for night time photography, some photographs may appear to suffer from motion blur. However, these images are representative of the night time scene.
- 13.58 Where lighting information is not made available within applications pertaining to the cumulative developments, it is assumed that all lighting works will follow best practice as per British Standards and ILP guidance, and that all reasonable mitigation will be included within the lighting designs for these cumulative developments.
- 13.59 Where the lighting for the entrance for the Site interacts with the existing lighting for Oxford Road and Frieze Way (A4260) the lighting levels require liaison with the highway authority. It is currently assumed that these areas are likely lit to an M3/C2 lighting class as worst-case.
- 13.60 London Oxford Airport is not included as a receptor to the effects of obtrusive light. This is due to the distance of the airport from the Site (approximately 3.5km) and the Site's location South of Kidlington. However, all lighting within the Proposed Development will take due care to ensure there is not distraction to air traffic associated with London Oxford Airport, and mitigation is embedded into the lighting design to reduce direct upward light which could cause distraction.
- 13.61 When developed it is assumed all mitigation detailed within this Chapter for construction lighting will be incorporated into the Construction Environmental Management Plan (CEMP) and that this will include a suitable construction phase lighting strategy.

- 13.62 Section 278 works are being developed as part of the Proposed Development to make changes to Frieze Way and Oxford Road to support the Proposed Development (referred to as Transport Works), the lighting requirements for these areas are discussed in this chapter.
- 13.63 It is assumed that the speed limits along Frieze Way and Oxford Road adjacent to the main Site will be reduced to 30mph to support the proposed signalised crossings on Kidlington Roundabout and within the Transport Works. This is the case except where vehicles leave the stadium car park in the south of the Proposed Development (Frieze Way) which will be subject to national speed limit.
- 13.64 A design brief for the Transport Works lighting design has not been provided by the local highways authority at this stage. It is assumed one will be provided and that the lighting design for the Transport Works will follow this brief.
- 13.65 All lighting design for the Transport Works will comply with the lighting specification of the adopting authority. It is assumed that this will include modern LED luminaires with a suitable luminous intensity class, a 0% ULR, and that the proposed lighting columns will not exceed the heights of the existing lighting columns in the locations of the Transport Works.
- 13.66 After a design appraisal it may be necessary to provide supplementary lighting to Zebra/Tiger type pedestrian/cycle crossings. These are assumed to be lit using the guidance within ILP TR12:2007, this includes a change in the Correlated Colour Temperature (CCT) for the proposed crossings.
- 13.67 Please see Chapter 4 for more details on the descriptions of works included within the Transport Works.
- 13.68 Receptor locations that are included within the extents of the Transport Works will not experience the effects of obtrusive light from these areas. This is due to these receptor locations containing existing street lighting for the traffic routes affected by these works, and that the proposed lighting for the new Transport Works is assumed to comply with the relevant British Standards and Guidance to facilitate the use of these areas. These receptors are:
1. LR01/L01,
 2. LR02/L02,
 3. LR03/L03, and;
 4. LR04/L04.
- 13.69 Therefore, these receptors will only be assessed for effects resulting from the Stadium Proposals.
- 13.70 As a minimum it is assumed that the extent of the lighting on Frieze way will be extended to include the vehicle exit from the stadium car park in the south of the Proposed Development. The full extent of lighting on Frieze Way is subject to both a designers risk assessment and the design brief

discussed above. Due to the lack of a design brief for the proposed Transport Works a reasonable worst-case extent of lighting is based upon the Design Manual For Roads and bridges (DMRB) guidance documents CD 109:2020 and TD 501:2020. TD 501:2020 requires that, '*there shall not be an unlit gap less than four times the safe stopping distance between lit sections*'. As the likely extents of lighting between lit areas are less than this it is assumed that the lighting will extend to Loop Farm roundabout.

- 13.71 The amendments to access for Oxford Parkway Station will include one additional stepped access. Due to the existing levels of lighting present at Oxford Parkway Station it is assumed that supplementary lighting to this stepped access will be limited to handrail lighting subject to an assessment of the existing lighting levels in the proposed location, designers risk assessment and subsequent agreements with Network Rail. Due to this, the addition of the stepped access to Oxford Parkway Station is assumed not to result in a significant increase in obtrusive lighting and therefore will not cause significant effects on the identified lighting receptors.

Baseline Conditions

Introduction

- 13.72 The baseline conditions detailed within this section comprise those surveyed and documented during the day and night surveys that took place between the 03 October 2023 and the 05 October 2023.
- 13.73 For a comprehensive overview it is recommended that this section is read in conjunction with the following:
1. **Figure 13.1** – Lighting Receptor Plan,
 2. **Figure 13.2** – Environmental Zone Plan; and
 3. **Appendix 13.2** – Baseline Survey Photograph Sheets.
- 13.74 The area surrounding the Site is semi-rural. The areas to the East and West primarily consist of agricultural fields interspersed with scattered woodland and hedge rows, with 3 developed areas being located within 1.5km of the Site, these are:
1. The suburban area of Gosford and Kidlington (North),
 2. The suburban area of Cutteslowe and Sunnymead (South); and
 3. The Town of Yarnton (West).
- 13.75 Additionally, of the three adopted highways surrounding the Site only one is lit along its length, that being Oxford Road to the East. The A34 (to the south) contains existing lighting on the approaches/exit slip roads for the Peartree Roundabout, and the A4260 – Frieze Way (to the west)

contains existing lighting on the approach / exits from the Kidlington Roundabout and Loop Farm Roundabout. Both the A34 and the A4260 roads are not lit along their lengths.

- 13.76 An initial assessment of sky quality has been conducted using data produced by the Campaign to Protect Rural England (CPRE) and the Land Use Consultants (LUC). The Night Blight Mapⁱⁱⁱ (**Figure 13.4**) these organisations have produced is split into nine categories. Each category has a defined colour from dark blues (darker areas) to dark reds (brighter areas). The mapping data is supplied based upon 400m x 400m pixels that shows the amount of light shining up into the night sky from each area. This measure is provided in Skyward Radiance in nanowatts/cm²/steradian (nW/cm²/sr). Which, in simple terms, is a calculation of how a satellite instrument measures the light on the ground, taking account of the distance between the light sources and measurement instrument.
- 13.77 This mapping data shows that the Site is located within a medium / high brightness area. This indicates that the area surrounding the Site experiences significant levels of sky glow and contains a large presence of existing lighting. Due to the resolution of the light pollution map (400 x 400m per pixel) this does not mean the Site itself or the immediate surrounding area is brightly lit, or that there are many existing luminaires within the Site. This, however, does indicate that the wider area the Site is located within (pink – red) contains a larger presence of existing lighting than the areas to the East and West.

Baseline Survey Results and Descriptions

- 13.78 Full details of the lighting baseline survey can be found in **Appendix 13.2**.

Table 13.14: Environmental conditions during baseline survey

| Date | Astronomical Darkness^{iv} | Moon Phase/Visibility^v | Weather Conditions^{vi} | Temperature^{vii} |
|-------------|---|--|--|----------------------------------|
| 03/10/2023 | 19:51 – 05:56 | Wanning Gibbous (79%) | Mostly dry with some moisture. Some cloud cover with clear skies between. No wind. | 12-17° |
| 04/10/2023 | 19:48 – 05:57 | Wanning Gibbous (70%) | Mostly dry with some light rain. Overcast in places, with clear skies between. Light wind. | 13-17° |
| 05/10/2023 | 19:46 – 05:59 | Wanning Gibbous (61%) | Dry with no rain. Mixture of light cloud cover with clear skies between. Light wind. | 13-18° |

Source: Mott MacDonald Ltd 2023

Table 13.15: Baseline survey illuminance results

| Receptor Number | Illuminance results | |
|---|--|-------------------------------|
| LR01 / L01 | Lighting Measurements (Lux) (03/10/2023) | |
| | Ground | 18.83 |
| | North | 8.00 |
| | East | 4.58 |
| | South | 18.32 |
| | West | 5.97 |
| LR02 / L02 | Lighting Measurements (Lux) (03/10/2023) | |
| | Ground | 3.11 |
| | North | 5.30 |
| | East | 3.65 |
| | South | 0.52 |
| | West | 4.04 |
| LR03 / L03 | Lighting Measurements (Lux) (05/10/2023) | |
| | Ground | 8.85 |
| | North | 2.24 |
| | East | 6.77 |
| | South | 8.15 |
| | West | 7.07 |
| LR04 / L04 | Lighting Measurements (Lux) (05/10/2023) | |
| | Ground | 0.68 |
| | North | 0.64 |
| | East | 1.52 |
| | South | 0.88 |
| | West | 0.04 |
| LR05 / L05 | Lighting Measurements (Lux) (04/10/2023) | |
| | Ground | 2.47 |
| | North | 2.69 |
| | East | 1.15 |
| | South | 0.29 |
| | West | 0.80 |
| LR06 / H01 Existing sport lighting off | Lighting Measurements (Lux) (04/10/2023) | |
| | Ground | 0.02 |
| | North | 0.00 |
| | East | 0.07 |
| | South | 0.05 (0.07 aimed at sky glow) |
| | West | 0.00 (0.02 aimed at sky glow) |
| LR06 / H01 Existing sport lighting on | Lighting Measurements (Lux) (05/10/2023) | |
| | Ground | 0.08 |
| | North | 0.00 |
| | East | 0.04 |
| | South | 0.17 |
| | West | 0.35 |
| LR07 / H02 | Lighting Measurements (Lux) (05/10/2023) | |
| | Ground | 0.00 |
| | North | 0.02 |

| | | |
|-----|--|------------------------------|
| | East | 0.02 |
| | South | 0.03 |
| | West | 0.01 |
| E01 | Lighting Measurements (Lux) (03/10/2023) | |
| | Ground | 0.02 |
| | North | 0.25 |
| | East | 0.11 |
| | South | 0.05 |
| | West | 0.23 |
| E02 | Lighting Measurements (Lux) (03/10/2023) | |
| | Ground | 0.02 |
| | North | 0.05 (0.06 facing Northeast) |
| | East | 0.02 |
| | South | 0.00 |
| | West | 0.00 |
| E03 | Lighting Measurements (Lux) (03/10/2023) | |
| | Ground | 0.00 |
| | North | 0.01 |
| | East | 0.00 |
| | South | 0.00 |
| | West | 0.00 |

Source: Mott MacDonald Ltd 2023

Notes to **Table 13.15**:

Note 1: Refer to **Appendix 13.2** for images of the Site and the surrounding area from each identify receptor location.

13.79 Based on the findings detailed within **Appendix 13.2**, the sensitivity of the lighting receptors has been assessed (**Table 13.16**). The sensitivity of each receptor to changes in lighting is based on several factors:

1. The receptor type/designation,
2. The proximity of the receptor to the Site,
3. The existing lighting conditions at the receptor locations (including the visibility of existing lighting in the environment), and
4. The level of screening between the Site / Proposed Development and receptor location.

Table 13.16: Lighting Receptor Sensitivity

| Receptor Number | Receptor Designation | Description of Receptor Location | Sensitivity (.) Table 13.10) |
|-----------------|----------------------|--|---------------------------------|
| LR01/L01 | Human-Safety | Oxford Road – Lit Traffic Route (40mph) East of the Site | Medium |
| LR02/L02 | Human-Safety | Kidlington Roundabout – Roundabout North of the Site | Medium |
| LR03/L03 | Human-Safety | Water Eaton Bridge (A4165) / Oxford Parkway Station – Traffic Route (40mph) East of the Site, and Rail Route | Low |
| LR04/L04 | Human-Safety | Frieze Way (A4260) – Partially Lit Traffic Route (60mph) West of the Site | Medium |
| LR05/L05 | Human-Amenity | Residential Dwellings on Oxford Road | Medium |

| | | | |
|------------|---------------|--|--------|
| LR06 / H01 | Human-Amenity | Stratfield Farm – Grade 2 listed building. Currently used as a residential dwelling. | Medium |
| LR07 / H02 | Human-Amenity | Frieze Farm – Grade 2 listed building. Currently used by Versantus as an office space. | Low |

Source: Mott MacDonald Ltd 2023

13.80 The impact of lighting on ecology receptors has been considered in Chapter 8 (Receptor locations E01 – E03).

Potential Effects

13.81 The following information in the section forms the Lighting Management Plan for the Proposed Development. The lighting details and mitigation detailed within the section will be incorporated into the development of the lighting designs.

Construction Phase – Lighting Proposals

13.82 The careful implementation of artificial lighting during the construction phase of the Proposed Development will be secured through the CEMP (Chapter 4).

Construction Task Lighting

13.83 During the construction phase the majority of work activities will take place during the following hours:

1. Monday to Friday – 07:00 – 19:00,
2. Saturdays – 08:00 – 18:00,
3. Sundays and Bank Holidays – 08:00 – 13:00; and
4. Other hours by exception and with prior agreement from the LPA.

13.84 Further detail on the construction programme, working hours and the tasks that may be undertaken outside of the stated hours can be found in Chapter 4.

13.85 During the months where full daylight is not available within the programmed construction hours, or working outside of normal construction hours is necessary, lighting will be provided on a task-by-task basis.

13.86 During the construction phase, where lighting is required during the hours of darkness it will be implemented as outlined within the following standards and guidance:

1. BS 5489-1:2020, Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas (2020),

2. BS EN 12464-2:2014 – Light and Lighting – Lighting of work places Part 2: Outdoor work places (2014),
3. ILPGN01:2021 – Guidance Notes for the Reduction of Obtrusive Light, GN01 (2021), and;
4. ILP GN08:2023 – ILP and Bat Conservation Trust Guidance Note 08/23 Bats and Artificial Lighting in the UK, Bats and the Built Environment series (2023).

13.87 Floodlighting is typically used to provide construction phase task lighting and is generally restricted to an 8m mounting height. This type of lighting is often portable and will range in height depending on the type of tasks being undertaken.

13.88 During construction the following temporary lighting is anticipated to be required to facilitate construction:

1. Site offices and meeting room;
2. Canteen and mess room;
3. Male and female toilets;
4. Personal Protective Equipment (PPE) drying room;
5. Safe access and egress walkways with defined plan to and from the working area;
6. lighting of temporary compounds;
7. lighting on plant and equipment (e.g. cranes);
8. construction vehicle lighting;
9. lighting of parking facilities;
10. lighting within buildings remaining under construction;
11. temporary lighting structures (including mobile structures) to illuminate working areas;
12. Small tools and equipment storage;
13. Fuel storage and designated plant refuelling point;
14. Construction plant storage;
15. Material storage and laydown area; and
16. Concrete washout facilities.

13.89 Lighting will be provided at the minimum acceptable maintained illuminance detailed within BS EN 12464-2:2014 for the task being performed or the area being lit.

13.90 Separate lighting will be provided for travel routes (pedestrian and vehicle) and construction task areas – this is to reduce the need for large area floodlighting and to reduce the visibility of lighting from the surrounding area.

13.91 Luminaires will ideally be installed with 0° of tilt, and if required may have a maximum tilt of 5°.

- 13.92 Where practical luminaires will be positioned near the task being performed at the minimum safe height required to ensure the correct maintained illuminance and uniformity is complied with. Additionally, where possible luminaires must be focused into the Site away from the boundaries of the Site and the identified receptors.
- 13.93 When luminaires are installed near the boundaries of the Site light shields should be used to reduce any spill light reaching the boundaries of the Site and the identified receptors.
- 13.94 The ULR of the construction lighting will be limited to the maximum permissible percentage for the environmental zone (**Table 13.4**).
- 13.95 Where cranes are used, to aid visibility for passing air traffic they will be fitting with CAA recommended lighting dependant on the height of the cranes. This typically consists of steady red identification lights visible from all directions.
- 13.96 Construction task lighting may be mounted to the cranes to assist with the lighting of specific tasks after a risk assessment and accounting for all other mitigation detailed above.

Security Lighting

- 13.97 Security lighting will only be required during the construction phase due to lighting being provided throughout the night during the operation phase to facilitate the use of the hotel.
- 13.98 Security lighting should be provided by luminaires mounted with 0° of tilt. These will be controlled using Passive Infra-Red Motion Sensors (PIR). PIR uses infra-red to detect movement and activate the lighting ensuring those moving around the Site are visible.
- 13.99 These luminaires should be positioned at key areas including access and egress points/routes and in storage areas. This combined with movement sensing control systems will prevent the entire site remaining lit throughout the night.
- 13.100 This approach will focus the light on those moving through the Site making their location and movements clearly visible, and will allow for the use of CCTV in key areas of the Site.

Operational Phase – Lighting Proposals

- 13.101 The lighting design should aim to:
1. Deliver high quality and efficient lighting, which creates an attractive and safe environment for users, workers and athletes alike;

2. Create a lighting solution that makes use of modern luminaire and lamp technology to provide an energy efficient and flexible lighting scheme;
3. Provide an environment where people feel safe and secure;
4. Be sensitive to the setting while creating an enhanced and vibrant environment;
5. Pay attention to the sensitive nature of the surrounding ecology and local amenity in order to preserve the townscape and visual amenity, minimise environmental impact and minimise cost;
6. Provide a lighting installation that minimises sky glow, spill light and the luminous intensity that can be experienced from luminaires; and
7. Provide clear key routes during the evening for users and workers.

External Lighting

- 13.102 The lighting information detailed within this section is based on **Figure 13.5**, which details the lighting philosophy for the external areas of the Stadium Proposals. Information relating to the Transport Works is based on best practice and some assumptions have been made.
- 13.103 Due to the operating hours of the hotel element of the Proposed Development and the need for security to be on site 24-hours (Chapter 4), certain elements of the exterior lighting will be active throughout the night.
- 13.104 During non-match days the external lighting for the Stadium Proposals will be dimmed by $\leq 50\%$ after 23:00, on match days this dimming taking place once spectators have vacated the Site. Dimming times and levels are subject to further design development and risk assessment. However, a dimming curfew will be implemented in line with the hours of use and event schedule of the stadium.
- 13.105 This dimming cannot apply to the hotel entrance due to the need for disabled access, which requires the light levels to be maintained.
- 13.106 A localised Central Management System (CMS) system will be used to control the external and internal lighting on an integrated system. This will allow real time reporting on the lighting system and will allow for the programming of match and non-match day lighting scenarios.

Car Parking

- 13.107 The car parking area of the Proposed Development will be lit as per BS 5489-1:2020 and BS EN 12464-2:2014 (**Table 13.17**).

Table 13.17: BS EN 12464-2:2014 Table 5.9

| Type of Area | \bar{E}_m lx | U_o | R_{GL} | R_a |
|--|----------------|-------|----------|-------|
| Heavy traffic, e.g., Parking areas of major shopping centres, major sports and multipurpose sports and building complexes. | 20 | 0.25 | 50 | 20 |

Source: BS EN 12464-2:2014

Notes to **Table 13.17**:

- Lighting levels cited are E_m (maintained illuminance) levels, which are the values below which the average illuminance (in lux) on the specified surface is not allowed to fall. A maintenance factor, comprising a luminaire and lamp specific de-rating factor, is applied to lighting calculations to allow for lumen depreciation of a light source over time and a predicted amount of dirt build up on the glazing of the lantern given its height and the pollution category of the area.

- 13.108 The lighting for the car park will be provided by LED street lighting luminaires of a modern design with the option of installing back light louvres, shields, and/or the use of luminaire optics with back light control.
- 13.109 Column height will be a maximum of 8m. This mounting height will allow for a lower number of lighting assets to be used compared to a lower mounting, while ensure the luminaires are less visible from outside the Site compared to those mounted on taller lighting columns.
- 13.110 All luminaires will have an upward light ratio (ULR) of 0%, will be installed with 0° of tilt, and will have a minimum G class of G4.
- 13.111 The correlated colour temperature (CCT) will be limited to a maximum of 3000K.
- 13.112 To facilitate the use of the hotel, lighting will be active throughout the night on a dusk-till-dawn regime.

Road Area

- 13.113 The road area within the Stadium Proposals will be lit as per BS 5489-1:2020 and BS EN 13201-2:2015 (**Table 13.18**).

Table 13.18: BS EN 13201-2:2015 Table 3 – P lighting classes

| Class | Horizontal Illuminance | | Additional requirement if facial recognition is necessary | |
|-------|-------------------------------------|---------------------------|---|------------------------------|
| | \bar{E}^a [minimum maintained] lx | E_{min} [maintained] lx | $E_{V,min}$ [maintained] lx | $E_{sc,min}$ [maintained] lx |
| P1 | 15 | 3 | 5 | 5 |

Source: BS EN 13201-2:2015

Notes to **Table 13.18**:

- ^a: To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum \bar{E} value indicated for the class.

- 13.114 The lighting for the road area will be provided by LED street lighting luminaires of a modern design with the option of installing back light louvres, shields, and/or the use of luminaire optics with back light control.

- 13.115 Column height will be a maximum of 8m. This mounting height will allow for a lower number of lighting assets to be used compared to a lower mounting, while ensure the luminaires are less visible from outside the Site compared to those mounted on taller lighting columns.
- 13.116 All luminaires will have an ULR of 0%, will be installed with 0° of tilt, and will have a minimum G class of G4.
- 13.117 The CCT will be limited to a maximum of 3000K.
- 13.118 To facilitate the use of the hotel, lighting will be active throughout the night on a dusk-till-dawn regime.

Main Entrances

- 13.119 The stadium main entrance and hotel main entrance will be lit as outlined within BE EN 12464-1: 2021 and BS 8300-1:2018 (**Table 13.19**).

Table 13.19: BS 8300-1:2018 Table 5

| | E_{min} [maintained] lx |
|--|--|
| Pedestrian routes adjacent to the entrances/exits of buildings | 100 |

Source: BS EN 8300-1:2018

- 13.120 The design will achieve a minimum uniformity of ≥ 0.25 to ensure then entrance is sufficiently clear and attractive.
- 13.121 The lighting for the main entrances will be provided by LED luminaires of a modern design (bulkhead and column mounted).
- 13.122 Mounting height will be a maximum of 4m.
- 13.123 All luminaires will have an ULR of 0%, will be installed with 0° of tilt, and will have a minimum G class of G4.
- 13.124 The CCT will be limited to a maximum of 4000K.
- 13.125 To facilitate the use of the hotel, lighting for the hotel entrance will be active throughout the night on a dusk-till-dawn regime. To facilitate wayfinding to the hotel, the stadium entrance lighting will be switched off after the hours of use of the Stadium.

Building Perimeter Area

13.126 The building perimeter area used by pedestrians will be lit as per BS EN 12464-2: 2014 Table 5.1 (Table 13.20).

Table 13.20: BS EN 12464-2:2014 Table 5.1

| Type of area, task or activity | \bar{E}_m lx | U_o | R_{GL} | R_a |
|--|----------------|-------|----------|-------|
| Traffic areas for slowly moving vehicles (max. 10km/h), e.g. bicycles, trucks and excavators | 10 | 0.25 | 50 | 20 |

Source: BS EN 12464-2:2014

Notes to **Table 13.20**:

1. Lighting levels cited are E_m (maintained illuminance) levels, which are the values below which the average illuminance (in lux) on the specified surface is not allowed to fall. A maintenance factor, comprising a luminaire and lamp specific de-rating factor, is applied to lighting calculations to allow for lumen depreciation of a light source over time and a predicted amount of dirt build up on the glazing of the lantern given its height and the pollution category of the area.

13.127 The lighting for the building perimeter area will be provided by LED luminaires of a modern bulkhead and bollard design.

13.128 All luminaires will have an ULR of 0%, will be installed with 0° of tilt, and will have a minimum G class of G4 and will be mounted at a maximum of 6m.

13.129 The CCT will be limited to a maximum of 3000K.

13.130 To facilitate the use of the hotel, lighting for the building perimeter lighting will be active throughout the night on a dusk-till-dawn regime.

Plaza

13.131 Lighting may be required within the Plaza located within the north of the Site. Lighting in this area will be provided for wayfinding only, with the lighting levels being dependant on further design development.

13.132 Lighting in this location will be provided by luminaires of a modern bollard design with a maximum height of 1m.

13.133 All luminaires will have an ULR of 0%, will be installed with 0° of tilt, and will have a minimum G class of G4.

13.134 The CCT will be limited to a maximum of 3000K (ideally $\leq 2700K$).

13.135 Lighting is likely to not be required within the Plaza throughout the night, as this area is likely to receive minimal use after peak hours. During design development the switching off the lighting in this area at a predetermined time will be considered subject to a risk assessment.

Loading and Unloading Bays

13.136 The loading and unloading bays for the hotel and stadium will be lit as per BS EN 12464-2:2014 Table 5.7 (**Table 13.21**).

Table 13.21: BS EN 12464-2:2014 Table 5.7

| Ref. No. | Type of area, task or activity | \bar{E}_m lx | U_o | R_{GL} | R_a |
|----------|---|----------------|-------|----------|-------|
| 5.7.1 | Short-term handling of large units and raw materials, loading and unloading of solid bulk goods | 20 | 0.25 | 55 | 20 |

Source: BS EN 12464-2:2014

13.137 The lighting for the loading and unloading bays will be provided by LED luminaires of a modern design (bulkhead and column mounted).

13.138 Mounting height will be a maximum of 8m.

13.139 All luminaires will have an ULR of 0%, will be installed with 0° of tilt, and will have a minimum G class of G4.

13.140 The CCT will be limited to a maximum of 3000K.

13.141 Lighting provided for these areas will only be on when loading/unloading is taking place during the hours of darkness (morning and evening).

Transport Works on the Highway

13.142 The Transport Works proposed for the highways are subject to the lighting specification of the local highway’s authority, designers risk assessment and a design brief that will be provided by OCC.

13.143 The area of the Transport Works will have speed limits of 30mph except for a portion on Frieze Way south of the exit from the stadium car park, which will remain national speed limit.

Oxford Road

13.144 The lighting design for the Transport Works on Oxford Road will follow guidance detailed within BS 5489-1:2020 Table A.3 where the speed limit is \leq 40 mph (**Table 13.22**).

Table 13.22: BS 5489-1:2020 Table A.3 – Lighting classes for Traffic Routes (v ≤ 40 mph)

| Traffic Flow | Lighting Class |
|------------------------------|--------------------|
| | Single Carriageway |
| Low to Moderate ¹ | M4 |

Source: BS 5489-1-2020

Notes to **Table 13.22**:

1. Traffic flow in this area for all vehicles is between 10,000 – 14,000 AADT in 2026 with the Proposed Development, which falls within the Low to Moderate zone defined within BS 5489-1:2020 Annex A (Chapter 10).

13.145 The lighting classification is subject to designers’ risk assessment in accordance with section A.3.1.3 of BS5489-1:2020 therefore as a reasonable worst-case it is assumed to increase the lighting classification by one class to **M3**. The lighting classification and technical specification for this area is to be confirmed within the design brief for these works, which will be provided by OCC and will conform to the OCC lighting specification.

Frieze Way

13.146 The lighting design for the Transport Works on Frieze Way will follow guidance detailed within BS 5489-1:2020 Table A.3 where the speed limit is ≤ 40 mph (**Table 13.23**).

Table 13.23: BS 5489-1:2020 Table A.3 – Lighting classes for Traffic Routes (v ≤ 40 mph)

| Traffic Flow | Lighting Class |
|------------------------------|-------------------------------------|
| | Dual Carriageway |
| | Junction Density: High ² |
| Low to Moderate ¹ | M4 |

Source: BS 5489-1-2020

Notes to **Table 13.23**:

1. Traffic flow in this area for all vehicles is between 7,000 – 12,000 AADT in 2026 with the Proposed Development, which falls within the Low to Moderate zone defined within BS 5489-1:2020 Annex A (Chapter 10).
2. High junction density would be junction centres spaces <3km apart.

13.147 The lighting classification is subject to designers’ risk assessment in accordance with section A.3.1.3 of BS5489 therefore as a reasonable worst-case it is assumed to increase the lighting classification by one class to **M3**. The lighting classification and technical specification for this area is to be confirmed within the design brief for these works, which will be provided by OCC and will conform to the OCC lighting specification.

13.148 Where the speed limit on Frieze Way remains national speed limit the lighting design works will follow guidance detailed within BS 5489-1:2020 Table A.2 (**Table 13.24**).

Table 13.24: BS 5489-1:2020 Table A.2 – Lighting classes for Traffic Routes (v > 40 mph)

| Traffic Flow | Lighting Class |
|------------------------------|-------------------------------------|
| | Dual Carriageway |
| | Junction Density: High ² |
| Low to Moderate ¹ | M3 |

Source: BS 5489-1-2020

Notes to **Table 13.24**:

1. Traffic flow in this area for all vehicles is between 7,000 – 12,000 AADT in 2026 with the Proposed Development, which falls within the Low to Moderate zone defined within BS 5489-1:2020 Annex A (Chapter 10).
2. High junction density would be junction centres spaces <3km apart.

13.149 The lighting classification is subject to designers’ risk assessment in accordance with section A.3.1.3 of BS5489 therefore as a reasonable worst-case it is assumed to increase the lighting classification by one class to **M2**. The lighting classification and technical specification for this area is to be confirmed within the design brief for these works, which will be provided by OCC and will conform to the OCC lighting specification.

13.150 As a minimum this lighting will extend to the exit of the stadium car park in the south of the Proposed Development. The full extents of the lighting along Frieze Way is subject to a design risk assessment and the design brief to be provided by the council, but may extend to Loop Farm roundabout (Paragraph **13.70**).

Road Crossings

13.151 It may be necessary to provide supplementary lighting to zebra/tiger type pedestrian crossings proposed within the Transport Works. This will be appraised as part of the design process, and where it is deemed necessary the pedestrian crossing will be lit as per guidance detailed within ILP TR12:2007. This requires the following:

1. Minimum horizontal illuminance (E) on the carpet: 3.5 x average horizontal road illuminance with uniformity greater than 0.6 (60%),
2. Grid 1 (centre of crossing): 2 x nominal average horizontal road illuminance,
3. Grid 2 (kerb edge): 2 x nominal average horizontal road illuminance,
4. Grid 3 (rear of waiting area): 1.5 x nominal average horizontal road illuminance.

13.152 A colour temperature change is recommended for the road crossing lighting to highlight the presence of the crossing. This can be either an increase or decrease in CCT, but is subject to the design brief to be provided at a later stage as part of the Section 278 works.

Oxford Parkway

13.153 Stepped access to Oxford Parkway Station is proposed. This location will be lit as per BS 8300-1:2018 (**Table 13.25**).

Table 13.25: BS 8300-1:2018 Table 5 – The Artificial Lighting of Specific Applications

| Application | Average illuminance | Minimum Illuminance |
|--|---------------------|---------------------|
| Stairways and ramps (open) in the external environment | 30 | 15 |

Source: BS 830-1:2018

- 13.154 Due to the levels of existing lighting in this location, an assessment needs to be carried out on whether the proposed stairway will require additional lighting. If the existing illuminance levels are found to be unacceptable additional lighting will be provided.
- 13.155 Handrail lighting is assumed for this area, this is to be integrated into the handrails on of the proposed stepped access.
- 13.156 The CCT will be limited to a maximum of 3000K (ideally ≤ 2700 K).
- 13.157 The ULR of the proposed lighting in this location will be restricted to 0%.

Field of Play Lighting

- 13.158 The lighting information detailed within this section is based on **Appendix 13.3**, which details the lighting proposals for the field of play lighting of the Proposed Development.
- 13.159 Chapter 4 outlines the number and type of football matches predicted to take place on an annual basis.
- 13.160 The field of play lighting will be designed to achieve several different illuminance standards dependent on the task being undertaken, including:
1. Championship competition,
 2. League one competition,
 3. League two competition,
 4. Training days,
 5. Match day setup, and;
 6. Maintenance.
- 13.161 The lighting requirements for each activity, task or event are summarised below.

Match Days

- 13.162 It is anticipated that there will be 41 football matches/sporting events per annum as outlined in Chapter 4, with an additional 2 full stadium hire sporting events being anticipated for junior matches or similar. with Kick off times being anticipated as follows:
1. Kick-off for weekday matches: Around 19:45
 2. Kick-off for weekend matches: Around 15:00

- 13.163 It is expected that the majority of weekday matches will finish by 22:00 and the majority of weekend matches will finish by 17:00, with the exception of few Cup games which may go to extra time and penalties.
- 13.164 The field of play lighting will be left on during the time the spectators leave the stadium to aid with safe exit of the spectators.
- 13.165 Due to the typical football season in the UK (August – May), and pre and post season activities, the field of play lighting will be active at limited times throughout the year.
- 13.166 Illuminance levels for match days will be dependent on the level of competition of the match (**Table 13.26**).
- 13.167 Lower levels of illuminance will be used for training and other activities (**Table 13.26**).

Table 13.26: Lighting Criteria for the Field of Play Lighting Design

| | Championship | Class I | Class II | Class III | Setup |
|---|------------------------|----------------------|----------------------|----------------------|----------------------|
| | EFL Regulations | SLL LG4 | SLL LG4 | SLL LG5 | |
| Eh ave (average horizontal illuminance) | >800 Lux | 500 Lux | 200 Lux | 75 Lux | 10 Lux |
| Eh min (minimum horizontal illuminance) | 500 Lux | | | | |
| Ehgoal min (minimum horizontal illuminance at centre point of each goal line) | 750 Lux | | | | |
| Uniformity U1h | | 0.7 | 0.6 | 0.5 | 0.5 |
| Colour temperature (Tk) | 4200K to 5700K (TBC) | 4200K to 5700K (TBC) | 4200K to 5700K (TBC) | 4200K to 5700K (TBC) | 4200K to 5700K (TBC) |
| Colour rendering | Ra80 – Ra90 (TBC) | Ra80 – Ra90 (TBC) | Ra80 – Ra90 (TBC) | Ra80 – Ra90 (TBC) | Ra80 – Ra90 (TBC) |
| Glare rating (GR) | <50 | <50 | <50 | <50 | <50 |

Source: **Appendix 13.3**

- 13.168 OUFC are currently competing within Football league one. However, they may change league dependant on performance, and lighting provision is proposed for this when/if a change in league occurs.
- 13.169 During the setup of the stadium for match day events separate lighting levels will be provided (**Table 13.26**).
- 13.170 The CCT of the field of play lighting will be compliant with guidance for sports lighting for the applicable level of competition. With the colour rendering index of Ra80 – Ra90 and a colour temperature in the range of 4200K to 5700K (TBC).

- 13.171 The ULR of the field of play lighting will be $\leq 2.5\%$ in line with E2 environmental zone criteria. This is an upper limited and lower ULR % is likely for the finalised design.
- 13.172 The field of play lighting will be mounted on the side stand roofs at various heights depending on the slope of the roof. The mounting of the luminaires is subject to further design development and maintenance access requirements.

Maintenance

- 13.173 During maintenance the field of play lighting may need to be active for certain tasks. The illuminance levels provided by the field of play lighting during maintenance will be based on the task being performed, with supplementary lighting being provided as required.

Non Match Day Events

- 13.174 The Proposed Development is not proposed to host concerts. However, over the course of a year, it is anticipated that 578 events will be hosted. All events other than full stadium hire will take place indoors and will not require additional external lighting and the field of play lighting will not be in use (see Chapter 4 for more detail).
- 13.175 Where full stadium hire takes place, this is anticipated to be for sporting events, and therefore these events are considered matchdays as the field of play lighting will be in use (see **Table 13.26** and Paragraph 13.162). There are only 2 full stadium hire events anticipated throughout the year.

Façade Illumination and illuminated Advertising

- 13.176 All façade and illuminated advertising will follow the maximum permissible illuminance levels for the relevant environmental zone (**Table 13.8** and **Table 13.9**). This applies to all colours used within the façade lighting and illuminated advertising, and is controllable through content creation, sign display dimming, and luminaire dimming profiles.

Façade Illumination

- 13.177 Façade illumination for architectural purposes will conform with the luminance requirements detailed within **Table 13.8** for an E2 environmental zone.
- 13.178 Where possible, downlighting will be the primary source of façade illumination where access for maintenance allows. Uplighting may be used if there is no alternative, for example where access to downlighter mounting positions for maintenance is not possible. If uplighting is utilised then luminaires with the correct optical distribution in combination where required with light controlling

attachments such as shields, baffles and louvres will be used to ensure upward light and spill light is minimised as far as reasonably practical.

“Note 3: Some lighting schemes will require the deliberate and careful use of upward light, e.g. ground recessed luminaires, ground mounted floodlight and festive lighting, to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments” ILP GN01:2021 Note 3 to Table 6 (page 15).

- 13.179 Careful aiming of luminaires will be used to ensure that any upward light is minimised by utilising the stadium roof and other features to shield the light.

Illuminated Advertising

- 13.180 All illuminated advertising/signage will conform to the luminance requirements detailed within **Table 13.9**.
- 13.181 During the daytime sign luminance should never exceed 5000cd/m². This is to ensure drivers and pedestrians are not distracted by glare, and ensure the signage will not be overly prominent in the landscape.
- 13.182 For digital signs where the content is changeable, the rate of change will not exceed once every 5 seconds. Moving images, animation, video, or full motion images shall not be displayed at locations where they could present a hazard, for example if they could be seen by drivers in moving traffic.

Internal Lighting

- 13.183 Internal lighting will be configured and coordinated with the Architect and OUFC.
- 13.184 The approach to be taken for the internal lighting is outlined in this section.

Luminaire Selection

- 13.185 Luminaire positioning and optical angle will be carefully considered to ensure spill light through glazing is minimised as far as is reasonably practicable in line with guidance detailed within ILP GN08:2023 and ILP GN01:2021. This will include ensuring that internal luminaire position and beam angles are selected to ensure direct spill light through glazing is minimised, i.e. as proximity to areas of glazing increases the beam angle of the luminaire will reduce. Luminaire position will also be adjusted as proximity to glazing increases to assist with mitigation internal spill light.

13.186 Ceiling recessed luminaires, or non-recessed luminaires with tight optical control shall be used throughout the design. Internal wash lighting will be avoided where possible.

13.187 Decorative luminaires may be used to create features of interest; however, it must be demonstrated that the inclusion of these features will not result in unacceptable spill light through glazing, glare, or upward light.

Lighting Controls

13.188 Lighting control will be implemented to ensure a suitable internal illuminance level is achieved throughout the hours of use of the Proposed Development. Lighting control methods such as daylight harvesting will be used to achieve this.

13.189 The internal building lighting control system will also be used to ensure that no internal lighting is left on after the hours of use, other than that which may be necessary for security or operational purposes. Typical lighting control arrangements are as follows:

1. Local switching: small rooms, stores, control rooms.
2. Enhanced local switching (scene setting): Hospitality.
3. PIR: toilets, offices, corridors, changing rooms, plant rooms.
4. Centralised switching: concourse, external lighting, GA, sports lighting.
5. Centralised lighting control: all areas.

Embedded Mitigation Summary

13.190 This section summarises the mitigation that is detailed above and is embedded into the lighting design. This is mitigation that will be implement as part of the developing design at the next design stage/s and forms a standard part of the lighting design.

13.191 The embedded mitigation is summarised in **Table 13.27**.

Table 13.27: Summary of embedded mitigation

| Area of Application | Light Parameter being Mitigated | Description of Mitigation |
|--|---|---|
| All Phases (Lighting Management Plan) | | |
| General lit areas | Over lighting can increase energy and carbon use and potentially increase levels of obtrusive light | Consideration of appropriate lighting standards and associated lighting levels. Selection of appropriate lighting standard from relevant industry standards, British and European standards to ensure lighting is appropriate to the task being undertaken, the area being lit, and that areas are not over lit. Ensuring sensitive receptors and areas are considered during the lighting design process with a view to minimising obtrusive light. |

| | | |
|---|---|---|
| | | <p>Additionally, Constant Light Output (CLO) luminaires shall be considered due to the reduced initial lighting levels provided with this type of luminaire. This ensure that the designed maintained illuminance is achieved throughout the lifetime of the lighting installation. This will prevent over lighting at the beginning of the installation life cycle, and thus will reduce levels of all parameters of obtrusive light and the effects on human and ecology receptors.</p> |
| | <p>Minimising potential adverse effects of obtrusive light by ensuring sensitive receptors and areas are considered during the lighting design process with a view to minimising obtrusive light.</p> | <p>ILP GN01 – The Reduction of Obtrusive Light is to be utilised to inform the detailed design process.</p> |
| | <p>Minimising potential adverse effects of obtrusive light on Bats.</p> | <p>ILP and Bat Conservation Trust Guidance Note 08/23 Bats and Artificial Lighting in the UK, Bats and the Built Environment series (Bat Conservation Trust & ILP, 2023) is to be utilised to inform the detailed design process in collaboration with suitable biodiversity specialists.</p> |
| | <p>Minimisation of energy and carbon use</p> | <p>Specifying in accordance with BREEAM credit Ene 03 External lighting, which states that external light fittings used for car parking, associated roads and floodlighting should achieve luminous efficacy not less than 70 lumens per watt. External lighting installations included within the operational scheme designs shall aspire to achieve efficacy figures of 100 lumens per watt.</p> |
| <p>Construction Phase (Lighting Management Plan)</p> | | |
| <p>Construction Activities lighting</p> | <p>All effects</p> | <p>During the construction phase lighting will be limited to inside the permitted working hours (Chapter 4).</p> |
| | <p>All effects</p> | <p>Over lighting can increase energy and carbon use and potentially increase levels of obtrusive light.</p> <p>Lighting will be provided at the minimum acceptable maintained illuminance detailed within BS EN 12464-2:2014 for the task being performed or the area being lit.</p> |
| | <p>All effects</p> | <p>Construction lighting will be designed and positioned to ensure that any artificial light emitted from the working areas: minimises glare; does not prejudice health including for residents, walkers or passing drivers; does not create a nuisance under the Environmental Protection Act 1990; and avoids or reduces potential impacts upon the natural and historic environment.</p> |

| | | |
|-------------------|--------------------------|--|
| | All effects | During construction of the Proposed Development, the construction team would work with those affected by any temporary adverse lighting effects to remove or reduce this impact where safe, practicable and legally compliant to do so. |
| | Upward Light | The ULR of the construction lighting will be limited to the maximum permissible for the environmental zone (Table 13.4) |
| | All effects | Separate lighting will be provided for travel routes (pedestrian and vehicle) and construction task areas reducing the need for area floodlighting. |
| | Sky Glow | Luminaires will ideally be installed with 0° of tilt, and if required a tilt of 5°. |
| | Sky Glow and Spill Light | <p>Correlated colour temperatures of ≤3000K will be utilised.</p> <p>Reduction of blue light spectrum - Selection of lower colour temperatures for light sources with lower colour temperatures have less blue spectrum light and therefore less of an effect in terms of skyglow (International Dark-Sky Association, 2010).</p> <p>The warmer white colour temperature has a lower relative attractiveness to some insects, resulting in a greater number of insects in dark areas, which in turn increases the availability of the main food source of multiple types of bats.</p> <p>Selection of warmer colour temperatures with peak wavelengths greater than 550 nanometres cause less of an impact on bats (Bat Conservation Trust & ILP, 2023).</p> <p>Increased levels of blue light exposure in the evening have been shown to cause melatonin suppression and subsequent phase delays in the melatonin cycle. To mitigate potential adverse effects on melatonin production lower colour temperature light sources have been selected as they contain less blue light.</p> |
| Security Lighting | All effects | Motion sensor control, i.e., PIR. |
| | All effects | <p>Security lighting will only be provided at key areas, such as access and egress points, storage areas, or temporary office buildings.</p> <p>The use of infrared spectrum lighting (not visible to human receptors) shall be considered. This can be paired with modern camera technology to ensure those moving through the Site are recorded while removing all impact of obtrusive light on human receptor and significantly reducing effects on biodiversity.</p> |
| | Sky Glow | Security lighting should be provided by asymmetric luminaires / floodlights mounted with 0° of tilt. |

| | | |
|---|---|--|
| | | The upward light ration of the design will be limited to <2.5%. |
| Operational Phase (Lighting Management Plan) | | |
| Car Parking / Road Areas within Stadium Proposals | Spill Light | <p>Luminaires with asymmetric optical distributions that will have the option to install integral back light shields or external light louvres or shields.</p> <p>These will be most effective where luminaires are installed facing into the Site away from boundary features and the identified receptors.</p> |
| | Sky Glow, effects on ecology and reduction of potential adverse effects of lighting on sleep cycles | <p>Correlated colour temperatures of $\leq 3000\text{K}$ will be utilised.</p> <p>Reduction of blue light spectrum - Selection of lower colour temperatures for light sources with lower colour temperatures have less blue spectrum light and therefore less of an effect in terms of skyglow (International Dark-Sky Association, 2010).</p> <p>The warmer white colour temperature has a lower relative attractiveness to some insects, resulting in a greater number of insects in dark areas, which in turn increases the availability of the main food source of multiple types of bats.</p> <p>Selection of warmer colour temperatures with peak wavelengths greater than 550 nanometres cause less of an impact on bats (Bat Conservation Trust & ILP, 2023).</p> <p>Increased levels of blue light exposure in the evening have been shown to cause melatonin suppression and subsequent phase delays in the melatonin cycle. To mitigate potential adverse effects on melatonin production lower colour temperature light sources have been selected as they contain less blue light.</p> |
| | Sky Glow, Glare and Spill Light | All luminaires used will have a minimum luminous intensity Class of G4 with suitable photometric distribution to ensure that there is zero direct upward light. A luminaire with a minimum of a G4 rating and zero direct upward light will contribute to reduce sky glow. It will also help to control spill light, luminous intensity and minimise disability glare. |
| | All effects | <p>During non-match days the external lighting for the Stadium Proposals will be dimmed by $\leq 50\%$ after 23:00, with this dimming taking place once spectators have vacated the Site during match days.</p> <p>Dimming times and levels are subject to further design development and risk assessment</p> |

| | | |
|-------------------------|---------------------------------|--|
| Main Entrance | Sky Glow and Spill Light | All luminaires used will have a minimum G Class of G4 with suitable photometric distribution to ensure that there is zero direct upward light. A luminaire with a minimum of a G4 rating and zero direct upward light will contribute to reduce sky glow. It will also help to control spill light, luminous intensity and minimise disability glare. |
| Building Perimeter Area | Sky Glow and effects on ecology | <p>Correlated colour temperatures of $\leq 3000\text{K}$ will be utilised.</p> <p>Reduction of blue light spectrum - Selection of lower colour temperatures for light sources with lower colour temperatures have less blue spectrum light and therefore less of an effect in terms of skyglow (International Dark-Sky Association, 2010).</p> <p>The warmer white colour temperature has a lower relative attractiveness to some insects, resulting in a greater number of insects in dark areas, which in turn increases the availability of the main food source of multiple types of bats.</p> <p>Selection of warmer colour temperatures with peak wavelengths greater than 550 nanometres cause less of an impact on bats (Bat Conservation Trust & ILP, 2023).</p> <p>Increased levels of blue light exposure in the evening have been shown to cause melatonin suppression and subsequent phase delays in the melatonin cycle. To mitigate potential adverse effects on melatonin production lower colour temperature light sources have been selected as they contain less blue light.</p> |
| | Sky Glow and Spill Light | All luminaires used will have a minimum luminous intensity Class of G4 with suitable photometric distribution to ensure that there is zero direct upward light. A luminaire with a minimum of a G4 rating and zero direct upward light will contribute to reduce sky glow. It will also help to control spill light, luminous intensity and minimise disability glare. |
| | All effects | <p>During non-match days the external lighting for the Stadium Proposals will be dimmed by $\leq 50\%$ after 23:00, with this dimming taking place once spectators have vacated the Site during match days.</p> <p>Dimming times and levels are subject to further design development and risk assessment</p> |
| Plaza | All effects | Lighting in this area will be provided for wayfinding only, with the lighting levels being dependant on further design development. |

| | | |
|----------------------------|---------------------------------|---|
| | | Average illuminance levels will be significantly lower than in the rest of the Site. |
| | All effects | <p>During non-match days the external lighting for the Stadium Proposals will be dimmed by $\leq 50\%$ after 23:00, with this dimming taking place once spectators have vacated the Site during match days.</p> <p>Dimming times and levels are subject to further design development and risk assessment</p> |
| | Sky Glow and effects on ecology | <p>Correlated colour temperatures of $\leq 3000\text{K}$ (ideally 2700K) will be utilised.</p> <p>Reduction of blue light spectrum - Selection of lower colour temperatures for light sources with lower colour temperatures have less blue spectrum light and therefore less of an effect in terms of skyglow (International Dark-Sky Association, 2010).</p> <p>The warmer white colour temperature has a lower relative attractiveness to some insects, resulting in a greater number of insects in dark areas, which in turn increases the availability of the main food source of multiple types of bats.</p> <p>Selection of warmer colour temperatures with peak wavelengths greater than 550 nanometres cause less of an impact on bats (Bat Conservation Trust & ILP, 2023).</p> <p>Increased levels of blue light exposure in the evening have been shown to cause melatonin suppression and subsequent phase delays in the melatonin cycle. To mitigate potential adverse effects on melatonin production lower colour temperature light sources have been selected as they contain less blue light</p> |
| | Sky Glow and Spill Light | All luminaires used will have a minimum luminous intensity Class of G4 with suitable photometric distribution to ensure that there is zero direct upward light. A luminaire with a minimum of a G4 rating and zero direct upward light will contribute to reduce sky glow. It will also help to control spill light, luminous intensity and minimise disability glare. |
| Loading and Unloading Bays | Spill Light | <p>Luminaires with asymmetric optical distributions will have the option to install back light louvres or shields.</p> <p>These will be most effective where luminaires are installed facing into the Site away from boundary features and the identified receptors.</p> |
| | Sky Glow and effects on ecology | <p>Correlated colour temperatures of $\leq 3000\text{K}$ will be utilised.</p> <p>Reduction of blue light spectrum - Selection of lower colour temperatures for light sources with lower colour temperatures have less blue spectrum light and therefore less of an effect in</p> |

| | | |
|------------------------|--------------------------|--|
| | | <p>terms of skyglow (International Dark-Sky Association, 2010).</p> <p>The warmer white colour temperature has a lower relative attractiveness to some insects, resulting in a greater number of insects in dark areas, which in turn increases the availability of the main food source of multiple types of bats.</p> <p>Selection of warmer colour temperatures with peak wavelengths greater than 550 nanometres cause less of an impact on bats (Bat Conservation Trust & ILP, 2023).</p> <p>Increased levels of blue light exposure in the evening have been shown to cause melatonin suppression and subsequent phase delays in the melatonin cycle. To mitigate potential adverse effects on melatonin production lower colour temperature light sources have been selected as they contain less blue light.</p> |
| | Sky Glow and Spill Light | All luminaires used will have a minimum luminous intensity Class of G4 with suitable photometric distribution to ensure that there is zero direct upward light. A luminaire with a minimum of a G4 rating and zero direct upward light will contribute to reduce sky glow. It will also help to control spill light, luminous intensity and minimise disability glare. |
| | All effects | <p>During non-match days the external lighting for the Stadium Proposals will be dimmed by $\leq 50\%$ after 23:00, with this dimming taking place once spectators have vacated the Site during match days.</p> <p>Dimming times and levels are subject to further design development and risk assessment</p> |
| Field of Play Lighting | Sky Glow | Upward light ration will be limited to $\leq 2.5\%$. |
| | All effects | <p>Luminaires will be installed under the stadium roof at varying heights dependent on the slope of the roof. This will block direct views of the luminaires for external receptors and provided shielding for Spill Light, glare and luminous intensity.</p> <p>Luminaire mounting arrangements are subject to further design development and risk assessment</p> |
| | All effects | The stadium floodlighting will provide illuminance levels suitable for the level of competition or task being performed in the stadium. Meaning the maximum illuminance will only be provided in specific circumstances, and for the majority of the time the illuminance levels will be lower, or the lighting will be off. |
| Façade Illumination | Building Luminance | Facade lighting will follow the maximum permissible luminance levels for their relevant environmental zone (Table 13.8). |

| | | |
|-------------------------|-------------------|---|
| | Sky Glow | Careful aiming of luminaires will be used to ensure that any upward light is minimised. |
| | Sky Glow | Downlighting will be the primary source of façade illumination where access for maintenance allows. |
| | General effects | If uplighting is utilised then luminaires with the correct optical distribution in combination where required with light controlling attachments such as shields, baffles and louvres will be used to ensure upward light and spill light is minimised as far as reasonably practical |
| Illuminated Advertising | Night Luminance | Illuminated advertising will follow the maximum permissible luminance levels for their relevant environmental zone (Table 13.8 and Table 13.9). |
| | Daytime Luminance | During the daytime sign luminance should never exceed 5000cd/m ² . |
| | General effects | For digital signs where the content is changeable, the rate of change will not exceed once every 5 seconds. Moving images, animation, video, or full motion images shall not be displayed at locations where they could present a hazard, for example if they could be seen by drivers in moving traffic. |

Source: Mott Macdonald Ltd 2023

Construction Phase – Assessment of Effects

- 13.192 The assessment of the potential effects during the construction phase are based on the lighting requirements for this phase detailed in this Chapter, the mitigation detailed in **Table 13.27** and the construction details provided within Chapter 4.
- 13.193 No illuminated signs or façade lighting are anticipated to be used during the construction phase of the Proposed Development, as such the effects of building and sign luminance are not included in the assessment of magnitude of effect during the construction phase.
- 13.194 The construction phase lighting is required to conform to the same environmental zone requirements of the operational phase of the Proposed Development and the embedded mitigation, CEMP and construction program will ensure this is the case.
- 13.195 Construction tasks will be performed during the defined working hours (Chapter 4). This requires all works to stop after 19:00 (at the latest) aside from at limited times after prior agreement with the LPA. This will significantly reduce the time window in which the construction task lighting can affect the identified receptors.

Magnitude of Effect

Light Intrusion (into Windows)

- 13.196 Receptor LR05/L05 is located approximately 170m from the North boundary of the Site and is located adjacent to the A4260 (Oxford Road) and Kidlington Roundabout. At this distance and due to the mitigation detailed within **Table 13.27** the effects of light intrusion on receptor LR07/H02 will be Negligible.
- 13.197 Receptor LR06/H01 is located approximately 190m from the North/East boundaries of the Site. At this distance and due to the mitigation detailed within **Table 13.27** the effects of light intrusion on receptor LR06/H01 will be Negligible.
- 13.198 Receptor LR07/H02 is located approximately 735m from the South boundary of the Site and is located in Frieze Way Farm (A4260). At this distance and due to the mitigation detailed within **Table 13.27** the effects of light intrusion on receptor LR07/H02 will be Negligible.

Table 13.28: Light Intrusion (into Windows) – Magnitude of effect assessment – Construction Phase

| Receptor Number | Receptor Designation | Window Location and View | | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--------------------------|---|-----------------------------------|
| | | Façade Aspect | View Description | |
| LR05/L05 | Human-Amenity | North | Away from Site toward Kidlington | Negligible |
| | | East | Away from Site facing A4260 and Bicester Road | Negligible |
| | | South | Towards Site | Negligible |
| | | West | Away from Site towards Yarton | Negligible |
| LR06 / H01 | Human-Amenity | North | Away from Site toward Kidlington | Negligible |
| | | East | Towards Site | Negligible |
| | | South | Partially towards Site - Site within field of view | Negligible |
| | | West | Away from Site towards Yarton | Negligible |
| LR07 / H02 | Human-Amenity | North | Partially towards Site - Site within field of view | Negligible |
| | | East | Partially towards Site - Site within field of view | Negligible |
| | | South | Away from Site towards Cutteslowe and Summertown (Oxford) | Negligible |
| | | West | Away from Site towards Yarton and Worton. | Negligible |

Source: Mott MacDonald Ltd 2023

Spill Light

- 13.199 The assessment of magnitude of effect is provided to assist in the assessment of effects on ecological receptors detailed within Chapter 8.
- 13.200 Human-safety receptors LR01/L01, LR02/L02, LR03/L03 and LR04/L04 are assessed as detailed below.
- 13.201 This assessment is based on the predicted change in Spill Light during the construction phase from construction task and security lighting.
- 13.202 This assessment considers the baseline conditions and the requirements for the lighting during the construction phase, that are detailed within the report and will be detailed within the CEMP, to estimate magnitude of effect resulting from the construction phase.
- 13.203 **Table 13.15** details the baseline conditions found at receptor locations E01 to E03, which are provided to give context to the changes in light levels reaching the Site boundaries.
- 13.204 Lighting is visible from E01, E02, and E01, but this lighting is not having a significant effect on the Site boundaries with illuminance levels recorded being <0.3 Lux.
- 13.205 Due to areas of the Proposed Development requiring construction works either being within or close to the Stadium Proposals, even with the embedded mitigation illuminance levels in these locations are likely to exceed 5 Lux when construction tasks are being performed in these locations. This will result in a high level of change when considering the baseline conditions.

Table 13.29: Spill Light - Potential Change – Construction Phase – E01 to E03

| Receptor Number | Description of potential change |
|------------------------|--|
| E01 | It is predicted that there would be a level of change of ≥ 5 in this area but that this will be temporary as areas of the Stadium Proposals are completed and construction activities move around the Site. |
| E02 | It is predicted that there would be a level of change of ≤ 2.5 in this area but that this will be temporary as areas of the Stadium Proposals are completed and construction activities move around the Site. |
| E03 | It is predicted that there would be a level of change of ≤ 2.5 in this area but that this will be temporary as areas of the Stadium Proposals are completed and construction activities move around the Site. |

Source: Mott MacDonald Ltd 2023

- 13.206 The Northern boundary of the Site will experience a lower level of change compared to other areas of the Site, with the level of lighting on the boundary in this location being predicted as approximately

0.5 lux. (A minor increase in comparison with the baseline conditions). This is due to this location likely being used for storage and the main works being ground and arboriculture works in this location. As such, the illuminance levels during the construction phase in the most northern area of the Site will be lower than other areas.

- 13.207 Receptor LR01/L01 and LR04/L04 are both located near the boundaries of the Site where access to the Site will be available. In these locations the local highways authority will be consulted during construction planning on the appropriate lighting standard/s, level/s and specification/s to ensure there are no significant effects of spill light from the perspective of drivers, pedestrians or non-motorised users utilising these roadways/traffic routes. This combined with the mitigation detailed within **Table 13.27**, will ensure that there will be a Negligible magnitude of effect in terms of spill light in these locations.
- 13.208 Receptor LR02/L02's location adjacent to the North of the Site, which will become the Plaza, means that there is unlikely to be the need for high level construction task near this receptor. This is due to this location likely being used for storage and the main works being ground and arboriculture works in this location. As such, and in combination with the mitigation detailed within **Table 13.27** the magnitude of effect on this receptor is assessed as Negligible.
- 13.209 Lighting receptor LR03/L03 is approximately 57m Southeast of the Site boundary and contains some of the highest illuminance readings recorded during the lighting baseline survey (**Table 13.15**). Due to the distance of this receptor from the Site, the mitigation detailed within **Table 13.27** and the existing levels of illuminance in this location the magnitude of effect from spill light at this receptor is considered Negligible.

Table 13.30: Spill Light - Magnitude of effect assessment – Construction Phase – LR01/L01 to LR04/L04

| Receptor Number | Receptor Designation | Description of Effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--|-----------------------------------|
| LR01/L01 | Human-Safety | In this location the local highways authority will be consulted (during construction planning) on the appropriate lighting standard/s, level/s, and specification/s. The Proposed Development construction lighting will be carefully co-ordinated with the local highways authority lighting to ensure there are no significant effects of spill light from the perspective of drivers, pedestrians or non-motorised user utilising these roadways/traffic routes. This combined with the embedded mitigation (Table 13.27) will mean that spill light reaching this location will not significantly alter the baseline conditions at LR01/L01. | Negligible |
| LR02/L02 | Human-Safety | Limited views of the construction lighting will be available from this location. | Negligible |

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|----------|--------------|---|------------|
| | | This combined with the embedded mitigation (Table 13.27) will mean that spill light reaching this location will not significantly alter the baseline conditions at LR02/L02. | |
| LR03/L03 | Human-Safety | <p>The distance of this receptor location from the Site and the existing levels of illuminance in this location, means there will be no significant change to light levels in this location.</p> <p>This combined with the embedded mitigation (Table 13.27) will mean that spill light reaching this location will not significantly alter the baseline conditions at LR03/L03.</p> | Negligible |
| LR04/L04 | Human-Safety | <p>In this location the local highways authority will be consulted (during construction planning) on the appropriate lighting standard/s, level/s, and specification/s. The Proposed Development construction lighting will be carefully co-ordinated with the local highways authority lighting to ensure there are no significant effects of spill light from the perspective of drivers, pedestrians or non-motorised user utilising these roadways/traffic routes.</p> <p>This combined with the embedded mitigation (Table 13.27) will mean that spill light reaching this location will not significantly alter the baseline conditions at LR04/L04.</p> | Negligible |

Source: Mott MacDonald Ltd 2023

Luminous Intensity

13.210 The effects of luminous intensity will be controlled through the CEMP, the restrictions on working hours and the mitigation detailed within **Table 13.5**. This has led to the magnitude of effects as assessed in **Table 13.31**.

Table 13.31: Luminous Intensity – Magnitude of effect assessment – Construction Phase

| Receptor Number | Receptor Designation | Approximate Distance from Site Boundary | Description of Effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|---|--|-----------------------------------|
| LR01/ L01 | Human-Safety | ≤5m | <p>Direct views of the construction lighting are potentially available in this location.</p> <p>This location contains existing lighting (Table 13.15 and Appendix 13.2) and the proposed lighting will be</p> | Negligible |

| | | | | |
|----------|--------------|-----|--|------------|
| | | | <p>partially integrated into this existing system to ensure safe access to the Site. Construction lighting will incorporate the mitigation detailed within Table 13.27.</p> <p>As such, it is predicted that there will not be a distinguishable change to the baseline conditions in this location due to luminous intensity.</p> | |
| LR02/L02 | Human-Safety | ≤5m | <p>Limited views of the construction lighting are predicted to be available from this location.</p> <p>Although this location is close to the Site boundary, it will be significantly further from the areas of the Site where major work will take place.</p> <p>The construction lighting will incorporate the mitigation detailed within Table 13.27.</p> <p>As such, it is predicted that there will not be a distinguishable change to the baseline conditions in this location due to luminous intensity.</p> | Negligible |
| LR03/L03 | Human-Safety | 57m | <p>Limited views of the proposed lighting will be available from this location, and the proposed lighting will only be visible through an area that contains existing lighting in the form of street lighting.</p> <p>Due to the existing lighting in this location, the distance from the Site (57m), the limited views of the proposed lighting from this locations, and the compliance of the construction lighting with the mitigation detailed in Table 13.27, there will not be a distinguishable change to the baseline conditions in this location due to luminous intensity.</p> | Negligible |
| LR04/L04 | Human-Safety | 50m | <p>Direct views of the construction lighting are potentially available in this location.</p> | Negligible |

| | | | | |
|------------|---------------|------|--|------------|
| | | | <p>This location contains existing lighting (Table 13.15 and Appendix 13.2) and the proposed lighting will have to be partially integrated into this existing system to ensure safe access to the Site.</p> <p>Due to this location being brightly lit and compliance of the construction lighting with the mitigation detailed in Table 13.27, there will not be a distinguishable change to the baseline conditions in this location due to luminous intensity.</p> | |
| LR05/L05 | Human-Amenity | 170m | <p>Limited views of the proposed lighting may be available in this location, especially during the winter months.</p> <p>However, at this distance the luminaire output will not be high enough to cause distinguishable changes to this location</p> | Negligible |
| LR06 / H01 | Human-Amenity | 190m | <p>Limited views of the proposed lighting may be available in this location, especially during the winter months.</p> <p>However, at this distance the luminaire output will not be high enough to cause distinguishable changes to this location.</p> | Negligible |
| LR07 / H02 | Human-Amenity | 735m | <p>Views of the proposed lighting will not be possible from this location, and luminaire output will not be high enough to cause distinguishable changes to this location.</p> | Negligible |

Source: Mott MacDonald Ltd 2023

Discomfort/Disability Glare

13.211 The effects of discomfort/disability glare will be controlled through the CEMP, the restrictions on working hours and the mitigation detailed within **Table 13.27**. This has led to the magnitude of effects as assessed in **Table 13.32**.

Table 13.32: Discomfort/Disability Glare – Magnitude of effect assessment – Construction Phase

| Receptor Number | Receptor Designation | Description of effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--|-----------------------------------|
| LR01/L01 | Human-Safety | <p>Site access is likely to be required near this location and direct views of the construction lighting are potentially available in this location.</p> <p>This location contains existing lighting (Table 13.15 and Appendix 13.2) and the construction lighting will be partially integrated into this existing system to ensure safe access to the Site. This will require liaison with the highway authority on the lighting specification in this area to ensure safe access to the Site and safe use of the existing road.</p> <p>Construction lighting will incorporate the mitigation detailed within Table 13.27.</p> <p>As such, it is predicted that there will not be a distinguishable change to the baseline conditions in this location due to disability/discomfort glare.</p> | Negligible |
| LR02/L02 | Human-Safety | <p>Only limited views of the construction lighting will be available in this location.</p> <p>Construction lighting will incorporate the mitigation detailed within Table 13.27.</p> <p>As such, it is predicted that there will not be a distinguishable change to the baseline conditions in this location due to disability/discomfort glare.</p> | Negligible |
| LR03/L03 | Human-Safety | <p>Due to the existing lighting in this location, the distance from the Site (57m), the limited views of the construction lighting from this locations, and the compliance of the construction lighting with the mitigation detailed within Table 13.27 and that the construction lighting will not be illuminating this area and so will have no effect on the perception of disability/discomfort glare in this location.</p> | Negligible |
| LR04/L04 | Human-Safety | <p>Direct views of the construction lighting are potentially available in this location.</p> <p>This location contains existing lighting (Table 13.15 and Appendix 13.2) and the construction lighting will have to be partially integrated into this existing</p> | Negligible |

| | | | |
|------------|---------------|--|------------|
| | | <p>system. This will require liaison with the highway authority on the lighting specification in this area to ensure safe access to the Site and safe use of the existing road.</p> <p>Due to this location being brightly lit and compliance of the construction lighting with the mitigation detailed in Table 13.27, there will not be a distinguishable change to the baseline conditions in this location due to disability/discomfort glare.</p> | |
| LR05/L05 | Human-Amenity | <p>Due to the distance of this receptor location from the Proposed Development, and the existing lighting in this location there will be no distinguishable change to the baseline conditions in this location.</p> <p>This is due to the compliance of the construction lighting with mitigation detailed within Table 13.27, and the construction lighting will not be illuminating this area and so will have no effect on the perception of glare in this location.</p> | Negligible |
| LR06 / H01 | Human-Amenity | <p>Due to the distance of this receptor and the lack of visibility of the Proposed Development from this location, there will not be a distinguishable change to the baseline conditions in this location.</p> | Negligible |
| LR07 / H02 | Human-Amenity | <p>Due to the distance of this receptor and the lack of visibility of the Proposed Development from this location, there will not be a distinguishable change to the baseline conditions in this location.</p> | Negligible |

Source: Mott MacDonald Ltd 2023

Sky Glow

- 13.212 Construction tasks will be limited to before 19:00 without prior consent from the LPA. This will ensure that any potential effects on sky quality from the construction lighting are limited to the earliest hours of darkness in the winter months, and are not undertaken during the hours of darkness for a significant part of the year.
- 13.213 This combined with the mitigation detailed within **Table 13.27** and the existing sky conditions (**Appendix 13.2** and **Figure 13.4**) has led to the magnitude of effect on all receptors to be classified as Negligible.

Table 13.33: Sky Glow – Magnitude of effect assessment – Construction Phase

| Receptor Number | Receptor Designation | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|-----------------------------------|
| LR01/ L01 | Human-Safety | Negligible |
| LR02/L02 | Human-Safety | Negligible |
| LR03/L03 | Human-Safety | Negligible |
| LR04/L04 | Human-Safety | Negligible |
| LR05/L05 | Human-Amenity | Negligible |
| LR06 / H01 | Human-Amenity | Negligible |
| LR07 / H02 | Human-Amenity | Negligible |

Source: Mott MacDonald Ltd 2023

Significance of Effect Assessment – Construction Phase

Table 13.34: Significance of effect assessment – Construction Phase

| Receptor Number | Parameter of Obtrusive Light | Sensitivity of Receptor (. Table 13.10) | Magnitude of Effect (Table 13.11) | Significance of Effect (Table 13.12) |
|-----------------|---------------------------------|--|-----------------------------------|--------------------------------------|
| LR01/ L01 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | N/A | N/A |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Negligible | Negligible |
| LR02/L02 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | N/A | N/A |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Negligible | Negligible |
| LR03/L03 | Light Intrusion (into Windows) | Low | N/A | N/A |
| | Spill Light | Low | Negligible | Negligible |
| | Building and Sign Luminance | Low | N/A | N/A |
| | Luminous Intensity | Low | Negligible | Negligible |
| | Discomfort and Disability Glare | Low | Negligible | Negligible |
| | Sky Glow | Low | Negligible | Negligible |
| LR04/L04 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | N/A | N/A |
| | Luminous Intensity | Medium | Negligible | Negligible |

| | | | | |
|------------|---------------------------------|--------|------------|------------|
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Negligible | Negligible |
| LR05/L05 | Light Intrusion (into Windows) | Medium | Negligible | Negligible |
| | Spill Light | Medium | N/A | N/A |
| | Building and Sign Luminance | Medium | N/A | N/A |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Negligible | Negligible |
| LR06 / H01 | Light Intrusion (into Windows) | Medium | Negligible | Negligible |
| | Spill Light | Medium | N/A | N/A |
| | Building and Sign Luminance | Medium | N/A | N/A |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Negligible | Negligible |
| LR07 / H02 | Light Intrusion (into Windows) | Low | Negligible | Negligible |
| | Spill Light | Low | N/A | N/A |
| | Building and Sign Luminance | Low | N/A | N/A |
| | Luminous Intensity | Low | Negligible | Negligible |
| | Discomfort and Disability Glare | Low | Negligible | Negligible |
| | Sky Glow | Low | Negligible | Negligible |

Source: Mott MacDonald Ltd 2023

13.214 Based on the significance of effect detailed within **Table 13.34** the likely effect on each receptor before additional mitigation during construction is described within **Table 13.35**.

Table 13.35: Effects assessment – Construction Phase

| Receptor Number | Parameter of Obtrusive Light | Nature of Effect (Table 13.13) | Level (Table 13.13) | Description (Table 13.13) |
|-----------------|---------------------------------|--------------------------------|---------------------|---|
| LR01/ L01 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Building and Sign Luminance | N/A | N/A | N/A |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |

| | | | | |
|----------|---------------------------------|---------|-------------------|---|
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR02/L02 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Building and Sign Luminance | N/A | N/A | N/A |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR03/L03 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Building and Sign Luminance | N/A | N/A | N/A |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR04/L04 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Building and Sign Luminance | N/A | N/A | N/A |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall |

| | | | | |
|------------|---------------------------------|---------|-------------------|---|
| | | | | impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR05/L05 | Light Intrusion (into Windows) | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | N/A | N/A | N/A |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR06 / H01 | Light Intrusion (into Windows) | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | N/A | N/A | N/A |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR07 / H02 | Light Intrusion (into Windows) | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | N/A | N/A | N/A |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |

| | | | | |
|--|----------|---------|-------------------|---|
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
|--|----------|---------|-------------------|---|

Source: Mott MacDonald Ltd 2023

Operation Phase – Assessment of Effects

- 13.215 The potential effects of lighting on the receptors are based on the sensitivity of the receptor (**Table 13.16**) and the magnitude of effect assessment.
- 13.216 The assessment of effects of the Proposed Development is conducted for both match and non-match days. The expected number and times of matches are detailed in Chapter 4.
- 13.217 This section should be read in conjunction with **Appendix 13.2** and **Figure 13.1**.

Magnitude of Effect – Non-Match event Days

- 13.218 The magnitude of effect is assessed based on the visibility of the proposed lighting from the receptor location, and the likely effects resulting from the proposed lighting on the receptor accounting for the distance of the receptor from the Proposed Development.
- 13.219 The following assessment of magnitude of effect is based on a non-match day scenario where the field of play lighting is not in use and no events are being held in the stadium.

Light Intrusion (into Windows)

- 13.220 Lighting intrusion is illuminance reaching a window that has the potential to impact the amenity of those living/using the space inside. Receptors that can be affected by this are dwellings, specifically indoor areas where the amenity and rest of those inside can be impacted by the introduction of additional lighting.
- 13.221 Illuminance is a product of the lumen output of a light source and the distance of the light source from the measurement/calculation point or surface.
- 13.222 Receptor LR05/L05 is located approximately 170m from the North boundary of the Stadium Proposals and is located adjacent to the A4260 (Oxford Road) and Kidlington Roundabout. The existing lighting levels at Receptor LR05/L05 detailed within **Table 13.15** shows that there is a significant presence of lighting in this location that is contributing to the baseline lighting conditions at this receptor.

- 13.223 The only potential view of the Site comes from the South facing windows on the building. (**Appendix 13.2**), however direct views of the Site are unlikely due to existing foliage. The views in this direction are heavily obstructed by existing tree planting along Oxford Road, Kidlington Roundabout, Frieze Way, and the Site boundary.
- 13.224 Due to the anticipated compliance of the lighting for the Transport Works with the lighting design brief and specification of the adopting authority (**Paragraph 13.64 and Paragraph 13.65**), the distance of these works from Receptor LR05/L05 (approximately 160m), and the existing lighting located between this receptor and the Transport Works, there are unlikely to be increases in illuminance from the Transport Works at this receptor.
- 13.225 The combination of the distance from the Site, the heavily obstructed views, and the mitigation detailed within **Table 13.27** has led to the magnitude of effect on Receptor LR05/L05 from light intrusion being classified as Negligible.
- 13.226 Receptor LR06/H01 is located approximately 190m from the North/West boundaries of the Stadium Proposals. This receptor is located within a predominantly dark surrounding (**Table 13.15**), with heavily obstructed views of the existing lighting associated with Oxford Road and Frieze Way (A4260), Kidlington Roundabout, and dwellings within Kidlington.
- 13.227 The only potential view of the Site comes from the East/South facing windows on the building (**Appendix 13.2**), however direct views of the Site are unlikely due to existing foliage. The views in this direction are heavily obstructed by existing tree planting along Oxford Road, Kidlington Roundabout, Frieze Way, and the Site boundary.
- 13.228 As with Receptor LR05/L05, Receptor LR06/H01 is approximately 160m from the Transport works. This combined with the lighting for the Transport works complying with the design brief and specification of the adopting authority (**Paragraph 13.64 and Paragraph 13.65**), and the clear negligible effect the existing lighting for this location is having on this receptor (**Appendix 13.2**), means there is unlikely to be increases in illuminance in this location resulting from the Transport works.
- 13.229 The combination of the distance from the Site, the heavily obstructed views, and the mitigation detailed within **Table 13.27** has led to the magnitude of effect on Receptor LR06/H01 from light intrusion being classified as Negligible.
- 13.230 Receptor LR07/H02 is located approximately 735m from the South boundary of the Stadium Proposals and is located in Frieze Way Farm (A4260). The existing light levels in this location are low (**Table 13.15**) due the adjacent road being unlit, and the surrounding field contains no artificial

lighting. There are no direct views of the Site from this location due to the intervening topography and foliage.

13.231 The extents of the lighting for the Transport Works may extend to this location along Frieze way. However, due to the distance of the receptor from the roadway (approximate 50m) and the lighting for the Transport Work complying with the lighting specification of the local highway’s authority; this is not expected to result in an increase in lighting intrusion into this location.

13.232 The combination of the distance from the Site, the heavily obstructed views, and the mitigation detailed within **Table 13.27** has led to the magnitude of effect on Receptor LR07/H02 from light intrusion being classified as Negligible.

Table 13.36: Light Intrusion (into Windows) - Magnitude of effect assessment - Non-Match Days

| Receptor Number | Receptor Designation | Window Location and View | | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--------------------------|---|-----------------------------------|
| | | Façade Aspect | View Description | |
| LR05/L05 | Human-Amenity | North | Away from Site toward Kidlington | Negligible |
| | | East | Away from Site facing A4260 and Bicester Road | Negligible |
| | | South | Towards Site | Negligible |
| | | West | Away from Site towards Yarton | Negligible |
| LR06 / H01 | Human-Amenity | North | Away from Site toward Kidlington | Negligible |
| | | East | Towards Site | Negligible |
| | | South | Partially towards Site - Site within field of view | Negligible |
| | | West | Away from Site towards Yarton | Negligible |
| LR07 / H02 | Human-Amenity | North | Partially towards Site - Site within field of view | Negligible |
| | | East | Partially towards Site - Site within field of view | Negligible |
| | | South | Away from Site towards Cutteslowe and Summertown (Oxford) | Negligible |
| | | West | Away from Site towards Yarton and Worton. | Negligible |

Source: Mott MacDonald Ltd 2023

Spill Light

13.233 The assessment of magnitude of effect is provided to assist in the assessment of effects on ecological receptors detailed within Chapter 8.

- 13.234 Human-safety receptors LR01/L01, LR02/L02, LR03/L03 and LR04/L04 are assessed as detailed below.
- 13.235 This assessment is based on the predicted change in Spill Light using the baseline conditions and the lighting proposals to estimate the level change resulting from the Proposed Development.
- 13.236 Receptor Location E01 to E03 are provided to give context to the likely changes in light levels reaching the Site boundaries. These locations are likely to experience changes resulting from the proposed lighting due to their proximity to areas requiring lighting, and the lack of screening between these receptors and this proposed lighting.
- 13.237 **Table 13.15** details the baseline lighting conditions at Receptor Locations E01 to E03. Although existing lighting is visible in these locations, the illuminance levels recording during the baseline survey are low (<0.3 Lux).
- 13.238 **Table 13.37** details the predicted lux levels at Receptor Locations E01 to E03 during the operational phase of the Proposed Development. This is the same for the majority of the boundary of the Site except the most Northern section where lighting will be provided for way finding only using bollard luminaires.

Table 13.37: Spill Light - Potential Change - Non-Match Days – E01 – E03

| Receptor Number | Receptor Designation | Description of potential change |
|-----------------|----------------------|--|
| E01 | Ecology | It is predicted that there would be a level of change of approximately 5 to 7.5 Lux maximum in this area (See Paragraph 13.239 for more details on the most northern section of the Site boundary). |
| E02 | Ecology | It is predicted that there would be a level of change of approximately 1 to 2 Lux maximum in this area. |
| E03 | Ecology | It is predicted that there would be a level of change of approximately 1 to 2.5 maximum Lux in this area. |

Source: Mott Macdonald Ltd 2023

- 13.239 The Northern boundary of the Site will experience a lower level of change compared to other areas of the Site, with the level of lighting on the boundary in this location being predicted as approximately 0.5 lux. (A minor increase in comparison with the baseline conditions). This is due to the proposed lighting in this location being bollard type luminaires for wayfinding purposes only, which will produce significantly lower levels of illuminance compared to other areas of the Proposed Development.
- 13.240 Lighting receptor LR01/L01 and LR04/L04 are both located near the boundaries of the Site where access to the Stadium Proposals will be available. In these locations the local highways authority will be consulted (during detailed design) on the appropriate lighting standard/s, level/s and specification/s to ensure there are no significant effects of spill light from the perspective of drivers or pedestrians using these roadways/traffic routes. This will ensure that effects of spill light in these

locations does not significantly alter the existing conditions in these locations, and that there will be a Negligible magnitude of effect in terms of spill light.

- 13.241 Lighting receptor LR02/L02 is located north of the planted Site boundary in an area that contains some of the highest levels of existing lighting (**Table 13.15**). This area is also located north of the Plaza, the area of the Stadium Proposals with the lowest proposed levels of illuminance which will be provided for wayfinding purposes only by bollard type luminaires. The low levels of illuminance proposed for the north section of the Stadium Proposals combined with the existing levels of illuminance at LR02/L02 will mean there will be a Negligible magnitude of effect at this location from spill light.
- 13.242 Lighting receptor LR03/L03 is approximately 57m Southeast of the Site boundary. It is located on the Water Easton Bridge which contains an existing lit traffic route. As with lighting receptor LR02/L02, LR03/L03 contains some of the highest illuminance readings recorded during the lighting baseline survey (**Table 13.15**). Due to the distance of this receptor from the site and the existing levels of illuminance in this location the magnitude of effect from spill light at this receptor is considered Negligible.

Table 13.38: Spill Light – Magnitude of Effect assessment – Non-match days – LR01/L01 to LR04/L04

| Receptor Number | Receptor Designation | Description of Effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--|-----------------------------------|
| LR01/L01 | Human-Safety | In this location the local highways authority will be consulted (during detailed design) on the appropriate lighting standard/s, level/s, and specification/s. The Stadium Proposals lighting will be carefully co-ordinated with the local highways authority lighting to ensure there are no significant effects of spill light from the perspective of drivers, pedestrians or non-motorised user utilising these roadways/traffic routes. The Stadium Proposals lighting near this location is being provided for pedestrian/vehicular access at lighting classes similar to or lower than those that exist along the roadway and is not predicted to breach the limits detailed within ILP GN01:21 or cause significant effects on human Safety. | Negligible |
| LR02/L02 | Human-Safety | The location of this receptor North of the Site and adjacent to the Plaza has high levels of existing illuminance. The Stadium Proposals lighting levels are low in this area and are being provided by bollard style luminaires that are provided for wayfinding only, therefore it is not predicted that there will be significant effects of spill light on human safety in this location. | Negligible |
| LR03/L03 | Human-Safety | The distance of this receptor location from the Site and the existing levels of | Negligible |

| | | | |
|----------|--------------|---|------------|
| | | illuminance in this location, means there will be no significant change to light levels in this location. | |
| LR04/L04 | Human-Safety | <p>In this location the local highways authority will be consulted (during detailed design) on the appropriate lighting standard/s, level/s, and specification/s. The Stadium Proposals lighting will be carefully co-ordinated with the local highways authority lighting to ensure there are no significant effects of spill light from the perspective of drivers, pedestrians or non-motorised user utilising these roadways/traffic routes.</p> <p>The Stadium Proposals lighting near this location is being provided for pedestrian/vehicular access at lighting classes similar to or lower than those that exist along the roadway and is not predicted to breach the limits detailed within ILP GN01:21 or cause significant effects on human Safety.</p> | Negligible |

Source: Mott MacDonald Ltd 2023

Building and Sign Luminance

13.243 The architectural façade lighting within the Proposed Development will conform to the maximum luminance levels detailed within **Table 13.8**. With all illuminated signs within the Proposed Development conforming to the maximum luminance levels detailed within **Table 13.9**. This will ensure that the luminance of the building and sign displays is within the environmental zone requirements for the area, and is not overly bright compared to the surroundings.

13.244 The visibility of both the building façade and the illuminated advertising will be limited by the boundary planting of the Proposed Development. This screening will be less effective in the winter months and in the east and west views, where more foliage is being removed.

13.245 **Table 13.39** details the assessment of the magnitude of effect of building and sign luminance on the relevant identified receptors.

Table 13.39: Building and Sign Luminance - Magnitude of effect assessment - Non-Match Days

| Receptor Number | Receptor Designation | Description of Effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--|-----------------------------------|
| LR01/ L01 | Human-Safety | <p>Once complete, views of the Stadium Proposals will be available in this location while facing West. This means that the illuminated façade and sign illuminance has the potential to be visible from this location.</p> <p>All façade lighting and illuminated signage will conform to the environmental zone requirements detailed within Table 13.8 and Table 13.9, which will ensure there are</p> | Low |

| | | | |
|------------|---------------|---|------------|
| | | <p>limited effects of lighting and that the façade and signs do not appear overly bright compared to the baseline in this location (Table 13.15 and Appendix 13.2).</p> <p>However, this is likely to result in a minor shift away from the baseline conditions.</p> | |
| LR02/L02 | Human-Safety | <p>Views of the stadium façade will be potentially available from this location once the Stadium Proposals is complete, however views of illuminated signs will be minimal through foliage or not possible dependant on their positioning.</p> <p>Due to the compliance of the façade and sign luminance with the criteria detailed in Table 13.8 and Table 13.9, the façade and sign will not result in loss or alteration to one or more key elements or features of the baseline conditions. However, there is likely to be a minor shift away from the baseline conditions.</p> | Low |
| LR03/L03 | Human-Safety | <p>Once complete, views of the Stadium Proposals will be available in this location while facing Northwest. This means that the illuminated façade and sign illuminance has the potential to be visible from this location.</p> <p>All façade lighting and illuminated signage will conform to the environmental zone requirements detailed within Table 13.8 and Table 13.9, which will ensure there are limited effects of lighting and that the façade and signs do not appear overly bright compared to the baseline in this location (Table 13.15 and Appendix 13.2).</p> <p>However, this is likely to result in a minor shift away from the baseline conditions.</p> | Low |
| LR04/L04 | Human-Safety | <p>Once complete, views of the Stadium Proposals will be available in this location while facing Southeast. This means that the illuminated façade and sign illuminance has the potential to be visible from this location.</p> <p>All façade lighting and illuminated signage will conform to the environmental zone requirements detailed within Table 13.8 and Table 13.9, which will ensure there are limited effects of lighting and that the façade and signs do not appear overly bright compared to the baseline in this location (Table 13.15 and Appendix 13.2).</p> <p>However, this is likely to result in a minor shift away from the baseline conditions.</p> | Low |
| LR05/L05 | Human-Amenity | <p>There are no direct views of the Site from this location (Appendix 13.2). Therefore, there can be no significant effects of Building and Sign Luminance from this location.</p> | Negligible |
| LR06 / H01 | Human-Amenity | <p>There are no direct views of the Site from this location (Appendix 13.2). Therefore, there can be no significant effects of Building and Sign Luminance from this location.</p> | Negligible |
| LR07 / H02 | Human-Amenity | <p>There are no direct views of the Site from this location (Appendix 13.2). Therefore, there can be no significant effects of Building and Sign Luminance from this location.</p> | Negligible |

Source: Mott Macdonald Ltd 2023

Luminous Intensity

- 13.246 Effects of luminance intensity are assessed using the method detailed within Appendix 3 of ILP GN01:21^{viii} (**Table 13.5**). Effects of luminous intensity are a product of distance of an observer from a source of light, the apparent projected area of the luminaire from the observer position, the environmental zone the observer is located within and luminaire output.
- 13.247 Luminous intensity resulting from the Proposed Development will comply with the requirements detailed in **Table 13.5**. This will ensure that there are no significant changes resulting from the Proposed Development at the identified receptor locations.
- 13.248 **Table 13.40** outlines the assessment of magnitude of effect for the identified receptors accounting for compliance with the requirements detailed in **Table 13.5**.

Table 13.40: Luminous Intensity - Magnitude of effect assessment - Non-Match Days

| Receptor Number | Receptor Designation | Approximate Distance from Site Boundary | Description of Effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|---|---|-----------------------------------|
| LR01/ L01 | Human-Safety | ≤5m | <p>Direct views of the proposed lighting are available in this location.</p> <p>This location contains existing lighting (Table 13.5 and Appendix 13.2) and the proposed lighting will have to be partially integrated into this existing system to ensure safe access to the Stadium Proposals.</p> <p>Due to this location being brightly lit and compliance of the proposed lighting with the requirements of Table 13.5, there will not be a distinguishable change to the baseline conditions in this location due to luminous intensity.</p> | Negligible |
| LR02/L02 | Human-Safety | ≤5m | <p>Limited views of the proposed lighting will be available from this location.</p> <p>Although this location is close to the Stadium Proposals, it will be significantly further from the areas of the Site that will be lit to defined British Standards, with the closest area of the Site being lit for wayfinding only.</p> | Negligible |

| | | | | |
|----------|---------------|------|---|------------|
| | | | As such, and due to the compliance of the proposed lighting with the requirements of Table 13.5 , there will not be a distinguishable change to the baseline conditions in this location due to luminous intensity. | |
| LR03/L03 | Human-Safety | 57m | <p>Limited views of the proposed lighting will be available from this location, and the proposed lighting will only be visible through an area that contain existing lighting in the form of street lighting.</p> <p>Due to the existing lighting in this location, the distance from the Site (57m), the limited views of the proposed lighting from this locations, and the compliance of the proposed lighting with the requirements of Table 13.5, there will not be a distinguishable change to the baseline conditions in this location due to luminous intensity.</p> | Negligible |
| LR04/L04 | Human-Safety | 50m | <p>Direct views of the proposed lighting are available in this location.</p> <p>This location contains existing lighting (Table 13.15 and Appendix 13.2) and the proposed lighting will have to be partially integrated into this existing system to ensure safe access to the Proposed Development.</p> <p>Due to this location being brightly lit and compliance of the proposed lighting with the requirements of Table 13.5, there will not be a distinguishable change to the baseline conditions in this location due to luminous intensity.</p> | Negligible |
| LR05/L05 | Human-Amenity | 170m | <p>Limited views of the proposed lighting may be available in this location, especially during the winter months.</p> <p>However, at this distance the luminaire output will not be high enough to cause</p> | Negligible |

| | | | | |
|------------|---------------|------|--|------------|
| | | | distinguishable changes to this location. | |
| LR06 / H01 | Human-Amenity | 190m | Limited views of the proposed lighting may be available in this location, especially during the winter months. However, at this distance the luminaire output will not be high enough to cause distinguishable changes to this location. | Negligible |
| LR07 / H02 | Human-Amenity | 735m | Views of the lighting Stadium Proposals will not be possible from this location, and luminaire output will not be high enough to cause distinguishable changes to this location. If the lighting for the Transport Works extends to this receptor location, the specification of the local highway's authority (Paragraph 13.65) will be used. This combined with the distance of the receptor from the highway and the limited views of the highway from this location will result in no distinguishable change in this location. | Negligible |

Source: Mott Macdonald Ltd 2023

Discomfort/Disability Glare

- 13.249 The assessment of the experience of glare is partially based on the assessment of luminous intensity (**Table 13.5**). However, other metrics are also used.
- 13.250 The proposed lighting will comply with the requirements of veiling luminance and threshold increment detailed in **Table 13.6** and **Table 13.7**.
- 13.251 Threshold increment is a measure of disability glare expressed as the percentage increase in contrast between an object and its background for the object to be seen equally well with a source of glare present. Higher percentages of threshold increment equate to higher levels of glare.
- 13.252 Veiling luminance describes the veiling effect produced by bright sources or areas in the visual field that results in reduced visual performance and visibility. Higher levels of veiling luminance equate to higher level of glare.

Table 13.41: Discomfort/Disability Glare - Magnitude of effect assessment - Non-Match Days

| Receptor Number | Receptor Designation | Description of effect | Magnitude of Effect (Table 13.11) |
|------------------------|-----------------------------|--|--|
| LR01/L01 | Human-Safety | <p>The proposed lighting will be integrated into the existing lighting at this receptor to allow safe access to the Proposed Development.</p> <p>Through careful design and compliance with Table 13.6 and Table 13.7 there will be no significant effects of disability/discomfort glare in this location.</p> | Negligible |
| LR02/L02 | Human-Safety | <p>Only limited views of the proposed lighting will be available in this location, and the proposed lighting is not being integrated into the existing lighting in this area and will not be illuminating this area. As such there will be no significant effects of disability/discomfort glare in this location.</p> | Negligible |
| LR03/L03 | Human-Safety | <p>Due to the distance of this receptor location from the Proposed Development, and the existing lighting in this location there will be no distinguishable change to the baseline conditions in this location.</p> <p>This is due to the compliance of the proposed lighting with Table 13.6 and Table 13.7 and the proposed lighting will not be illuminating this area and so will have no effect on the perception of glare in this location.</p> | Negligible |
| LR04/L04 | Human-Safety | <p>The proposed lighting will be integrated into the existing lighting at this receptor to allow safe access to the Proposed Development.</p> <p>Through careful design and compliance with Table 13.6 and Table 13.7 there will be no significant effects of disability/discomfort glare in this location.</p> | Negligible |
| LR05/L05 | Human-Amenity | <p>Due to the distance of this receptor location from the Proposed Development, and the existing lighting in this location there will be no distinguishable change to the baseline conditions in this location.</p> <p>This is due to the compliance of the proposed lighting with Table 13.6 and Table 13.7, Paragraph 13.65 and the proposed lighting will not be illuminating this area and so will have no effect on the perception of glare in this location.</p> | Negligible |

| | | | |
|------------|---------------|--|------------|
| LR06 / H01 | Human-Amenity | Due to the distance of this receptor and the lack of visibility of the Proposed Development from this location, there will not be a distinguishable change to the baseline conditions in this location. | Negligible |
| LR07 / H02 | Human-Amenity | Due to the distance of this receptor from the Site and the lack of visibility of the Stadium Proposals from this location, there will not be a distinguishable change to the baseline conditions in this location. If the lighting for the Transport Works extends to this receptor location, the specification of the local highway's authority (Paragraph 13.65) will be used. This combined with the distance of the receptor from the highway and the limited views of the highway from this location will result in no distinguishable change in this location. | Negligible |

Source: Mott Macdonald Ltd 2023

Sky Glow

- 13.253 The area surrounding the Site contains high levels of existing sky glow (**Appendix 13.2** and **Figure 13.4**). Where sky glow was not noted in the lighting baseline survey this was because contrast with existing lighting reduced its visibility. The existing sky glow is described as bright, but it varies in colour dependent on the location and the existing lighting in the field of view.
- 13.254 Effects of lighting installation on sky glow are assessed using ULR **Table 13.4**. The proposed exterior lighting will have an ULR of 0% (which is compliant with E1 and E0 environmental zone requirement) with the effects of the façade lighting being limited by careful design and the mitigation measure detailed within **Table 13.27**.
- 13.255 This will ensure that receptor locations do not experience significant increases in sky glow, and a significant reduction in sky quality on non-match days.

Table 13.42: Sky Glow - Magnitude of effect assessment - Non-Match Days

| Receptor Number | Receptor Designation | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|-----------------------------------|
| LR01/ L01 | Human-Safety | Negligible |
| LR02/L02 | Human-Safety | Negligible |
| LR03/L03 | Human-Safety | Negligible |
| LR04/L04 | Human-Safety | Negligible |
| LR05/L05 | Human-Amenity | Negligible |
| LR06 / H01 | Human-Amenity | Negligible |
| LR07 / H02 | Human-Amenity | Negligible |

Source: Mott Macdonald Ltd 2023

Significance of Effect Assessment - Non-Match Days

Table 13.43: Significance of effect assessment - Non-Match Days

| Receptor Number | Parameter of Obtrusive Light | Sensitivity (. Table 13.10) | Magnitude of Effect (Table 13.11) | Significance of Effect (Table 13.12) |
|------------------------|-------------------------------------|--|--|---|
| LR01/L01 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | Low | Minor |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Negligible | Negligible |
| LR02/L02 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | Low | Minor |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Negligible | Negligible |
| LR03/L03 | Light Intrusion (into Windows) | Low | N/A | N/A |
| | Spill Light | Low | Negligible | Negligible |
| | Building and Sign Luminance | Low | Low | Minor/Negligible |
| | Luminous Intensity | Low | Negligible | Negligible |
| | Discomfort and Disability Glare | Low | Negligible | Negligible |
| | Sky Glow | Low | Negligible | Negligible |
| LR04/L04 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | Low | Minor |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Negligible | Negligible |
| LR05/L05 | Light Intrusion (into Windows) | Medium | Negligible | Negligible |
| | Spill Light | Medium | N/A | N/A |
| | Building and Sign Luminance | Medium | Negligible | Negligible |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |

| | | | | |
|------------|---------------------------------|--------|------------|------------|
| LR06 / H01 | Sky Glow | Medium | Negligible | Negligible |
| | Light Intrusion (into Windows) | Medium | Negligible | Negligible |
| | Spill Light | Medium | N/A | N/A |
| | Building and Sign Luminance | Medium | Negligible | Negligible |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| LR07 / H02 | Sky Glow | Medium | Negligible | Negligible |
| | Light Intrusion (into Windows) | Low | Negligible | Negligible |
| | Spill Light | Low | N/A | N/A |
| | Building and Sign Luminance | Low | Negligible | Negligible |
| | Luminous Intensity | Low | Negligible | Negligible |
| | Discomfort and Disability Glare | Low | Negligible | Negligible |
| | Sky Glow | Low | Negligible | Negligible |

Source: Mott Macdonald Ltd 2023

13.256 Based on the significance of effect detailed within **Table 13.43** the likely effect on each receptor before additional mitigation during non-match days is described within **Table 13.44**.

Table 13.44: Effects assessment - Non-Match Days

| Receptor Number | Parameter of Obtrusive Light | Nature of Effect (Table 13.13) | Level (Table 13.13) | Description (Table 13.13) |
|-----------------|---------------------------------|--------------------------------|-----------------------|---|
| LR01/L01 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out |
| | Building and Sign Luminance | Adverse | Minor adverse effects | Slight increase in visibility of site in terms of building and sign luminance - No significant impact |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR02/L02 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Building and Sign Luminance | Adverse | Minor adverse effects | Slight increase in visibility of site in terms of building and |

| | | | | |
|---------------------------------|---------------------------------|--------------------------------|-----------------------|---|
| | | | | sign luminance - No significant impact |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR03/L03 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Building and Sign Luminance | Adverse | Minor adverse effects | Slight increase in visibility of site in terms of building and sign luminance - No significant impact |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | LR04/L04 | Light Intrusion (into Windows) | N/A | N/A |
| Spill Light | | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| Building and Sign Luminance | | Adverse | Minor adverse effects | Slight increase in visibility of site in terms of building and sign luminance - No significant impact |
| Luminous Intensity | | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| Discomfort and Disability Glare | | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| Sky Glow | | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR05/L05 | | Light Intrusion (into Windows) | Neutral | None / negligible |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |

| | | | | |
|------------|---------------------------------|---------|-------------------|---|
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR06 / H01 | Light Intrusion (into Windows) | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| LR07 / H02 | Light Intrusion (into Windows) | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Neutral | None / negligible | No significant impact or overall impacts balancing out. |

Source: Mott Macdonald Ltd 2023

Magnitude of Effect – Match Days

13.257 The expected number and times football matches will take place are detailed in Chapter 4, with the illuminance levels proposed for different levels of competition and other activities detailed in **Table 13.26**.

13.258 The magnitude of effect is assessed based on the visibility of the proposed lighting from the receptor location, and the likely effects resulting from the proposed lighting on the receptor accounting for the distance of the receptor from the Proposed Development.

13.259 The following assessment of magnitude of effect is based on a match day scenario where the field of play lighting is in use.

13.260 The assessment of magnitude of effect for match days considers the magnitude of effect assessed on non-match days with the addition of the field of play lighting.

Light Intrusion (Into Windows)

13.261 The field of play lighting will be mounted on the underside of the stadium roof with the mounting arrangement following the edges on both the east and west stands. This will allow the field of play lighting to be focused directly onto the pitch and will allow the stadium to act as a shield preventing the spread of light.

13.262 Due to this mounting arrangement and the shielding effect of the stadium stands, there will not be increases in light intrusion compared to the non-match days.

Table 13.45: Light Intrusion (into Windows) - Magnitude of effect assessment - Match Days

| Receptor Number | Receptor Designation | Window Location and View | | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--------------------------|---|-----------------------------------|
| | | Façade Aspect | View Description | |
| LR05/L05 | Human-Amenity | North | Away from Site toward Kidlington | Negligible |
| | | East | Away from Site facing A4260 and Bicester Road | Negligible |
| | | South | Towards Site | Negligible |
| | | West | Away from Site towards Yarton | Negligible |
| LR06 / H01 | Human-Amenity | North | Away from Site toward Kidlington | Negligible |
| | | East | Towards Site | Negligible |
| | | South | Partially towards Site - Site within field of view | Negligible |
| | | West | Away from Site towards Yarton | Negligible |
| LR07 / H02 | Human-Amenity | North | Partially towards Site - Site within field of view | Negligible |
| | | East | Partially towards Site - Site within field of view | Negligible |
| | | South | Away from Site towards Cutteslowe and Summertown (Oxford) | Negligible |
| | | West | Away from Site towards Yarton and Worton. | Negligible |

Source: Mott MacDonald Ltd 2023

Spill Light

- 13.263 The assessment of magnitude of effect is provided to assist in the assessment of effects on ecological receptors detailed within Chapter 8.
- 13.264 Human-safety receptors LR01/L01, LR02/L02, LR03/L03 and LR04/L04 are assessed as detailed below.
- 13.265 This assessment is based on the predicted change in Spill Light using the baseline conditions and the lighting proposals to estimate the level change resulting from the Proposed Development.
- 13.266 Due to this mounting arrangement and the shielding effect of the stadium stands, there will not be increases in spill light at the Site boundaries compared to the non-match days.

Table 13.46: Spill Light - Potential Change - Match Days – E01 to E03

| Receptor Number | Receptor Designation | Description of potential change |
|-----------------|----------------------|---|
| E01 | Ecology | It is predicted that there would be a level of change of approximately 5 to 7.5 Lux maximum in this area. (See Paragraph 13.267 for more details on the most northern section of the Site boundary). |
| E02 | Ecology | It is predicted that there would be a level of change of approximately 1 to 2 Lux maximum in this area. |
| E03 | Ecology | It is predicted that there would be a level of change of approximately 1 to 2.5 maximum Lux in this area. |

Source: Mott MacDonald Ltd 2023

- 13.267 The Northern boundary of the Site will experience a lower level of change compared to other areas of the Site, with the level of lighting on the boundary in this location being predicted as approximately 0.5 lux. (A minor increase in comparison with the baseline conditions). This is due to the proposed lighting in this location being bollard type luminaires for wayfinding purposes only, which will produce significantly lower levels of illuminance compared to other areas of the Proposed Development.
- 13.268 As with E01 to E03 Lighting receptor LR01/L01, LR02/L02, LR03/L03 and LR04/L04 will not experience increase levels of spill light (illuminance) compared to non-match days. Therefore, the magnitude of effect experience by these receptors from spill light will not differ compared to non-match days.

Table 13.47: Spill Light – Magnitude of Effect assessment – Match days – LR01/L01 to LR04/L04

| Receptor Number | Receptor Designation | Description of Effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--|-----------------------------------|
| LR01/L01 | Human-Safety | There will be no measurable difference compared to non-match days (Table 13.38) | Negligible |
| LR02/L02 | Human-Safety | There will be no measurable difference compared to non-match days (Table 13.38) | Negligible |

| | | | |
|----------|--------------|--|------------|
| LR03/L03 | Human-Safety | There will be no measurable difference compared to non-match days (Table 13.38) | Negligible |
| LR04/L04 | Human-Safety | There will be no measurable difference compared to non-match days (Table 13.38) | Negligible |

Source: Mott MacDonald Ltd 2023

Building and Sign Luminance

13.269 During match days the façade lighting and illuminated signs will comply with the requirements detailed in **Table 13.8** and **Table 13.9**. This will ensure there are no additional effects of building and sign luminance compared to non-match days (**Table 13.39**).

Table 13.48: Building and Sign Luminance - Magnitude of effect assessment - Match Days

| Receptor Number | Receptor Designation | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|-----------------------------------|
| LR01/ L01 | Human-Safety | Low |
| LR02/L02 | Human-Safety | Low |
| LR03/L03 | Human-Safety | Low |
| LR04/L04 | Human-Safety | Low |
| LR05/L05 | Human-Amenity | Negligible |
| LR06 / H01 | Human-Amenity | Negligible |
| LR07 / H02 | Human-Amenity | Negligible |

Source: Mott MacDonald Ltd 2023

Luminous Intensity

13.270 As with non-match days luminous intensity resulting from the Proposed Development will comply with the requirements detailed in **Table 13.5**. This will ensure that there are no significant changes resulting from the Proposed Development at the identified receptor locations due to luminous intensity.

13.271 The mounting of the field of play lighting under the stadium roof following the edges on both the east and west stands will ensure that direct views of the luminous area of the luminaires are minimal. This is due to the field of play luminaires being focused directly onto the pitch and the blocking effects of the stadium stands.

13.272 This means that the luminaires will be focused into the stadium and down, away from the surrounding receptors.

Table 13.49: Luminous Intensity - Magnitude of effect assessment - Match Days

| Receptor Number | Receptor Designation | Approximate Distance from Site Boundary | Description of Effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|---|--|-----------------------------------|
| LR01/ L01 | Human-Safety | ≤5m | There will be no measurable difference compared to non-match days (see Table 13.40). | Negligible |

| Receptor Number | Receptor Designation | Approximate Distance from Site Boundary | Description of Effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|---|--|-----------------------------------|
| LR02/L02 | Human-Safety | ≤5m | There will be no measurable difference compared to non-match days (see Table 13.40). | Negligible |
| LR03/L03 | Human-Safety | 57m | There will be no measurable difference compared to non-match days (see Table 13.40). | Negligible |
| LR04/L04 | Human-Safety | 50m | There will be no measurable difference compared to non-match days (see Table 13.40). | Negligible |
| LR05/L05 | Human-Amenity | 170m | There will be no measurable difference compared to non-match days (see Table 13.40). | Negligible |
| LR06 / H01 | Human-Amenity | 190m | There will be no measurable difference compared to non-match days (see Table 13.40). | Negligible |
| LR07 / H02 | Human-Amenity | 735m | There will be no measurable difference compared to non-match days (see Table 13.40). | Negligible |

Source: Mott MacDonald Ltd 2023

Discomfort/Disability Glare

13.273 As with non-match days the proposed lighting will comply with the requirements of veiling luminance and threshold increment detailed in **Table 13.6** and **Table 13.7**, and the luminous intensity requirements detailed in **Table 13.5**.

13.274 Due to the mounting arrangement and the design of the stadium, the addition of the field of play lighting will not significantly alter the proposed or existing lighting in the surrounding area. The focusing of the luminaires onto the pitch from under the stadium roof, and the blocking effects of the stands will prevent any additional effects of discomfort/disability glare on match days compared to non-match days.

Table 13.50: Discomfort/Disability Glare - Magnitude of effect assessment - Match Days

| Receptor Number | Receptor Designation | Description of effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--|-----------------------------------|
| LR01/ L01 | Human-Safety | There will be no measurable difference compared to non-match days (see Table 13.41). | Negligible |
| LR02/L02 | Human-Safety | There will be no measurable difference compared to non-match days (see Table 13.41). | Negligible |
| LR03/L03 | Human-Safety | There will be no measurable difference compared to non-match days (see Table 13.41). | Negligible |
| LR04/L04 | Human-Safety | There will be no measurable difference compared to non-match days (see Table 13.41). | Negligible |

| Receptor Number | Receptor Designation | Description of effect | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|--|-----------------------------------|
| LR05/L05 | Human-Amenity | There will be no measurable difference compared to non-match days (see Table 13.41). | Negligible |
| LR06 / H01 | Human-Amenity | There will be no measurable difference compared to non-match days (see Table 13.41). | Negligible |
| LR07 / H02 | Human-Amenity | There will be no measurable difference compared to non-match days (see Table 13.41). | Negligible |

Source: Mott MacDonald Ltd 2023

Sky Glow

- 13.275 The proposed field of play lighting will have an ULR that is compliant with E2 environmental zone requirements (**Table 13.4**). This requires the proposed field of play to have an ULR of $\leq 2.5\%$.
- 13.276 The proposed external lighting will have an ULR of 0%, which is compliant with E1 and E0 environmental zone requirements, with the effects of the façade lighting being limited by careful design and the mitigation measure detailed within **Table 13.27**.
- 13.277 The addition of the field of play lighting will not cause an exceedance of the ULR requirements for an E2 environmental zone, and the field of play lighting will not be active every night of the year and will only be at full light output for a limited number of matches (**Table 13.26**). This will ensure that there are not significant alterations to the existing sky conditions.
- 13.278 The area surrounding the Site contains high levels of existing sky glow (**Table 13.15** and **Figure 13.4**), with this being noted as bright and varying in colour depending on the receptor location.
- 13.279 Due to the compliance of the field of play lighting with E2 environmental zone criteria there will not be a significant change in sky conditions during matches from direct illumination. However, there will be a minor shift away from the baseline sky conditions resulting from ambient illumination (**Table 13.51**).

Table 13.51: Sky Glow - Magnitude of effect assessment - Match Days

| Receptor Number | Receptor Designation | Magnitude of Effect (Table 13.11) |
|-----------------|----------------------|-----------------------------------|
| LR01/ L01 | Human-Safety | Low |
| LR02/L02 | Human-Safety | Low |
| LR03/L03 | Human-Safety | Low |
| LR04/L04 | Human-Safety | Low |
| LR05/L05 | Human-Amenity | Low |
| LR06 / H01 | Human-Amenity | Low |
| LR07 / H02 | Human-Amenity | Low |

Source: Mott MacDonald Ltd 2023

Significance of Effect Assessment - Match Days

Table 13.52: Significance of effect assessment - Match Days

| Receptor Number | Parameter of Obtrusive Light | Sensitivity). Table 13.10) | Magnitude of Effect (Table 13.11) | Significance of Effect (Table 13.12) |
|------------------------|-------------------------------------|---|--|---|
| LR01/L01 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | Low | Minor |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Low | Minor |
| LR02/L02 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | Low | Minor |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Low | Minor |
| LR03/L03 | Light Intrusion (into Windows) | Low | N/A | N/A |
| | Spill Light | Low | Negligible | Negligible |
| | Building and Sign Luminance | Low | Low | Minor/Negligible |
| | Luminous Intensity | Low | Negligible | Negligible |
| | Discomfort and Disability Glare | Low | Negligible | Negligible |
| | Sky Glow | Low | Low | Minor/Negligible |
| LR04/L04 | Light Intrusion (into Windows) | Medium | N/A | N/A |
| | Spill Light | Medium | Negligible | Negligible |
| | Building and Sign Luminance | Medium | Low | Minor |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Low | Minor |
| LR05/L05 | Light Intrusion (into Windows) | Medium | Negligible | Negligible |
| | Spill Light | Medium | N/A | N/A |
| | Building and Sign Luminance | Medium | Negligible | Negligible |
| | Luminous Intensity | Medium | Negligible | Negligible |

| | | | | |
|------------|---------------------------------|--------|------------|------------------|
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Low | Minor |
| LR06 / H01 | Light Intrusion (into Windows) | Medium | Negligible | Negligible |
| | Spill Light | Medium | N/A | N/A |
| | Building and Sign Luminance | Medium | Negligible | Negligible |
| | Luminous Intensity | Medium | Negligible | Negligible |
| | Discomfort and Disability Glare | Medium | Negligible | Negligible |
| | Sky Glow | Medium | Low | Minor |
| LR07 / H02 | Light Intrusion (into Windows) | Low | Negligible | Negligible |
| | Spill Light | Low | N/A | N/A |
| | Building and Sign Luminance | Low | Negligible | Negligible |
| | Luminous Intensity | Low | Negligible | Negligible |
| | Discomfort and Disability Glare | Low | Negligible | Negligible |
| | Sky Glow | Low | Low | Minor/Negligible |

Source: Mott Macdonald Ltd 2023

13.280 Based on the significance of effect detailed within **Table 13.52** the likely effect on each receptor before additional mitigation is described within **Table 13.53**.

Table 13.53: Effects assessment - Match Days

| Receptor Number | Parameter of Obtrusive Light | Nature of Effect (Table 13.13) | Level (Table 13.13) | Description (Table 13.13) |
|-----------------|---------------------------------|--------------------------------|-----------------------|--|
| LR01/ L01 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Building and Sign Luminance | Adverse | Minor adverse effects | Slight increase in visibility of site in terms of building and sign luminance - No significant impact. |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Adverse | Minor adverse effects | Slight increase in sky glow - No significant impact. |
| LR02/L02 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |

| | | | | |
|---------------------------------|---------------------------------|--------------------------------|-----------------------|--|
| | Building and Sign Luminance | Adverse | Minor adverse effects | Slight increase in visibility of site in terms of building and sign luminance - No significant impact. |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Adverse | Minor adverse effects | Slight increase in sky glow - No significant impact. |
| LR03/L03 | Light Intrusion (into Windows) | N/A | N/A | N/A |
| | Spill Light | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Building and Sign Luminance | Adverse | Minor adverse effects | Slight increase in visibility of site in terms of building and sign luminance - No significant impact. |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Adverse | Minor adverse effects | Slight increase in sky glow - No significant impact. |
| | LR04/L04 | Light Intrusion (into Windows) | N/A | N/A |
| Spill Light | | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| Building and Sign Luminance | | Adverse | Minor adverse effects | Slight increase in visibility of site in terms of building and sign luminance - No significant impact. |
| Luminous Intensity | | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| Discomfort and Disability Glare | | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| Sky Glow | | Adverse | Minor adverse effects | Slight increase in sky glow - No significant impact. |
| LR05/L05 | | Light Intrusion (into Windows) | Neutral | None / negligible |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | Neutral | None / negligible | No significant impact or overall impacts balancing out. |

| | | | | |
|------------|---------------------------------|---------|-----------------------|---|
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Adverse | Minor adverse effects | Slight increase in sky glow - No significant impact. |
| LR06 / H01 | Light Intrusion (into Windows) | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Adverse | Minor adverse effects | Slight increase in sky glow - No significant impact. |
| LR07 / H02 | Light Intrusion (into Windows) | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Spill Light | N/A | N/A | N/A |
| | Building and Sign Luminance | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Luminous Intensity | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Discomfort and Disability Glare | Neutral | None / negligible | No significant impact or overall impacts balancing out. |
| | Sky Glow | Adverse | Minor adverse effects | Slight increase in sky glow - No significant impact. |

Source: Mott Macdonald Ltd 2023

Mitigation Measures and Residual Effects

13.281 This section details any additional mitigation that is required for the construction or operational phase following the assessment of effects of the proposed lighting for the Proposed Development.

Mitigation

13.282 All reasonably practical mitigation has been included as embedded mitigation **Table 13.27**, and therefore no additional mitigation is proposed.

Residual effects

13.283 There are **no significant residual effects** of the Proposed Development in terms of obtrusive light upon the identified receptors.

13.284 The only residual effects are **Minor Adverse** and will not materially alter the surroundings of the Site such that this will be significant change compared to the baseline lighting conditions. **Table 13.56** contains a summary of the residual effects of lighting resulting from the Proposed Development.

Cumulative Effects

13.285 Cumulative effects are those that may result from a combination of past, present or future actions of existing planned activities within a project’s zone of influence. Effects of the Proposed Development, which in themselves may be insignificant in their effect, when combined with effects (significant or insignificant) resulting from other existing, planned or future developments may result in significant cumulative effects.

13.286 The current list of planned developments which are included within this cumulative impact assessment can be found within Chapter 2. The potential cumulative effects of these planned developments with the Proposed Development are summarised within **Table 13.55**.

13.287 Cumulative effects of obtrusive light are primarily subject to the distance of the two developments from each other and from the identified receptors. This is due to the inverse-square law and how it affects levels of the different parameters of light over distance:

$$\text{Intensity (cd)} / \text{distance (m)}^2$$

13.288 An example of the effect of distance on illuminance is shown in **Table 13.54**

Table 13.54: The effect of the inverse squared law on illuminance over varying distances

| Effect of the Inverse Square Law on Illuminance | | | | |
|---|--------------|--------|---------|-----------|
| | Distance (m) | | | |
| Intensity (cd) | 1m | 10m | 100m | 1000m |
| 1000 | 1000 Lux | 10 Lux | 0.1 Lux | 0.001 Lux |

Source: Mott MacDonald Ltd 2023

13.289 The cumulative assessment should be read in conjunction with **Appendix 13.2** and **Figure 13.4** which provides context to the existing lighting conditions within the Site and in the surrounding area.

Table 13.55: Summary of cumulative effects for lighting

| No. | Planned Development Description | Discussion of potential effects | Potential inter-project Cumulative Effect |
|-----|---|--|---|
| 1 | <p>Location: OS Parcel 4347 East of Pipal Cottage Oxford Road Kidlington. Cherwell District Council.</p> <p>Outline application (with all matters except access reserved for future consideration) for the demolition of existing buildings and the erection of up to 800 dwellings (Class C3); a two form entry primary school; a local centre (comprising convenience retailing (not less than 350sqm and up to 500sqm (Class E(a))), business uses (Class E(g)(i)) and/or financial and professional uses (Class E(c)) up to 500sqm, café or restaurant use (Class E(b)) up to 200sqm; community building (Class E and F2); car and cycle parking); associated play areas, allotments, public open green space and landscaping; new vehicular, pedestrian and cycle access points; internal roads, paths and communal parking infrastructure; associated works, infrastructure (including Sustainable Urban Drainage, services and utilities) and ancillary development. Works to the Oxford Road in the vicinity of the Site to include, pedestrian and cycle infrastructure, drainage, bus stops, landscaping and ancillary development.</p> <p>Application is waiting consideration.</p> <p>A Lighting Strategy, Lighting Baseline Survey, and Lighting Impact Assessment is provided with the application.</p> | <p>Due to the distance (approximately 350m at its closest point) of this planned development from the Site, and the presence of Oxford Parkway Station (and associated facilities) and Oxford Road between this planned development and the Site, it is unlikely there will be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, and discomfort/disability glare.</p> <p>However, there are likely to be cumulative effects on sky quality due to increases in ambient illuminance. This effect will primarily be caused by reflected light, due to best practice being using in both the Proposed Development and the planned development for the reduction of effects of sky glow.</p> <p>Effects of reflected light on sky quality are less significant than effects resulting from direct illumination of the sky, however a slight change in sky quality in the area is likely.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Minor adverse effects on all identified receptors.</p> |

| | | | |
|---|--|--|---|
| 2 | <p>Location: North Oxford Golf Club, Land West of Oxford Road. Cherwell District Council.</p> <p>Allocated for residential development in the Cherwell District Local Plan Partial Review as PR6b.</p> <p>No application pertaining to this land parcel has been submitted, however the allocation for residential development will be used to conduct the assessment.</p> | <p>No application is submitted for this parcel of land. It is, however, assessed for the potential change to residential use as is described within Cherwell District Local Plan Partial Review (PR6b).</p> <p>It is assumed that lighting within this allocated site will conform with the specification of the adopting authority, and that best practice as detailed within ILP GN01:2021 and GN08:2023 will be followed.</p> <p>This allocated site is approximately 200m from the Site at its closest point. At this distance, it is unlikely there will be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, and discomfort/disability glare upon the identified receptors.</p> <p>This is due in part to the residential allocation of this land, which requires significantly lower illuminance levels compared to industrial/commercial or exterior sport applications.</p> <p>However, it is likely there will be cumulative effects on sky quality due to increases in ambient illuminance and reflected light resulting from the size of the allocated site.</p> <p>Effects of reflected light on sky quality are less significant than effects resulting from direct illumination of the sky, however a slight change in sky quality in the area is likely.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Minor adverse effects on all identified receptors.</p> |
| 3 | <p>Location: Frieze Farm, Kidlington. Cherwell District Council.</p> <p>Policy PR6c - 30 hectares will be reserved for the potential construction of a golf course should this be required as a result of the development</p> | <p>No application is submitted for this parcel of land. It is, however, assessed for the potential change to a golf course as is described within Cherwell District Local Plan Partial Review (PR6c).</p> <p>It is assumed this golf course will be a like for like replacement of the North Oxford Golf Club, and therefore</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> |

| | | | |
|---|---|---|---|
| | <p>of Land to the West of Oxford Road under Policy PR6b.</p> <p>No application pertaining to this land parcel has been submitted, however the allocation for the construction of a golf course will be used to conduct the assessment of cumulative effects.</p> | <p>that a lit driving range will not be included in the proposals, and that tee times will not extend passed 5pm.</p> <p>External lighting for this golf course is likely to be minimal, with lighting likely only being provided to the club house, amenity areas, access, and parking.</p> <p>It is assumed that lighting within this allocated site will conform with the specification of the adopting authority, and that best practice as detailed within ILP GN01:2021 and GN08:2023 will be followed.</p> <p>This allocated site is approximately 175m from the Site at its closest point. Due to this distance and the minimal need for lighting it is unlikely there will be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, discomfort/disability glare, and sky glow upon the identified receptors.</p> | <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 4 | <p>Location: Land at Bicester Road Kidlington. Cherwell District Council.</p> <p>Southern part of the PR7a Site.</p> <p>Outline planning application for the development of up to 370 homes, public open space (including play areas and woodland planting), sports pitches and pavilion, drainage and engineering works, with all matters reserved (appearance, landscaping, layout and scale) except for vehicular and emergency accesses to Bicester Road.</p> <p>Application has a resolution to grant planning permission subject to a S106 Agreement.</p> | <p>This is the closest of the identified planned developments – being located approximately 25m East of the Site across Oxford Road.</p> <p>It is assumed that lighting within this allocated site will conform with the specification of the adopting authority, and that best practice as detailed within ILP GN01:2021 and GN08:2023 will be followed.</p> <p>The main residential provision within this development is located in the northern section of this parcel. The lighting for this area is not likely to result in significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, and discomfort/disability glare upon the identified receptors. This is due to the distance of this section of the development from the identified receptors, and the</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> |

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| | <p>No lighting information is provided with the planning application. A Lighting Strategy and Assessment is suggested as a condition. It is assumed that the Lighting Strategy will follow best practice and all reasonable mitigation will be implement within the lighting design.</p> | <p>typically lower levels of illuminance provided for subsidiary roads.</p> <p>In the southern section of this parcel there is “ <i>Provision of 4ha of sports facilities including at least one all-weather pitch with lighting, a community pavilion and car park</i> ”^{ix}. No lighting details are provided for the lit sports pitch; however, it is assumed this pitch will be lit for recreational use only as per BS EN 12193:2018.</p> <p>Due to the design of the Stadium Proposals and the mitigation employed there is unlikely to be significant cumulative effects with the proposed all-weather pitch of spill light, building and sign luminance, luminous intensity, and discomfort/disability glare upon the identified receptors.</p> <p>However, it is likely there will be cumulative effects on sky quality due to increases in ambient illuminance and reflected light.</p> | <p>Sky Glow: Minor adverse effects on all identified receptors.</p> |
| 5 | <p>Location: Land North Of 66 And Adjacent Water Eaton Lane Gosford. Cherwell District Council.</p> <p>Northern part of the PR7a site. Full Application for Development of 96 Dwellings (50% affordable housing), extension to Bicester Road Cemetery with associated access (from Bicester Road), open space, landscaping and infrastructure</p> <p>Application has a resolution to grant planning permission subject to a S106 Agreement.</p> <p>No lighting information is provided with the planning application. A Lighting Strategy is suggested as a condition. It is assumed that the</p> | <p>It is assumed that lighting within this allocated site will conform with the specification of the adopting authority, and that best practice as detailed within ILP GN01:2021 and GN08:2023 will be followed.</p> <p>Due to the distance of this planned development (approximately 850m Northeast) from the Site and the proposals being for residential use, there are unlikely to be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, and discomfort/disability glare upon the identified receptors.</p> <p>Due to the scale of this planned development, it’s distance from the Site and its allocations for residential use, there</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> |

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| | <p>Lighting Strategy will follow best practice and all reasonable mitigation will be implement within the lighting design.</p> | <p>are unlikely to be significant cumulative effects of sky glow.</p> <p>This is also partially due to the existing sky conditions in this location, with the sky already exhibiting significant sky glow (Figure 13.4 and Table 13.16).</p> | <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 6 | <p>Location: Stratfield Farm 374 Oxford Road Kidlington OX5 1DL. Cherwell District Council.</p> <p>Allocated in the Cherwell District Local Plan Partial Review as PR7b.</p> <p>Outline planning application for up to 118 no dwellings (all matters reserved except for access) with vehicular access from Oxford Road.</p> <p>Application has a resolution to grant planning permission subject to a S106 Agreement.</p> <p>No lighting information is provided with the planning application. A Lighting Strategy is suggested as a condition. It is assumed that the Lighting Strategy will follow best practice and all reasonable mitigation will be implement within the lighting design.</p> | <p>It is assumed that lighting within this allocated site will conform with the specification of the adopting authority, and that best practice as detailed within ILP GN01:2021 and GN08:2023 will be followed.</p> <p>Due to the location of this development, which surrounds receptor LR06/H01, there cannot be cumulative effects on this receptor. All effects on this receptor will be from this planned development due to the blocking nature of the planned development and the distance of this receptor from the Proposed Development (approximately 120m).</p> <p>Cumulative effects on the other receptors in proximity to this development (LR02/L02, LR04/L04, LR05/L05) are unlikely to be significant in terms of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, and discomfort/disability glare. This is due to the location of the planned development in relation to the Proposed Development and the mitigation proposed within the Proposed Development.</p> <p>There will be an increase in ambient illuminance in the environment. This is likely to result in cumulative effects on sky quality due to increases in ambient illuminance and reflected light.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Minor adverse effects on all identified receptors.</p> |
| 7 | <p>Former Piggery and Land North Of Woodstock Road Yarnton. Cherwell District Council.</p> <p>Southern part of site allocation PR8.</p> | <p>The ES Chapter states <i>“the lighting scheme will be designed to minimise light pollution, particularly as seen in views from the wider countryside to the south. Any lighting within the Site should follow County Council’s Guidance and where necessary it should also include</i></p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> |

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| | <p>Outline planning application for the residential development of up to 300 dwellings with associated infrastructure and open space (outline) and new access off the A44 (detailed).</p> <p>Application is waiting consideration.</p> <p>A Lighting ES Chapter has been provided with the application for this development. This concludes that the development will result in a Negligible effect in terms of light pollution as the design will be effectively managed and controlled.</p> | <p><i>measures such as the use of directional lighting, limiting the use of lighting to specified operating hours and implementation of lights that reduce glare and spill.</i>^{xx}. Based on this, it is assumed the adoptable specification will be followed and all reasonable mitigation will be implemented within the lighting strategy and design for the planned development. This is assumed to include conforming with the best practice as detailed within ILP GN01:2021 and GN08:2023 will be followed.</p> <p>The above combined with the distance of the planned development from the Proposed Development (approximately 1.4Km) means there are unlikely to be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, discomfort/disability glare and skyglow upon the identified receptors.</p> | <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 8 | <p>Location: Begbroke Science Park Begbroke Hill Begbroke Kidlington OX5 1PF. Cherwell District Council.</p> <p>Northern part of site allocation PR8.</p> <p>Outline application, with all matters reserved, for a multi-phased (severable), comprehensive residential-led mixed use development comprising: Up to 215,000 square metres gross external area of residential floorspace (or c.1,800 homes which depending on the housing mix could result in a higher or lower number of housing units) within Use Class C3/C4 and large houses of multiple occupation (Sui Generis); Supporting social infrastructure including secondary school/primary school(s) (Use Class F1); health, indoor sport and recreation, emergency and nursery facilities (Class E(d)-(f)).</p> | <p>The Framework Lighting Strategy highlights that <i>“the proposed lighting strategy seeks to minimise the impact of the artificial lighting for the Proposed Development. Careful consideration should be applied to the proposed lighting strategy to cater for the existing sensitive receptor within the Site and suitable measures put in place to protect the existing ecology and limit impact onto the surrounding areas beyond the Site boundary...Whilst the Proposed Development would change the visual character of the existing conditions, the lighting framework strategy ensures the protection of the existing areas of sensitive receptor and adheres to the criteria of permissible light spill and light pollution as per the ILP recommendations and guidance for the lighting environmental zone applicable to the Site.”</i>^{xi} Based on this, it is assumed the adoptable specification will be followed and all reasonable mitigation will be implemented within the lighting strategy and design for the planned development.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible /Minor effects on all identified receptors.</p> |

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| <p>Supporting retail, leisure and community uses including retail (Class E(a)), cafes and restaurants (Class E(b)), commercial and professional services (Class E(c)), a hotel (Use Class C1), local community uses (Class F2), and other local centre uses within a Sui Generis use including public houses, bars and drinking establishments (including with expanded food provision), hot food takeaways, venues for live music performance, theatre, and cinema. Up to 155,000 net additional square metres (gross external area) of flexible employment uses including research and development, office and workspace and associated uses (Use E(g)), industrial (Use Class B2) and storage (Use Class B8) in connection with the expansion of Begbroke Science Park; Highway works, including new vehicular, cyclist and pedestrian roads and paths, improvements to the existing Sandy Lane and Begbroke Hill road, a bridge over the Oxford Canal, safeguarded land for a rail halt, and car and cycle parking with associated electric vehicle charging infrastructure; Landscape and public realm, including areas for sustainable urban drainage systems, allotments, biodiversity areas, outdoor play and sports facilities (Use Class F2(c)); Utility, energy, water, and waste water facilities and infrastructure; together with enabling, site clearance, demolition and associated works, including temporary meanwhile uses.</p> <p>A Framework Lighting Strategy has been submitted with the application which highlights that the proposed development will adhere to the criteria of permissible light spill and light pollution as per the ILP recommendations and</p> | <p>The planned development is approximately 1.75Km Northwest of the Proposed Development, and at this distance there are unlikely to be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity and discomfort/disability glare upon the identified receptors.</p> <p>However, due to the scale of the planned development (minimum of 1,750 dwelling and supporting uses) there is likely to be an increase in ambient illuminance which may result in effects on sky quality alongside the Proposed Development.</p> | |
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| | guidance for the lighting environmental zone applicable to the Site. | | |
| 9 | <p>Location: OS Parcel 3673 Adjoining and West Of 161 Rutten Lane Yarnton OX5 1LT. Cherwell District Council.</p> <p>Allocated in the Cherwell District Local Plan Partial Review as PR9.</p> <p>The erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works. All matters are reserved, save for the principal access points.</p> <p>Application pending decision via appeal.</p> <p>A Lighting ES Chapter has been provided with the application for this development. This concludes with an assessment as negligible overall effects, with a caveat that cumulative effects could be anticipated if development goes beyond the Site boundaries.</p> | <p>The lighting ES Chapter for the planned development states <i>"Cumulative residual effects could be anticipated if the extent of development goes beyond the Proposed Development considered by this Chapter and alters the rural / developed landscape to a greater degree. It is likely that an increase in sky glow would be the most visible product of such a situation, were it to occur. Following the mitigation measures presented in this Chapter would likely reduce the impact of further lighting to the lowest possible level."</i>^{xii}</p> <p>The planned development is approximately 2.5Km Northwest of the Proposed Development. At this distance there are unlikely to be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity and discomfort/disability glare upon the identified receptors , considering the scale of both developments.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 10 | Location: Northern Gateway, Oxford City Council. | The planned development is located approximately 1.35Km Southwest of the Proposed Development on the edge of Sunnymead and Cutteslowe. Due to the distance | Light Intrusion (into windows): Negligible effects on all identified receptors. |

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| | <p>Hybrid planning application comprising:</p> <p>(i) Outline application (with all matters reserved save for "access"), for the erection of up to 87,300 sqm (GIA) of employment space (Use Class B1), up to 550 sqm (GIA) of community space (Use Class D1), up to 2,500 sqm (GIA) of Use Classes A1, A2, A3, A4 and A5 floorspace, up to a 180 bedroom hotel (Use Class C1) and up to 480 residential units (Use Class C3), installation of an energy sharing loop, main vehicle access points from A40 and A44, link road between A40 and A44 through the Site, pedestrian and cycle access points and routes, car and cycle parking, open space, landscaping and associated infrastructure works. Works to the A40 and A44 in the vicinity of the Site.</p> <p>(ii) Full application for part of Phase 1A comprising 15,850 sqm (GIA) of employment space (Use Class B1), installation of an energy sharing loop, access junctions from the A40 and A44 (temporary junction design on A44), construction of a link road between the A40 and A44, open space, landscaping, temporary car parking (for limited period), installation of cycle parking (some temporary for limited period), foul and surface water drainage, pedestrian and cycle links (some temporary for limited period) along with associated infrastructure works. Works to the A40 and A44 in the vicinity of the Site. (Amended plans and additional information received 19.06.2019)</p> <p>Application approved in September 2021.</p> | <p>of the planned development from the Proposed Development, there are unlikely to be cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, discomfort/disability glare upon the identified receptors.</p> <p>This planned development is located within an area that contains similar or higher levels of existing sky glow than the Proposed Development (Figure 13.4 and Table 13.6).</p> <p>Both the planned development and Proposed Development have sensitive lighting strategies which included reasonable mitigation. This will ensure there are negligible effects of direct upward light, however there is likely to be an increase in ambient illuminance which may result in effects on sky quality alongside the Proposed Development.</p> | <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible/Minor effects on all identified receptors.</p> |
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| | A lighting impact assessment, lighting design concept document and specification of the proposed luminaires is provided to discharge planning condition 38 for phase 1a of the planned development. | | |
| 11 | <p>Location: Land South West Of St Frideswide Farm Banbury Road Oxford Oxfordshire OX2 8EH.</p> <p>Application has been approved and subsequent conditions has been discharged.</p> <p>Full planning permission for 134 dwellings (use class C3), informal open space including community pavilion, seating and children's play areas, hard and soft landscape and sustainable drainage areas, access, associated roads and infrastructure, car and cycle parking, bin storage, pumping station, substation and associated engineering works.</p> | <p>A Lighting Layout Plan along with specifications for the proposed luminaires is provided with the application.</p> <p>The planned development is lit to two different standards depending on the use of the area, these are:</p> <ol style="list-style-type: none"> 1. BS EN 12464-2:2014, Table 5.9, ref 5.9.1: 5 Lux average, 0.25 (25%) uniformity. 2. BS EN 13201-2:2015 Table 3, Class P5, 3.0-4.5 Lux average, 0.6 Lux minimum. <p>The specified lighting columns height is 5m – 6m.</p> <p>The specified street and car park luminaires are DW Windsor Kirium Pro Mini.</p> <p>The luminaires specified have G Classes of G3 at an assumed 0 degree tilt.</p> <p>The external lighting within the Stadium Proposals will also have a ULR of 0% and a minimum G class of G4. The field of play lighting will also comply with the ULR requirements of an E2 environmental zone.</p> <p>The St Frideswide Private Lighting Plan shows Lux contours of 1 lux remain within or close to the Site boundary, or that they do not extend far from the area of the access road included within the plan.</p> <p>The private lighting for the dwellings is not included within the Lighting Layout Plan, but it is not anticipated that this lighting will have a significant effect on the lux contours.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |

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| | | <p>This planned development is located approximately 1.1km Southeast of the Site, and is located just north of the Oxford Lawn Tennis Club and Oxford Hawks Hockey Club which contains existing sports lighting.</p> <p>Due to the distance of this development from the Proposed Development, and the restriction of spill lighting to broadly within the planned development boundary there will be no significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, or discomfort/disability glare.</p> <p>The illuminance levels provided by the design are suitable for the task and are relatively low (<10 Lux Average). This combines with the 0% upward light ratio of the private lighting streetlighting luminaires, and the high brightness environment near this planned development (due to the existing sports lighting), means it is unlikely there will be significant cumulative effects on sky quality (sky glow).</p> | |
| 12 | <p>Location: University Press Sports Ground</p> <p>SP52 – University Press Sports Ground</p> <p>Allocated for 130 dwellings.</p> <p>No application pertaining to this land parcel has been submitted, however the allocation for residential development will be used to conduct the assessment.</p> | <p>No application has been submitted for this parcel of land, however it is allocated for residential development for 130 dwellings.</p> <p>This allocated site is approximately 1.2km South of the Proposed Development, and is located between two parcels of residential use land.</p> <p>This allocated site is relatively small and is located within an area that contains lighting of a similar type to that assumed to be proposed within this allocated site. This existing lighting consists of residential street lighting, car park lighting, and private dwelling lighting. The existing lighting surrounding this allocated site is contribution to</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> |

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| | | <p>high levels of sky glow in this area, which was noted during the lighting baseline survey.</p> <p>It is assumed that lighting within this allocated site will conform with the specification of the adopting authority, and that best practice as detailed within ILP GN01:2021 and GN08:2023 will be followed.</p> <p>The distance from the Proposed Development means there will be no significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, or discomfort/disability glare.</p> <p>The location of this allocated site in an area with high levels of existing sky glow, and the small size of this allocated site, means there are unlikely to be significant cumulative effects of Sky Glow.</p> | <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 13 | <p>Location: Hill View Farm, Marston - SP25 – Hill View Farm</p> <p>Application has been approved and subsequent conditions has been discharged.</p> <p>Demolition of existing buildings and construction of 159 dwellings, associated roads and infrastructure, drainage and landscaping.</p> | <p>Hill View Farm, Marston - SP25 – Hill View Farm is approximately 3.5km Southeast of the Proposed Development and northeast of Marston.</p> <p>Both a Section 38 Street Lighting Design and a Private Street Lighting Design are provided with the application for this planned development. These plans show Isolux Contours for 7.5 Lux, 5.0 Lux and 1.0 Lux, and the lighting is designed to achieve a P4 lighting class (5.0 Lux – 7.5 Lux average (maintained minimum), 1 Lux minimum).</p> <p>All lighting columns proposed within the planned development are 6m in height.</p> <p>The proposed luminaires for the planned development are all DW Windsor KIRIUM PRO MINI 8LED 3k A2 CLO with powers of 500mA and 600mA. This luminaire with the A2 optic has a Luminous intensity class of G3 and a ULR of 0%.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |

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| | | Due to the distance of this planned development from the Proposed Development and the design achieving a subsidiary road lighting class there will be no significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, discomfort/disability glare, or sky glow. | |
| 14 | <p>Location: Land west of Mill Lane, Marston - SP26 – Land West of Mill Lane</p> <p>Application has been approved.</p> <p>Erection of 80 residential dwellings (use class C3) formed of 13 one-bedroom apartments and 28 two-, 35 three- and 4 four-bedroom houses with associated public open space, access and landscaping</p> | <p>Land west of Mill Lane, Marston - SP26 – Land West of Mill Lane is approximately 3.75km Southeast of the Proposed Development and northeast of Marston.</p> <p>No lighting information is provided with the application for this planned development, which is likely to be submitted at a later stage in the application.</p> <p>The lighting for this planned development is likely to follow the specification of the adopting authority, and is assumed to consist of subsidiary road lighting classes and some private external lighting for the dwellings. It is assumed that the proposed lighting designs will follow best practice as detailed within ILP GN01:2021 and GN08:2023 and the illuminance levels will be suitable for a development of this scale.</p> <p>Due to the scale of this planned development its distance from the Site, and it's proximity to an existing settlement (Marston) there are unlikely to be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, discomfort/disability glare, or sky glow.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 15 | <p>Location: Marston Paddock, Butts Lane - SP23 – Marston Paddock</p> <p>Application has been approved.</p> | <p>Marston Paddock, Butts Lane - SP23 – Marston Paddock is approximately 4.5km Southeast of the Proposed Development, and is located within Marston.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> |

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| | <p>Full planning permission for the erection of 40 residential dwellings (Class C3), access arrangements and public open space, landscaping, associated infrastructure and works including pedestrian and cycle routes</p> | <p>The planned development is surrounded by existing residential development in the Northeast, East, Southeast and South by residential development that contains exiting external artificial lighting to varying degrees. This existing lighting primarily consists of subsidiary road lighting and private external lighting for residential use.</p> <p>Lighting calculations are provided with the planning application for this planned development. These show 6 lighting columns used within the design.</p> <p>The scale of the lighting design for this planned development and its distance from the Proposed Development, means there are unlikely to be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, discomfort/disability glare, or sky glow.</p> | <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 16 | <p>Location: Land north of Bayswater Brook near Barton</p> <p>Allocated for residential development. Application pending decision.</p> <p>Outline Planning permission for up to: 1. 1,450 new dwellings (Class C3), 2. 120 units of Assisted Living dwellings, with ancillary communal and care facilities (Class C2/C3), 3. 560 sq.m of new community use buildings (Class F2), 4. 500 sq.m of new commercial/business/service buildings/health provision (Class E), 5. 2,600 sq.m of new Primary School (Class F1), 6. Creation of areas of green infrastructure, including areas of open space, allotments, habitats, recreation facilities and public park areas, 7. Associated transport,</p> | <p>No lighting plan or specification is provided with this application. However, a lighting rationale is provided showing where lighting is to be provided and whether it will be all night or part-night lighting.</p> <p>A mixture of all night and part-night lighting is specified within this planned development. Some areas have lighting classes indicatively proposed which included subsidiary road and traffic route classes:</p> <p>1. M2, M4, M5, C3, & P5</p> <p>Lighting classes are not specified for the whole planned development, and it is assumed light levels in the rest of the Site will follow best practice and provided the lowest appropriate illuminance level detailed within British Standards.</p> <p>This planned development is located approximately 4.8km Southeast of the Proposed Development. At this distance</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |

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| | <p>parking, access, surface water and utility infrastructure works.</p> <p>Full planning permission for: 1. Change of Use to Class E and associated refurbishment works to the Main Barn and 3no. curtilage barns at Wick Farm, 2, Change of Use to Class F1 and associated refurbishment works to the Wick Farm Well House building, 3. Erection of New Build barn-style building (Class E), 4. Erection of New Build building containing back-of-house facilities for the Main Barn-style building (Class E), 5. Erection of New Build Community Space building (Class F2), 6. Associated transport, parking associated with the local centre, access and utility infrastructure works, 7. Demolition of identified buildings, 8. Associated landscaping, public realm and market garden.</p> | <p>there will be no significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, or discomfort/disability glare.</p> <p>Although several different lighting levels will be required for different uses within the planned development it is unlikely there will be significant cumulative effects with the Proposed Development on sky glow. This is primarily due to the distance of the panned development from the Proposed Development, the assumed use of part-night lighting within the planned development, and the requirement of the lighting designs of each phase to follow guidance detailed within ILP GN08:2023 and ILP GN01:21, and the level of mitigation proposed within the Proposed Development.</p> | |
| 17 | <p>Location: Oxford Technology Park Buildings 8-11 - Policy Kidlington 1 (small-scale review of the Green Belt to accommodate identified High Value Employment Needs).</p> <p>Application has been approved.</p> <p>Planning Application for Development within Use Classes E(g) (i), and/or (ii), and/or (iii), and/or B2 and/or B8 and associated works including access and parking (relating to proposed Buildings 8, 9, 10 and 11) (total of a total of 16,909 sqm)</p> | <p>Oxford Technology Park Buildings 8-11 - Policy Kidlington 1 is located approximately 3.3km Northwest of the Proposed Development, and South of the London Oxford Airport in Kidlington.</p> <p>This planned development is for the construction of units 8, 9, 10 and 11 at the Oxford Technology Park Buildings and associated access and parking.</p> <p>Lighting plans and details are not submitted with the application, however external lighting is subject to a planning condition requiring lighting to be installed in line with approved plans.</p> <p>It is assumed that the lighting for the planned development will follow best practice as outlined within ILP GN01:21, ILP GN08:2023 and will conform to the</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> |

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| | | <p>appropriate lighting class detailed within BS EN 12464-2:2014 and BS EN 13201-2:2015.</p> <p>This technology park is located within a wider commercial and employment zone in the north of Kidlington, which is likely to have higher levels of ambient illuminance/luminance than the surrounding area (Figure 13.4).</p> <p>Due to the distance of this planned development from the Proposed Development, there will be no significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, or discomfort/disability glare.</p> <p>Significant cumulative effects of sky glow are also unlikely. This is due to the distance between the planned development and the Site, but also because of the scale of the lighting needed for the planned development, which will not result in a significant increase in the number of lighting assets in the area surrounding the planned development.</p> | <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 18 | <p>Location: New Science Park, Oxford Airport - Policy Kidlington 1 (small-scale review of the Green Belt to accommodate identified High Value Employment Needs)</p> <p>Application has a resolution to grant planning permission subject to a S106 Agreement.</p> <p>Redevelopment of the Site to include the demolition of existing buildings and development of new accommodation across 5 buildings for employment uses (Class E(g)(ii) and (iii)) plus ancillary amenity building, outdoor amenity space, car parking, cycle parking, landscaping and associated works (18,767sqm).</p> | <p>New Science Park, Oxford Airport - Policy Kidlington 1 is located approximately 3.75km Northwest of the Site within land associated with London Oxford Airport.</p> <p>Proposed lighting calculations are provided with the application for the planned development, and the installation of any lighting within the planned development is subject to a planning condition requiring mitigation to be implemented and all plans to be approved prior to occupation.</p> <p>It is assumed that the lighting for the planned development will follow best practice as outlined within ILP GN01:21, ILP GN08:2023 and will conform to the</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> |

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| | | <p>appropriate lighting class detailed within BS EN 12464-2:2014 and BS EN 13201-2:2015.</p> <p>An illuminance map is provided with the application, which shows that spill light is broadly restricted to the planned development boundary. This combined with the distance from the Site means there will be no significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, discomfort/disability glare, or sky glow.</p> | <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 19 | <p>Location: Land North of Manor Farm, Noke</p> <p>Application awaiting decision.</p> <p>Development of a ground mounted solar farm incorporating the installation of solar PV panels, associated infrastructure and access, as well as landscape planting and designated ecological enhancement areas.</p> | <p>Land North of Manor Farm, Noke is located approximately 4.3km East of the Site.</p> <p>Minimal lighting is expected to be proposed for this planned development and the LVIA that accompanies the application states:</p> <p><i>"The proposed solar farm development is not considered to produce considerable light pollution and therefore matters regarding night-time impacts and lighting are not further referred to within this LVIA."</i>^{xiii}</p> <p>This minimum requirement/proposal of lighting combined with the distance from the Site, means there will not be significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, discomfort/disability glare, or sky glow.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
| 20 | <p>Location: Land West of Cuckoo Lane and adjacent to the A40, Eynsham</p> <p>Application decided April 2021. Number of applications to discharge conditions approved. Currently under construction.</p> | <p>This planned development is located approximately 1.9km at its closest point from the Site, and approximately 7.9km from the Site at its furthest point.</p> <p>The planned development runs West of the Site along the A40, with the park and ride being located northwest of the A40/Cuckoo Lane junction.</p> | <p>Light Intrusion (into windows): Negligible effects on all identified receptors.</p> <p>Spill Light: Negligible effects on all identified receptors.</p> |

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| | <p>Construction of a park & ride car park providing 850 car parking spaces, cycle spaces, motorcycle spaces, electric vehicle charging points, bus shelters, landscaping, external lighting, public open space, toilets, seating, fencing, habitat creation, drainage features, new access from Cuckoo Lane, new roundabout with access onto A40, an eastbound bus lane approximately 6.5km in length from the park & ride site to the A40 bridge over the Dukes Cut canal, two sections of westbound bus lane (each approximately 500m in length), new shared use footway/cycleway, widening of Cassington New Bridge, junction improvements, new crossings, new footbridge alongside Cassington Halt Bridge, and associated works</p> | <p>At these distances there will be no significant cumulative effects of light intrusion (into windows), spill light, building and sign luminance, luminous intensity, or discomfort/disability glare.</p> <p>The primary area of the planned development, where there will be the highest concentration of lighting, is the park and ride which is located at the further point from the Site.</p> <p>Detailed lighting specifications are provided for all lighting within the planned development along with the plan showing the calculation lux contours resulting from the proposed lighting.</p> <p>Several different lighting asset arrangements are proposed for the planned development. All of which use DW Windsor Kirium Pro 2 3000K luminaires with varying optics, all of which comply with G4 to G6 luminous intensity classes.</p> <p>The proposed column heights area between 8-10m.</p> <p>The illuminance levels proposed are as follows:</p> <ol style="list-style-type: none"> 1. Park and Ride Car park and access: 10Lux average with 0.25 uniformity (BS EN 12464-2:2014 5.9.2) 2. Share footway/cycleways: 5 – 7.5 Lux average (maintained minimum), 1 Lux minimum (BS EN 13201-2:2015 P4) <ol style="list-style-type: none"> a. Several remote footpaths do not achieve a recommend standard, and receive minimal ambient lighting from the park and ride. With the potential lighting of these area to be confirm at a late stage. | <p>Building and sign luminance: Negligible effects on all identified receptors.</p> <p>Luminous intensity: Negligible effects on all identified receptors.</p> <p>Discomfort/disability glare: Negligible effects on all identified receptors.</p> <p>Sky Glow: Negligible effects on all identified receptors.</p> |
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| | | <p>3. Main access from A40: 20 lux average (maintained minimum), 0.4 (40%) uniformity (BS EN 13201-2:2015 C2)</p> <p>4. Bus Interchange: 20 lux average (maintained minimum), 0.4 (40%) uniformity (BS EN 13201-2:2015 C2)</p> <p>The luminaires proposed within the planned development have a complete upward light cut off, meaning the design will have a ULR of 0%. This is further improved upon by the specification of G4 – G6 luminous intensity classes. This level of control is also consistent with that of the Proposed Development.</p> <p>The above combined with the distance between the Site and the planned development, means that there will not be significant cumulative effects of sky glow (sky quality).</p> | |
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Source: Cherwell District Council 2023 and Mott MacDonald Ltd 2023

13.290 The main cumulative effect likely to occur from the planned developments is an increase in ambient illuminance resulting in a decrease in sky quality. This is will primarily be a result of increasing sky glow through reflected light from surfaces or internal lighting. All planned developments have, or will have, sensitive lighting strategies (subject to condition), and best practice as outlined within ILP GN01:2021 and GN08:2023 are assumed to be followed.

13.291 However, if all these planned developments go ahead there is likely be a change in the environmental zone of the area. Likely to E3, rather than the current environmental zone of E2 (**Table 13.3**), due to the increase in ambient illuminance. This is assessed as a **Moderate adverse effect** if most or all of the planned developments are constructed (**Table 13.13**), and this would take place whether the Proposed Development is constructed or not.

Conclusions

13.292 A summary of effects is presented within **Table 13.56**.

13.293 Following the implementation of the embedded mitigation, the Proposed Development is shown to have **no residual significant effects** on obtrusive light and the impacts are assessed to be Minor Adverse in the worst-case.

Table 13.56: Summary of residual effects for obtrusive light

| Receptor Number | Parameter of Obtrusive Light | Receptor (Sensitivity) | Mitigation (Embedded) | Magnitude | Level/ Nature of Effect | Residual Effect |
|---------------------------|------------------------------|------------------------|--|------------|---|-------------------------------------|
| Construction Phase | | | | | | |
| LR01/L01 | All parameters | Medium | Mitigation will be embedded in the CEMP for construction task and security lighting (see Table 13.27). | Negligible | None / negligible, Neutral, Temporary, Direct | None / negligible - not significant |
| LR02/L02 | All parameters | Medium | Mitigation will be embedded in the CEMP for construction task and security lighting (see Table 13.27). | Negligible | None / negligible, Neutral, Temporary, Direct | None / negligible - not significant |
| LR03/L03 | All parameters | Low | Mitigation will be embedded in the CEMP for construction task and security lighting (see Table 13.27). | Negligible | None / negligible, Neutral, Temporary, Direct | None / negligible - not significant |
| LR04/L04 | All parameters | Medium | Mitigation will be embedded in the CEMP for construction task and security lighting (see Table 13.27). | Negligible | None / negligible, Neutral, Temporary, Direct | None / negligible - not significant |
| LR05/L05 | All parameters | Medium | Mitigation will be embedded in the CEMP for construction task and security lighting (see Table 13.27). | Negligible | None / negligible, Neutral, Temporary, Direct | None / negligible - not significant |
| LR06 / H01 | All parameters | Medium | Mitigation will be embedded in the CEMP for construction task and security lighting (see Table 13.27). | Negligible | None / negligible, Neutral, Temporary, Direct | None / negligible - not significant |
| LR07 / H02 | All parameters | Low | Mitigation will be embedded in the CEMP for construction task and security lighting (see Table 13.27). | Negligible | None / negligible, Neutral, Temporary, Direct | None / negligible - not significant |

| Operational Phase (Non-match days) | | | | | | |
|---|---|--------|--|------------|---|---|
| LR01/L01 | Light Intrusion (into Windows), Spill light, Luminous Intensity, Discomfort and Disability Glare, Sky glow. | Medium | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Building and Sign Luminance | Medium | Façade luminance and signage luminance will follow the maximum permissible illuminance levels for their relevant environmental zone (Table 13.8 and Table 13.9). Mitigation will be embedded into the lighting design as detailed in Table 13.27 | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR02/L02 | Light Intrusion (into Windows), Spill light, Luminous Intensity, Discomfort and Disability Glare, Sky glow. | Medium | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Building and Sign Luminance | Medium | Façade luminance and Illuminated signage luminance will follow the maximum permissible illuminance levels for their relevant environmental zone (Table 13.8 and Table 13.9). Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR03/L03 | Light Intrusion (into Windows), Spill light, Luminous Intensity, | Low | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |

| | | | | | | |
|------------|---|--------|--|------------|---|---|
| | Discomfort and Disability Glare, Sky glow. | | | | | |
| | Building and Sign Luminance | Low | <p>Façade luminance and Illuminated signage luminance will follow the maximum permissible illuminance levels for their relevant environmental zone (Table 13.8 and Table 13.9).</p> <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR04/L04 | Light Intrusion (into Windows), Spill light, Luminous Intensity, Discomfort and Disability Glare, Sky glow. | Medium | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Building and Sign Luminance | Medium | <p>Façade luminance and signage luminance will follow the maximum permissible illuminance levels for their relevant environmental zone (Table 13.8 and Table 13.9).</p> <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR05/L05 | All parameters | Medium | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| LR06 / H01 | All parameters | Medium | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| LR07 / H02 | All parameters | Low | <p>Mitigation will be embedded into the</p> | Negligible | None / negligible | None / negligible - |

| | | | | | | |
|-------------------------------------|---|--------|---|------------|---|---|
| | | | lighting design as detailed in Table 13.27 . | | | not significant |
| Operation phase (Match days) | | | | | | |
| LR01 / L01 | Light Intrusion (into Windows), Spill light, Luminous Intensity, Discomfort and Disability Glare. | Medium | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Building and Sign Luminance | Medium | Façade luminance and signage luminance will follow the maximum permissible illuminance levels for their relevant environmental zone (Table 13.8 and Table 13.9). Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| | Sky glow | Medium | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . External lighting will have an upward lighting ratio limited to 0% ULR, and luminaires will have a minimum luminous intensity class of G4. The field of play lighting will have an upward light ratio of ≤ 2.5 ULR. The correlated colour temperature for the external lighting will be ≤ 3000 K, except for the main entrances and field of play lighting. | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR02 / L02 | Light Intrusion (into Windows), Spill light, Luminous Intensity, Discomfort and | Medium | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |

| | | | | | | |
|------------|---|--------|--|------------|---|---|
| | Disability Glare. | | | | | |
| | Building and Sign Luminance | Medium | <p>Façade luminance and signage luminance will follow the maximum permissible illuminance levels for their relevant environmental zone (Table 13.8 and Table 13.9).</p> <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| | Sky glow | Medium | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> <p>External lighting will have an upward lighting ratio limited to 0% ULR, and luminaires will have a minimum luminous intensity class of G4.</p> <p>The field of play lighting will have an upward light ratio of ≤ 2.5 ULR.</p> <p>The correlated colour temperature for the external lighting will be ≤ 3000K, except for the main entrances and field of play lighting.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR03 / L03 | Light Intrusion (into Windows), Spill light, Luminous Intensity, Discomfort and Disability Glare. | Low | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Building and Sign Luminance | Low | <p>Façade luminance and signage luminance will follow the maximum permissible illuminance levels for their relevant environmental zone (Table 13.8 and Table 13.9).</p> <p>Mitigation will be embedded into the</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |

| | | | | | | |
|------------|---|--------|--|------------|---|---|
| | | | lighting design as detailed in Table 13.27 . | | | |
| | Sky Glow | Low | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> <p>External lighting will have an upward lighting ratio limited of 0% ULR, and luminaires will have a minimum luminous intensity class of G4.</p> <p>The field of play lighting will have an upward light ratio of ≤ 2.5 ULR.</p> <p>The correlated colour temperature for the external lighting will be ≤ 3000K, except for the main entrances and field of play lighting.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR04 / L04 | Light Intrusion (into Windows), Spill light, Luminous Intensity, Discomfort and Disability Glare. | Medium | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Building and Sign Luminance | Medium | <p>Façade luminance and signage luminance will follow the maximum permissible illuminance levels for their relevant environmental zone (Table 13.8 and Table 13.9).</p> <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| | Sky Glow | Medium | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> <p>External lighting will have an upward lighting ratio limited to 0% ULR, and luminaires will have a minimum luminous intensity class of G4.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |

| | | | | | | |
|------------|--|--------|--|------------|---|---|
| | | | <p>The field of play lighting will have an upward light ratio of ≤ 2.5 ULR.</p> <p>The correlated colour temperature for the external lighting will be ≤ 3000K, except for the main entrances and field of play lighting.</p> | | | |
| LR05 / L05 | Light Intrusion (into Windows), Spill light, Building and sign luminance, Luminous Intensity, Discomfort and Disability Glare. | Medium | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Sky glow. | Medium | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> <p>External lighting will have an upward lighting ratio limited to 0% ULR, and luminaires will have a minimum luminous intensity class of G4.</p> <p>The field of play lighting will have an upward light ratio of ≤ 2.5 ULR.</p> <p>The correlated colour temperature for the external lighting will be ≤ 3000K, except for the main entrances and field of play lighting.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR06 / H01 | Light Intrusion (into Windows), Spill light, Building and sign luminance, Luminous Intensity, Discomfort and Disability Glare. | Medium | Mitigation will be embedded into the lighting design as detailed in Table 13.27 . | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |

| | | | | | | |
|------------|--|--------|--|------------|---|---|
| | Sky glow. | Medium | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> <p>External lighting will have an upward lighting ratio limited to 0% ULR, and luminaires will have a minimum luminous intensity class of G4.</p> <p>The field of play lighting will have an upward light ratio of ≤ 2.5 ULR.</p> <p>The correlated colour temperature for the external lighting will be ≤ 3000K, except for the main entrances and field of play lighting.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |
| LR07 / H02 | Light Intrusion (into Windows), Spill light, Building and sign luminance, Luminous Intensity, Discomfort and Disability Glare. | Low | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Sky Glow | Low | <p>Mitigation will be embedded into the lighting design as detailed in Table 13.27.</p> <p>External lighting will have an upward lighting ratio limited to 0% ULR, and luminaires will have a minimum luminous intensity class of G4.</p> <p>The field of play lighting will have an upward light ratio of ≤ 2.5 ULR.</p> <p>The correlated colour temperature for the external lighting will be ≤ 3000K, except for the main entrances and field of play lighting.</p> | Low | Minor adverse effects, Adverse, Permanent, Direct | Minor adverse effects - not significant |

| Cumulative Effects | | | | | | |
|---------------------------|---|--------------|--|------------------|--|--|
| All Receptors | Light Intrusion (into Windows), Spill light, Luminous Intensity, Discomfort and Disability Glare. | Low / Medium | <p>Best practice for the designing of lighting will be used within the Proposed Development.</p> <p>All reasonable mitigation is embedded into the lighting design and will be carried forward into the design development process for the lighting designs (see Table 13.27).</p> | Negligible | None / negligible, Neutral, Permanent, Direct | None / negligible - not significant |
| | Sky Glow | Low / Medium | <p>Best practice for the designing of lighting will be used within the Proposed Development.</p> <p>All reasonably practical mitigation is embedded into the lighting design and will be carried forward into the design development process for the lighting designs (see Table 13.27).</p> | Negligible / Low | Negligible / Minor Adverse, Neutral / Adverse, Permanent, Direct | Negligible / Minor Adverse - not significant |
| All Receptors | N/A | Low/Medium | <p>Best practice for the designing of lighting will be used within the Proposed Development.</p> <p>All reasonable mitigation is embedded into the lighting design and will be carried forward into the design development process for the lighting designs (see Table 13.27).</p> <p>However, there is still likely to be a change in the environmental zone of the area surrounding the Site from E2 to E3 if all or most of the planned development are constructed, and this would take place whether the Proposed Development is constructed or not.</p> | Medium | Minor / Moderate Adverse, Adverse, Permanent, Direct | Moderate Adverse |

References

- ⁱ Oxford United Stadium Scoping Report Inputs, 2023, Mott MacDonald Ltd
- ⁱⁱ Due to access issues LR07 could not be surveyed at the same location for the daytime and night-time surveys. As such, the eastings and northings given are for the daytime and night-time locations respectively.
- ⁱⁱⁱ England's Light Pollution and Dark Skies, 2023-09-15, [England's Light Pollution and Dark Skies \(cpre.org.uk\)](https://cpre.org.uk)
- ^{iv} Time and Date, 2023-09-13, Oxford, England, United Kingdom — Sunrise, Sunset, and Daylength, September 2023, [Sunrise and sunset times in Oxford \(timeanddate.com\)](https://timeanddate.com)
- ^v Moon Phases, 2023-09-13, Current Moon Phase and Monthly Moon Phase Calendar, [Moon Phases | Current Moon Phase and Monthly Moon Phase Calendar](#)
- ^{vi} Met Office, 2023-09-13, Weather Oxford (Oxfordshire), [Oxford \(Oxfordshire\) weather - Met Office](#)
- ^{vii} Met Office, 2023-09-13, Weather Oxford (Oxfordshire), [Oxford \(Oxfordshire\) weather - Met Office](#)
- ^{viii} Institution of Lighting Professional, Guidance Note 1 2021, Reduction of Obtrusive Light, Appendix 3 Page 22 - 25
- ^{ix} CSA Environmental, Land at Gosford, Ecological Impact Assessment, February 2022, CAS/3263/09, Paragraph 5.3 Page 18
- ^x Carter Jonas, Hallam Land Management, Environmental Statement November 2023, Page 286, Paragraph 18.60
- ^{xi} Buro Happold, Framework Lighting Strategy November 2023, P31
- ^{xii} WSP, ES Chapter 14 Lighting, 14/10/2023, Paragraph 10.5 Page 43
- ^{xiii} Pegasus Group, Land at Manor Farm, Noke, Oxfordshire, Landscape and Visual Impact Assessment, November 2021, Paragraph 2.14 Pages 7 and 8