LIGHTING IMPACT ASSESSMENT

PROJECT: LAND OFF SCHOOL LANE, ELMSWELL, SUFFOLK

PREPARED FOR: RICHARD BROWN PLANNING

MARCH 2023

PROJECT NUMBER: 2595			DOCUMENT REF: 2595-DFL-ELG-XX-RP-EO-13001			
S3	P02	For Planning	AR	DS	DS	13/03/2023
S3	P01	For Planning	AR	DS	DS	18/01/2023
Suitability	**Revision**	**Purpose Description**	**Originated**	**Checked**	**Authorised**	**Date**

Designs for Lighting Ltd
17 City Business Centre, Hyde Street, Winchester, SO23 7TA

T: +44(0)1962 855080, E: info@dfl-uk.com www.dfl-uk.com

CONTENTS

1 Introduction

1.1 General

1.1.1 This document is provided by Design for Lighting ltd (DFL-UK Ltd), a specialist lighting consultancy with extensive knowledge and experience in Lighting Impact Assessments, mitigation and lighting design for the protection of amenity and ecology. DFL-UK is currently represented within the Institution of Lighting Professionals (ILP) technical committee and British Standard committees for lighting, providing technical input into industry technical guidance documents.

1.1.2 Designs for Lighting Ltd are Corporate Premier Members of the Institution of Lighting Professionals and Members of the Highway Electrical Association. All lighting designs and Lighting Impact Assessments produced by DFL-UK Ltd are authorised by an Incorporated or Chartered Engineer.

1.1.3 Designs for Lighting Ltd have been commissioned to develop a sensitive Lighting Strategy and undertake a Lighting Impact Assessment for the development at Land off School Road, Elmswell, Suffolk (hereafter referred to as the Application Site) (**Figure 1**).

1.1.4 We shall prepare any reports in accordance with your instructions. We shall not be responsible for any use of the report (which is confidential and non-assignable) or its contents for any purpose other than that for which it was prepared and provided. Should you require to pass copies of the report to other parties for information, the whole of the report may be copied, but no professional liability or warranty shall be extended to other parties by us in this connection without our express written permission. Should you enter into discussions to sell or develop the site, the report can be regarded as having been issued by us jointly in favour of you and the potential purchaser/developer. We would owe the potential purchaser/developer the same duty of care that we owed to you (in relation to the report) when we were instructed to prepare the report subject to all the matters contained or referred to in the report and the limitations in this agreement.

1.1.5 The Lighting Strategy proposes good practice and outlines a suitable approach to apply to the lighting design at the detailed design phase. The aim of the strategy is to outline a minimally obtrusive approach to lighting, which is functional, compliant with minimum standards and to ensure sensitivity to both the potentially sensitive local environment and potentially sensitive human receptors.

1.1.6 The objective of the Lighting Impact Assessment is to provide an independent report on the suitability of the proposed lighting in accordance with guidance outlined in the Institution of Lighting Professionals (ILP) Professional Lighting Guidance (PLG) 04 (2013) 'Guidance on undertaking Environmental Lighting Impact Assessments.

1.1.7 The Proposed Development is for: 60 bed Care Home and care accommodation.

1.1.8 The Proposed Development will require lighting for the purposes of safety, security and amenity during the hours of darkness. Lighting associated with the Proposed Development can be applied sensitively to ensure that the potential for obtrusive light is suitably minimised in compliance with the predetermined obtrusive light limits for the relevant Environmental Zone. This can be achieved through the implementation of a carefully planned and implemented Lighting Strategy informed by relevant standards and guidance.

1.1.9 The Lighting Strategy for the Proposed Development can be found in **Appendix 1**.

1.1.10 The masterplan upon which the Lighting Strategy and associated Lighting Impact Assessment are based is presented in **Figure 2**. A larger version of the masterplan is presented in **Appendix 2**.

Figure 1: The Application Site Location.

Figure 2: The Proposed Development Master Plan Produced by Pegasus Group (Reproduced in Appendix 2).

2 Legislative and Policy Framework

2.1 National Policy and Legislation

Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

2.1.1 Since 2005, artificial light has been incorporated as a potential statutory nuisance. An amendment to section 79 of the Environmental Protection Act 1990, contained within the Clean Neighbourhoods and Environment Act 2005 states:

"Artificial light emitted from premises so as to be prejudicial to health and nuisance constitutes a 'Statutory Nuisance' and it shall be the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under section 80 and, where a complaint of a statutory nuisance is made to it by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint".

National Planning Policy Framework 2021

2.1.2 The National Planning Policy Framework (NPPF) sets out the government's planning policies for England and how they are expected to be applied and provides a framework for local plans. With regard to light pollution, the NPPF was updated in July 2021 and states that the following elements are to be considered:

"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:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

Planning Practice Guidance

2.1.3 Guidance for assessing the effects of proposed artificial lighting is outlined in the planning practice guidance (PPG). The guidance states:

"Does a new development proposal, or a major change to an existing one, materially alter light levels outside the development and/or have the potential to adversely affect the use or enjoyment of nearby buildings or open spaces?

Does an existing lighting installation make the proposed location for a development unsuitable? For example, this might be because:

- *the artificial light has a significant effect on the locality;*
- *users of the Proposed Development (e.g. a hospital) may be particularly sensitive to light intrusion from the existing light source.*

Does a proposal have a significant impact on a protected site or species e.g. located on, or adjacent to, a designated European site or where there are designated European protected species that may be affected?

Is the development in or near a protected area of dark sky or an intrinsically dark landscape where it may be desirable to minimise new light sources?

Are forms of artificial light with a potentially high impact on wildlife (e.g. white or ultraviolet light) being proposed close to sensitive wildlife receptors or areas, including where the light shines on water?

Does the Proposed Development include smooth, reflective building materials, including large horizontal expanses of glass, particularly near water bodies (because it may change natural light, creating polarised light pollution that can affect wildlife behaviour)?"

2.2 Local Policy

Mid Suffolk District Council Core Strategy Development Plan Document (Adopted September 2008)

2.2.1 The relevant Local Authority for the Application Site is Mid Suffolk District Council.

2.2.2 Policies relevant to the lighting of the Proposed Development are contained within the Mid Suffolk District Council Core Strategy Development Plan Document (Adopted September 2008), these are as follows:

Policy CS4

"…

*"**Pollution:** To protect people and the environment from unsafe or unhealthy pollutants. Development that harms the quality of soil or air and/or causes noise, dust, odour or light pollution will be avoided wherever possible. Development proposals will have no adverse effect on water quality."*

Further to the above paragraph 3.13 states the following:

"Pollution is a strategic issue for Mid Suffolk. Noise pollution (from domestic and commercial sources) is the most frequent cause of complaint by residents. Light pollution is also a concern to residents."

2.3 British Standards

2.3.1 The most applicable British Standards for lighting that relate to the Proposed Development are:

- **BS 5489-1: 2020** – *Lighting of Roads and Public Amenity Areas - Code of practice.* – This guidance is applicable to the internal roads that help to facilitate movement of vehicular and pedestrian traffic about the development, and car parking areas.
- **BS EN 13201-2:2015** – *Road Lighting – Part 2: Performance Requirements.* – This guidance is applicable to the internal roads that help to facilitate movement of vehicular and pedestrian traffic about the development, by providing the standard levels of lighting to be used to facilitate the use of the areas.

2.3.2 The application of these standards and the selected lighting classes are detailed within **Appendix 1**.

3 Guidance

3.1 Guidance Notes for the Reduction of Obtrusive Light, 2021

3.1.1 Guidance notes produced by the Institution of Lighting Professional (ILP) are among the most commonly referenced guidance notes for good practice within the lighting design industry.

3.1.2 Obtrusive light (or sometimes referred to as light pollution) refers to any light emitted in a direction in which it is not required or wanted and as such is detrimental to other users.

3.1.3 Consideration is given to light intrusion, direct upward light (sky glow) and glare within the context of varying Environmental Zones.

3.1.4 Light intrusion refers to the spilling of light beyond the boundary of the area to be lit. This includes the intrusion of light into bedroom windows.

3.1.5 Sky glow refers to the brightening of the sky above towns caused by direct or reflected upward light.

3.1.6 Glare refers to the uncomfortable brightness of a light source when viewed against a dark background. **Figure 3** illustrates the different types of obtrusive light.

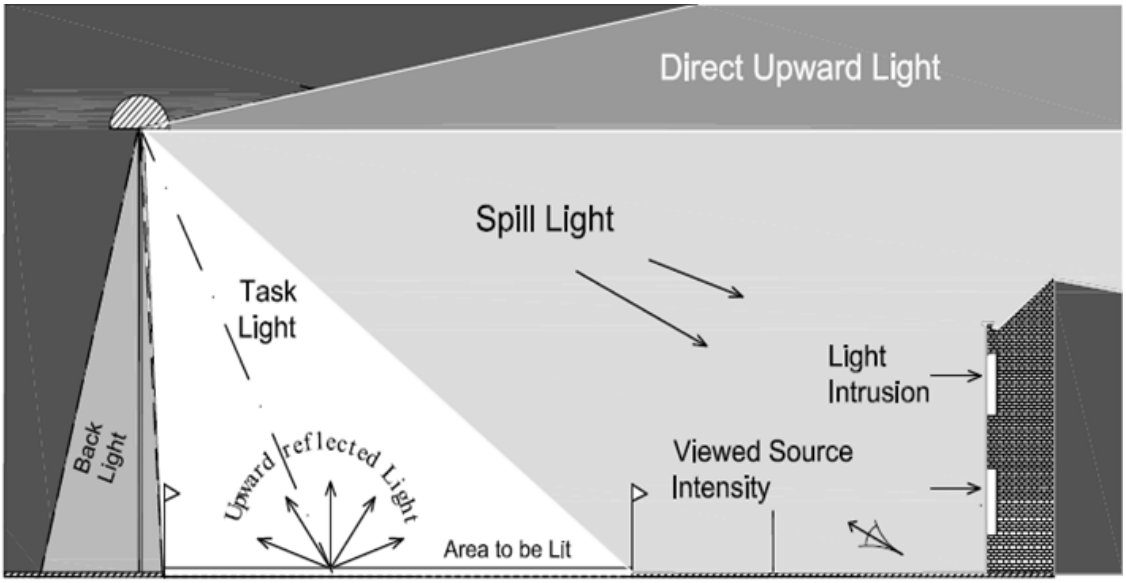


Figure 3: Obtrusive Light Diagram

3.2 Institution of Lighting Professionals (ILP) PLG 03 – Lighting for subsidiary roads

3.2.1 PLG03 provides lighting design guidance for subsidiary roads within the UK.

3.3 Institution of Lighting Professionals (ILP) PLG 04 "Guidance on Undertaking Environmental Lighting Impact Assessments", 2013

3.3.1 PLG 04 is used to ensure that the Lighting Impact Assessment is correctly carried out:

> *"...this document is designed to provide an explanation of, and guidance on, the process for producing a Lighting Assessment…to remove or minimise environmental problems".*

3.4 Institution of Lighting Professionals (ILP) and Bat Conservation Trust GN08:18 "Bats and Artificial Lighting in the UK"

3.4.1 Guidance for artificial lighting and bats was updated in Autumn 2018, the guidance states the following:

"It is acknowledged that, especially for vertical calculation planes, very low levels of light (<0.5 lux) may occur even at considerable distances from the source if there is little intervening attenuation. It is therefore very difficult to demonstrate 'complete darkness' or a 'complete absence of illumination' on vertical planes where some form of lighting is proposed on site despite efforts to reduce them as far as possible and where horizontal plane illuminance levels are zero. Consequently, where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light averse behaviour (Stone, 2012)."

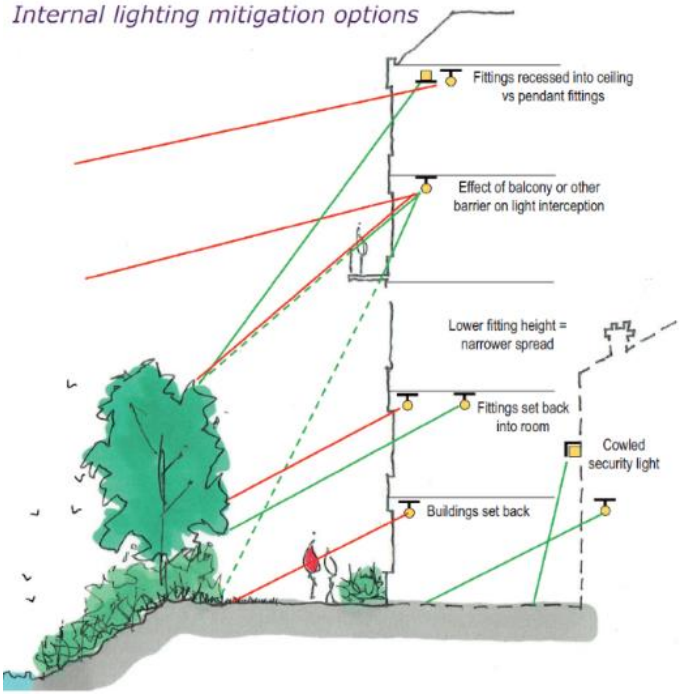


Figure 4: Internal Light Spill Mitigation Extract from GN08/18

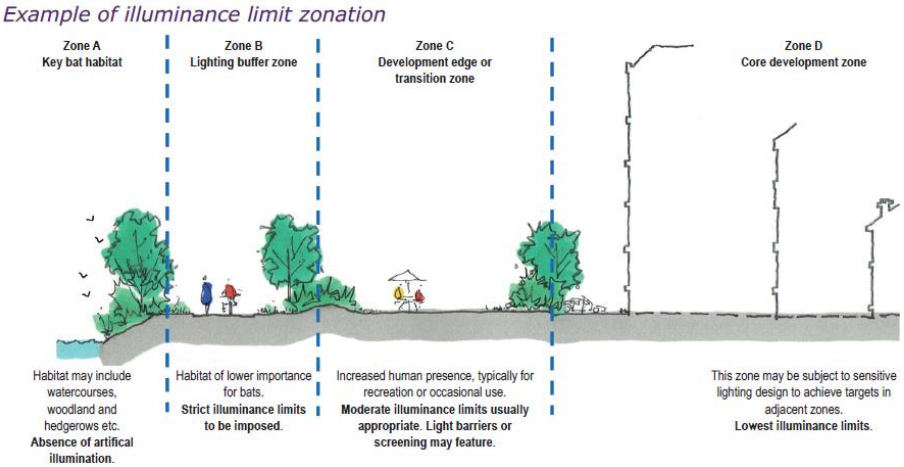


Figure 5: Illuminance Limit Zonation Extract from GN08/18

4 Assessment Methodology and Significance Criteria

4.1 Methodology

4.1.1 The assessment has been carried out in accordance with the published guidance documents from the ILP. These quantify the levels of direct upward light, light intrusion, viewed source intensity and glare regarded as acceptable for varying Environmental Zones.

4.1.2 The Lighting Impact Assessment is desk-top based. The methodology employed for this assessment is appropriate to the location of the site. It comprises a desk-top study of the legislative, policy and guidance context; consultation with the design team; confirmation of the general expected light levels for the relevant Environmental Zone in which the site is located, and evaluation of the likely effects of the proposed lighting using appropriate assessment criteria.

4.1.3 The methodology takes guidance from the Institution of Lighting Professionals PLG 04 document "Guidance on Undertaking Environmental Lighting Impact Assessments". This sets out industry best practice for conducting the assessment.

4.1.4 The desktop study involved research into relevant legislation, policy and guidance relating to obtrusive light. It also involved studying of ordnance survey maps, plans and aerial photography to identify likely receptor locations.

4.2 Study Area

4.2.1 The desktop study area was determined by assessing the potential receptors that could be affected by a change in artificial lighting in line with the criteria outlined in **Table 2** and limits set within GN08:18. This included nearby existing residential development, roadways and any identified sensitive ecology.

4.2.2 The study area is detailed in **Appendix 2**.

4.3 Potential Effects from Artificial Light

4.3.1 The following potential effects can arise from inappropriately designed artificial lighting:

Effects from light intrusion from exterior lighting on residents (through windows)

4.3.2 Light intrusion (or light spill) is the term for the spilling of light beyond the boundary of the area being lit. The ILP Guidance Notes places a limit on the amount of vertical Illuminance which falls upon the centre of a dwelling window. The suggested maximum values quoted are relative to the amount of light measured as a baseline without the presence of the obtrusive light source.

Effects from viewed source intensity on residents and sightseers

4.3.3 **Table 4** within ILP GN01/21 advises limits on luminaire intensity or viewed source intensity from luminaires to an observer. The greatest effects are usually encountered from poorly aimed floodlights or security lighting, or from lighting which is located too close to properties.

Effects from upward light (or sky glow)

4.3.4 Light emitted above the horizontal either directly from luminaires or indirectly as reflected light from surfaces such as the landscape or buildings, has the potential to cause sky glow. The ILP "Guidance Notes for the Reduction of Obtrusive Light" places limits on the percentage of direct upward light emitted from the luminaires in their installed attitude, which is dependent upon the Environmental Zone in which the Application Site lies.

4.3.5 Indirect upward light is subject to surface reflectance properties. It is not easily quantifiable but is unlikely to be as significant as direct upward light from luminaires.

Effects from disability glare on transport users

4.3.6 The lighting is designed to be installed such that glare is minimised in accordance with the ILP guidance notes.

Effects from light on bats roosts and insects

4.3.7 Light falling on a roost access point will at least delay some species of bats from emerging and this shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed.

4.3.8 In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats. There are two aspects to this - one is the attraction that light from certain types of lamps has to a range of insects; the other is the presence of lit conditions causing bats to exhibit their light adverse behaviours.

4.4 Classification of Environmental Zone

4.4.1 The ILP Guidance Notes quantify the levels of Obtrusive light regarded as acceptable for varying Environmental Zones (E0 to E4).

4.4.2 The Application Site is described as exhibiting low-medium district brightness and representative of *"Sparsely inhabited rural areas, Village or relatively dark outer suburban locations",* therefore the lighting of the Proposed Development will follow **E2** Environmental Zone criteria in accordance with ILP Guidance Notes.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5 +)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty 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

Table 1 Environmental Zones

Notes:
1. Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.
2. Rural zones under protected designations should use a higher standard of policy.
3. Zone E0 must always be surrounded by an E1 Zone.
4. Zoning should be agreed with the local planning authority and due to local requirements a more stringent zone classification may be applied to protect special/specific areas.
5. SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA), the criteria for E0 being revised in mid-2019 but not retrospective.
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.
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.

4.5 Obtrusive Light Limitations

4.5.1 In the absence of suitable statutory guidance, the ILP "Guidance Notes for the Reduction of Obtrusive Light" GN01:2021 is typically used, in order to provide suitable assessment criteria against which to assess the likely effects of artificial lighting on human receptors and the night sky.

4.5.2 The relevant criteria of upward light, light intrusion and direct source intensity for the relevant Environmental Zone are detailed in **Table 2**.

Environmental Zones	Sky Glow ULR (Max %)	Light Trespass (into Windows) E_v (lux)		Building Luminance Average, Pre-curfew
		Pre- Curfew	Post-Curfew	Average L (cd/m^2)
E0	0	0	0	< 0.1
E1	0	2	< 0.1 (1*)	< 0.1
E2	**2.5**	**5**	**1**	**5**
E3	5	10	2	10
E4	15	25	5	25

Table 2 Obtrusive light criteria relating to each Environmental Zones

Note: * If the installation is for public (road) lighting then this may be up to 1 lx.

4.5.3 Guidance published by the ILP and the Bat Conservation Trust is used to assess the effects of lighting on protected light sensitive ecology (**Section 4.4**).

4.6 Significance Criteria

4.6.1 The significance of an effect from artificial lighting has been based upon the sensitivity of the receptor and the magnitude of change at that receptor due to the revised conditions.

4.6.2 The sensitivity of the receptor has been classified as High, Medium, or Low according to the descriptions provided in **Table 3.**

4.6.3 The magnitude of change is determined as being High, Medium, Low or Negligible and descriptions for each are provided in **Table 4.**

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

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

Sensitivity	Description of Criteria
High	The environment is fragile and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible. Human (Amenity) – receptors which are sensitive to a change in lighting such that the quality of life would be affected (i.e. lighting is designated a statutory nuisance) Human (Safety) - receptors where a change in the lighting has the potential to either dramatically improve or reduce safety (for pedestrians, drivers or workers). Ecological – where a change in the lighting affects the habitats, breeding or feeding of fauna (e.g. protected habitats or other special areas) or growth patterns of fauna / crops.
Medium	The environment has a degree of adaptability and resilience and is likely to accommodate the changes caused by an impact, although there may still be some residual modification as a result. Human (Amenity) – receptors which are sensitive to a change in lighting however not such that the quality of life would be affected. Human (Safety) - receptors where a change in the lighting has the potential to either improve or reduce safety (for pedestrians, drivers or workers). Ecological – where a change in the lighting affects the movement or feeding patterns of fauna but the receptor can adapt.
Low	The environment is adaptable and is resilient to change. Nearly all impacts can be absorbed within it without modifying the baseline conditions. Human (Amenity) – receptors which would not noticeably be aware of a change in lighting. (i.e. in areas of medium to high luminance)

Sensitivity	Description of Criteria
	Human (Safety) - receptors where a change in the lighting has limited potential to affect safety (for pedestrians, drivers or workers). Ecological – area with limited wildlife.
Negligible	Receptor has little or no night-time activity

Table 3 Criteria for receptor Sensitivity

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

Table 4 Criteria for Magnitude of Change

Magnitude of Change	Sensitivity of Receptor			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor to Moderate	Negligible
Low	Moderate	Minor to Moderate	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Table 5 Scale of Effect Matrix

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

Table 6 Likely Effects Description

4.7 Assumptions and Limitations

4.7.1 This assessment assumes that the designing and installation of artificial lighting associated with the Proposed Development will be undertaken by suitably qualified and experienced designers and contractors; who are capable of carrying out such works, and that the detailed lighting design follows the Lighting Strategy provided in **Appendix 1**.

4.7.2 This assessment uses 2-dimensional lighting software for calculations, where site topography and light limiting features have not been accounted for within the design. This approach slightly exaggerates the extents of the Isolux contours shown on light spill diagrams. Modelling demonstrates the absolute adverse scenario (worst case) and therefore ensures that real world lighting levels are not higher than those assessed.

4.7.3 The calculations that this assessment is based on are indicative, and full detailed calculations are required for the final design to ensure compliance with this Lighting Impact Assessment.

5 Baseline Conditions

5.1 Site Description and Context

5.1.1 The Application Site is located in Elmswell, in Suffolk.

5.1.2 The Application Site currently consists of a single field used for agricultural purposes.

5.1.3 The Application Site and the area to the north is consistent with the conditions for an **E2** Environmental Zone, as defined within ILP GN01:2021.

5.1.4 There are both areas of rural and suburban residential development surrounding the Application Site.

5.1.5 The immediate area north of the Application Site is typical of rural locations with the majority of the land being used for agricultural purposes.

5.2 Desktop Assessment

5.2.1 During the desktop assessment publicly available information was used to assess the Application Site and the surrounding area to inform the identification of potentially sensitive receptors, and the Environmental Zone applicable to the Application Site and the surrounding area.

5.2.2 Information used during the desktop assessment includes:

1. The Countryside Charity (CPRE) Skyward Radiance Mapping,
2. Mid Suffolk District Council Local Policies Mapping Data,
3. Arial photography and mapping; and
4. Google imaging data for roadways.

5.2.3 Skyward radiance mapping data produced by the CPRE shows the Application Site and the surrounding area to contain existing levels of skyward radiance (NanoWatts/cm^2/sr) typical of an **E2** Environmental Zone near **E3** Environmental Zones (**Figure 6 and Appendix 4**).

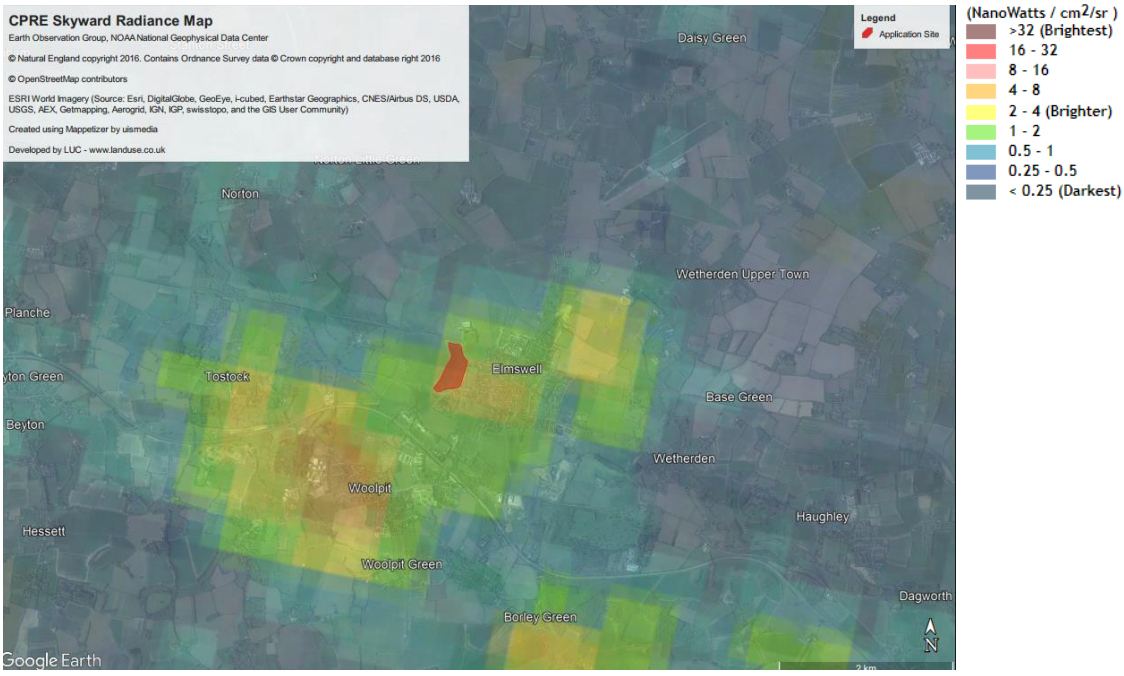


Figure 6 CPRE Light Pollution Mapping (The Indicative Application Site Area is Outlined in Red)

5.2.4 As can be seen in **Figure 6** the Application Site and the surrounding area contains existing levels of skyward radiance ranging between 0.25-32 NanoWatts/cm^2/sr, indicating areas containing both high/medium levels and low levels of existing external artificial lighting.

5.2.5 Considering that the Application Site and the surrounding area contains "*low district brightness"* and is typical of *"Sparsely inhabited rural areas, Village or relatively dark outer suburban locations"* a **E2** Environmental Zone has been chosen to inform the Lighting Impact Assessment and Lighting Strategy (**Table 1 and 2**).

5.2.6 The distribution of skyward radiance shown in **Figure 5** is supported by the images available on Google Street View of the surrounding roads. As can be seen in **Figures 7 – 9** the roads surrounding the Application Site are either unlit or contain lighting typical of residential roads in village locations.

Figure 7 Image of the School Road Facing South

Figure 8 Image of School Road Facing North

Figure 9 shows the location of the site in School Road which is unlit.

5.2.7 **Figures 7 – 9** shows that the surroundings of the Application Site contain existing lighting but that this does not completely surround the Applications.

5.2.8 This supports the information presented within **Figure 6** and shows that the identified human receptors are sensitive to levels of light greater than those detailed within **Table 2**.

5.1 Sensitive Receptors

5.1.1 During the desktop assessment several potentially sensitive receptors to the Proposed Development where identified.

5.1.2 Where multiple receptors are sited in the same direction relative to sources of lighting, the closest of the two receptors will be considered; as the magnitude of change at receptor positions will diminish as the distance from the Application Site increases.

5.1.3 Human amenity receptors will be assessed for potential impacts in accordance with the requirements set out in ILP GN01:2021 for an **E2** Environmental Zone.

5.1.4 The potentially sensitive Human Amenity receptors to the Proposed Development are residential properties surrounding the Application Site.

5.1.5 Potentially sensitive human amenity receptors to the Proposed Development will consist of residential properties, with this assessment considering 1st floor bedroom windows facing in the direction of the Application Site as the primary source of sensitivity. These windows typically start at heights of approximately 3.8 metres and will be considered as the main point of sensitivity. Human amenity receptors are considered to have a **Medium** sensitivity to changes in lighting.

5.1.6 The potentially sensitive ecological receptors to the Proposed Development are predominantly bats and other light sensitive species, who may use existing hedgerows surrounding the Application Site as commuting and foraging routes and the surrounding areas of woodland. These wooded/planted areas have been identified as sensitive receptors and are considered to have **High** sensitivity to changes in lighting.

5.1.7 The night sky within and surrounding the Application Site is also considered a sensitive receptor, however this is not highlighted on the map presented within **Appendix 3**. The condition of the night sky within and surrounding the Application Site (**Figure 6**: 0.25-23 NanoWatts/cm^2/sr) has led to the sensitivity of the sky being considered **Medium**.

5.1.8 Potentially sensitive receptors are shown in **Appendix 3** and are summarised in **Table 7**.

Receptor Type	Receptor No. (Appendix 3&4)	Description	Sensitivity
Ecology	001	Woodland and Hedgerow	High
Ecology	002	Woodland Planting	High
Ecology	003	Potential Bat Corridor	High
Ecology	004	Potential Bat Corridor	High
Human Amenity	005	Dwellings off School Road Road 001	Medium
Human Amenity	006	Dwellings off Church Lane 002	Medium

Table 7 Potentially Sensitive Receptors

6 Lighting Requirements

6.1 Lighting Strategy

6.1.1 This Lighting Impact Assessment is informed by a Lighting Strategy which defines the types, mounting heights, orientation and specification of lighting units to be used as part of the Proposed Development.

6.1.2 The Lighting Strategy is presented in **Appendix 1**.

6.2 Construction Lighting

6.2.1 Due to the scale of the Proposed Development, lighting will be required to enable use of the construction site during the hours of darkness.

6.2.2 Where construction lighting is required, it will be temporary in nature, as it will be removed once the Proposed Development is completed.

6.2.3 If construction lighting is required, lighting levels will be defined on a task-by-task basis, in accordance with the relevant guidance and lighting levels set out in BS EN 12464-2: 2014.

6.2.4 Construction lighting will be implemented in line with the Lighting Strategy (**Appendix 1**) and the Construction Environment Management Plan (CEMP).

6.3 Operational Lighting

6.3.1 British Standard compliant lighting is to be provided to the areas of the Proposed Development as required for the safe function of the development. These areas have been identified as follows:

1. Primary Streets,
2. Secondary Streets, and.
3. Building Entrance

6.3.2 The Private Roads and shared surfaces within the Proposed Development will be lit.

6.3.3 Dwelling Fronts and Rears will require illumination by single luminaires to provide lighting for wayfinding for those living within them.

6.3.4 Lighting within the Proposed Development will use a maximum Correlated Colour Temperature (CCT) of 3000K, being installed post-top or wall mounted with 0° of tilt, on 6m heigh columns (street lighting) or a maximum of 2m heigh on walls (dwelling lighting).

6.3.5 The luminaire performance requirements for each area identified above and the mitigation embedded within the design are detailed within the Lighting Strategy (**Appendix 1**).

7 Potential Effects

7.1 Potential Effects from Construction Phase Artificial Lighting (without mitigation)

7.1.1 Glare from inappropriately oriented floodlighting associated with the construction phase has limited potential to affect nearby potentially sensitive receptors during winter months, when flood lighting of construction operations has the potential to be required for short durations after sunset.

7.1.2 It is likely that isolated instances of skyglow over the construction site would occur for short periods of time where tasks require specific lighting levels for safety. This would mainly occur between sunset and the end of the construction day.

7.1.3 Lighting associated with the construction phase of the project has minimal potential to impact residential and ecological receptors through obtrusive light, as the majority of site preparation and construction tasks are unlikely to take place during the hours of darkness. Where preparation and construction tasks take place in the late afternoon of winter months, lighting for limited periods may be necessary for safety purposes, depending upon the tasks being undertaken.

7.1.4 Poorly designed construction phase lighting can contribute the following obtrusive light components:

- Light intrusion onto windows: this is typical of luminaires installed with high tilt angles,
- Upward light causing sky glow: this is typical of up-lighting and luminaires installed with high tilt angles,
- Glare: due to high light source intensity from floodlights, or luminaires installed so the light source is directly visible; and
- Light spill affecting ecology: caused by excessive height, tilt, and the use of illuminance levels significantly above what is required for the task.

7.1.5 The potential effects from construction phase lighting without mitigation are likely to be temporary in nature and of **Moderate Adverse** significance, based on the above components of obtrusive light, all of which could occur unless mitigation measures outlined in **Appendix 1** are implemented.

7.2 Potential Effects from Operational Artificial Lighting (without mitigation)

7.2.1 As a result of the exterior lighting detailed above (i.e. without mitigation) (**Section 7**), there is a potential for obtrusive light to occur if it is not installed in accordance with the Lighting Strategy (**Appendix 1**).

7.2.2 Obtrusive light can arise from poorly designed lighting, that generally consists of the installation of a limited number of luminaires that are being used to light a wide area. Due to this, the lighting is normally installed with tilt angles that are too great, or that provide an inappropriate lighting distribution, primarily because there is a need to spread the light as far as possible, lighting the intended area, as well as surfaces where the lighting was not intended. This also has the effect of producing high levels of vertical illuminance.

7.2.3 Poorly designed lighting can contribute the following obtrusive light components:

- Light Intrusion onto premises: this is typical of poorly controlled and installed luminaires with potentially high tilt angles,
- Upward light causing sky glow: this is typical of up-lighting,
- Glare: due to high light source intensity from floodlights, or luminaires used for highway lighting; and
- Light Spill: light falling beyond the boundaries of the area being lit, with the potential to affect ecology; this can be caused by excessive height and tilt.

7.2.4 The potential effects without mitigation are likely to be temporary or permanent in nature and of **Moderate Adverse** significance, based on the above components of obtrusive light, all of which could occur unless mitigation measures outlined in **Appendix 1** are implemented.

8 Scope of Mitigation

8.1 Mitigation by Design – Construction

8.1.1 Construction lighting will be provided in compliance with the guidance within BS EN 12464-2: 2014; which defines appropriate lighting levels for outdoor work tasks. The levels required will vary depending upon the task being undertaken and will be assessed on a task-by-task basis. Construction lighting will not significantly exceed the relevant lighting standard for the task being undertaken in order to limit the visibility of construction lighting within the landscape.

8.1.2 Construction lighting will be maintained at a low level and focussed into the site, onto the task being undertaken. Where possible, construction lighting is to be provided by handheld sources or headtorches, ensuring the lowest possible amount of light is used for the task at hand.

8.1.3 Where this is not possible, construction lighting will be mounted an appropriate distance from the task being performed to ensure the required minimum illuminance levels and uniformity is achieved without the need to tilt the luminaires. Additionally, luminaires will be fitted with baffles or shields where necessary to ensure that light spill is not directed towards potentially sensitive receptors.

8.1.4 Construction tasks will predominantly be undertaken during the hours of daylight and as such, there is a limited requirement for construction lighting throughout the construction phase of the Proposed Development. Construction tasks are not anticipated to be undertaken for significant periods during the hours of darkness.

8.1.5 To limit the visibility of construction lighting within the landscape, it will be switched off when not in use. Task lighting for construction tasks is to be controlled by timed switches, ensuring that task lighting is only provided when needed and does not operate outside the hours of use.

8.1.6 Security lighting to the construction compound will be provided by luminaires fixed to site infrastructure, such as cabins or scaffolding poles, will be oriented downwards only and will be focussed into the site only to reduce the levels of light spill leaving the site.

8.1.7 Security lighting will be controlled via photosensor and Passive Infra-red Motion Sensor (PIR), ensuring that lighting is only operational during the hours of darkness and when required.

8.1.8 Detailed construction lighting requirements will be provided in the CEMP accompanying the application. Through the implementation of the CEMP, potentially impacts associated with construction lighting will be minimised.

8.1.9 This information is also detailed within the Lighting Strategy (**Appendix 1**).

8.2 Mitigation by Design - Operation

8.2.1 Potentially negative effects of artificial lighting associated with the Proposed Development will be effectively mitigated through the implementation of the Lighting Strategy.

8.2.2 The Lighting Strategy sets out the types, positions, heights, luminaire specification, and the levels of light to be used throughout the Proposed Development.

8.2.3 Measures as outlined in ILP GN01:2021 will be implemented to ensure the Proposed Development does not adversely impact nearby potentially sensitive receptors. Where required and possible, lighting will be implemented in accordance with ILP GN08:2018 for the protection of nearby ecological receptors.

8.2.4 Lighting will be implemented at the lowest applicable level, with lighting designed such that it does not significantly exceed the requirements of the lighting standards proposed throughout the Application Site.

8.2.5 Mounting heights will be minimised to the lowest practical level, to reduce the potential spread of light beyond the areas where it is needed.

8.2.6 All fixtures will emit light downwards only, with an Upward Light Output Ratio (ULOR) of 0%. This minimises the level of skyglow created by the Proposed Development and reduces the potential for the Proposed Development to impact potentially sensitive receptors.

8.2.7 Additionally, the combination of the 0% ULOR and the restriction of the luminaire G Class to a minimum of G3 will result in a reduced impact on landscape views. This is due to the restriction of 0% light output emitted above the horizontal, and a restriction of light output emitted between 80° - 90°, resulting in the light sources being less visible within the landscape.

8.2.8 Glare experienced by road users and pedestrians will be controlled by limiting the Threshold Increment to levels detailed within *BS EN 13201-2:2015* for P Classes. In the case of the Proposed Development the maximum f_{TI} will be 30%.

8.2.9 All luminaires proposed are to have good optical control and the option for the installation of back light shields. This is an effective method of shielding the source intensity and reducing both horizontal and vertical light spill.

8.2.10 Luminaires in proximity to potentially sensitive receptors will have back light shields installed by default; specifically on columns adjacent to ecological sensitive areas throughout the site.

8.2.11 All lighting will be controlled as per the Suffolk County Council Adoptable Specification.

8.2.12 The Lighting Strategy is presented in **Appendix 1** and contains detailed descriptions of the lighting requirements for each area of the Proposed Development.

9 Residual Effects Assessment

9.1 Brief

9.1.1 The effects associated with the detailed lighting design would be minimised by the application of the mitigation measures outlined above and within the Lighting Strategy (**Appendix 1**).

9.2 Magnitude of Change Assessment

9.2.1 Lighting is required for the following areas of the Proposed Development:

1. Primary Streets,
2. Secondary Streets, and;
3. Building Entrances

9.2.2 Dwelling Fronts and Rears will require illumination by single luminaires to provide lighting for wayfinding for those living within the dwellings.

9.2.3 The implementation of the Lighting Strategy will ensure the effect of lighting on the identified receptors within this report is compliant with the levels stipulated within GN01:21 and GN08:18 for the relevant components of obtrusive light.

9.2.4 Human Amenity Receptors will be protected from the adverse effects of light intrusion using a number of measures which include the low levels of light required within the Proposed Development, the specification of back light shields on perimeter luminaires, and the restriction of luminaire G Class to G3 or higher. These measures mean that levels of light intrusion reaching these dwellings will be significantly lower than levels required within GN01:21 and therefore the magnitude of change is considered ‘Negligible’.

9.2.5 The magnitude of change to potentially sensitive ecological receptors 001 - 003 is considered ‘Negligible’. This is due to the low levels of light required within the Proposed Development, the specification of back light shields on all boundary luminaires and the use of warm white correlated colour temperatures on the proposed luminaires. The above will ensure light levels reaching sensitive ecological areas will be compliant with the requirements of GN08:18, and the impact of the proposed lighting on ecology will be ‘Negligible’

9.2.6 The Upward Light Output Ratio (ULOR) of the proposed luminaires is 0% (**Appendix 1**) and the installation is therefore compliant with the Upward Light Ratio criteria detailed within **Table 2**. There will be some impact resulting from reflected upward light. However, as the light levels

specified within **Appendix 1** are the minimum for the required tasks and ground surface materials are typically low reflectance, the magnitude of change is considered 'Negligible'. Additionally, the restriction of the G Class of the luminaires to a minimum of G3 will reduce the visibility of the lighting within the landscape, and further reduce the effect the proposed lighting will have on the night sky (receptor 009).

9.2.7 In accordance with **Table 5**, the significance of the change from the proposed lighting is summarised in **Table 9.**

Environmental Effect	Receptor Type	Sensitivity of Receptor	Change Magnitude	Nature of Impact (Permanent / Temporary)	Residual Effects
Sky Glow or Upward Light	Night Sky (012)	Medium	Negligible	Permanent	Neutral / Not Significant
Light Intrusion	Human Residential Receptors	Medium	Negligible	Permanent	Neutral / Not Significant
Light Spill	Human Residential Receptors (01)	Medium	Negligible	Permanent	Neutral / Not Significant
	Human Safety Receptors (02)	Medium			
	Ecological Receptors (006-010)	High			
Glare	Human Safety Receptors (01,02)	Medium	Negligible	Permanent	Neutral / Not Significant

Table 9 Significance of Change to Each Receptor Location

9.2.8 Further criteria are given in **Table 6** which aim to assess the significance of the effects of the change in lighting. In this case, due to the 'Negligible' significance of change at the potentially sensitive receptors, the effects of the change in lighting on human and ecology receptors would be classified as **Neutral / Not Significant** in all cases.

9.2.9 Whilst the implementation of the lighting scheme will represent visual change within the environment, the lighting attributed to the site is not considered to give rise to permanent significant adverse effects as defined in GN01:21 and GN08:18 due to the requirements of the lighting design and the mitigation measures detailed within the Lighting Strategy (**Appendix 1**).

10 Conclusions

10.1 Brief

10.1.1 This Lighting Impact Assessment is presented to evaluate the potential effects of lighting associated with the Proposed Development.

10.1.2 The objective of the assessment is to provide an independent report on the suitability of the proposed lighting in accordance with guidance outlined in the Institution of Lighting Professionals (ILP) Professional Lighting Guide (PLG) 04 (2013).

10.1.3 Permanent lighting is proposed for the following areas:

1. Primary Streets,
2. Secondary Streets, and;
3. Building Entrances.

10.1.4 Lighting is to be subject to the Lighting Strategy outlined in **Appendix 1**.

10.2 Baseline Conditions

10.2.1 The Application Site is located in an **E2** Environmental Zone, where the typical background luminance within the area would be described as 'Low'. Existing lighting is present in the area surrounding the Application Site, associated with dwellings and roadways; and the Application Site itself is considered dark. This conclusion was informed by the desktop assessment and the lighting baseline survey conducted as part of the Lighting Impact Assessment.

10.3 Lighting Strategy

10.3.1 A comprehensive Lighting Strategy has been prepared for the Proposed Development, which limits the type, mounting height, inclinations, positions and operating hours of the proposed lighting, to ensure it is minimally obtrusive within the landscape and has a minimal impact on nearby potentially sensitive receptors. This Lighting Strategy is presented in **Appendix 1**.

10.4 Sensitive Receptors

10.4.1 Potentially sensitive human amenity and ecological receptors were identified within the assessment, with their sensitivity described as medium or high.

10.4.2 Mitigation has been embedded within the design of the proposed lighting to ensure its impact on the surrounding identified receptors is 'Negligible' as described within GN01:21 and GN08:18.

10.4.3 This mitigation is detailed with **Section 9.2, 10.2** and **Appendix 1**.

10.5 Assessment Outcome

10.5.1 The Lighting Strategy contained within **Appendix 1** will ensure the lighting of the Proposed Development will not result in significant adverse effects on the identified sensitive receptors (**Table 7**).

10.5.2 Mitigation against all relevant components of obtrusive light is detailed within the Lighting Strategy (**Appendix 1**) and **Section 9.2 and 10.2**.

In conclusion, through the implementation of the Lighting Strategy and the mitigation detailed within this report, there are unlikely to be effects from lighting associated with the Proposed Development that would be considered significant in terms of obtrusive light (GN01:21 and GN08:18).

10.5.3 Additionally, the proposed lighting detailed within **Appendix 1** is compliant with Mid Suffolk District Council Core Strategy Development Plan Document (Adopted September 2008).

10.5.4 This is due to the protection provided to both ecologically sensitive areas, the night sky, and landscape views detailed with this report and the Lighting Strategy, and the benefits this protection also provides human receptors (both in terms of amenity and safety).

Appendix 1 – Lighting Strategy

1 Lighting Strategy

1.1 Brief

1.1.1 The Proposed Development will require lighting for safety, and amenity during the hours of darkness. Lighting must be fit for purpose and sensitive to nearby sensitive human and ecological receptors.

1.1.2 The Application Site is broadly set within an **E2** Environmental Zone.

1.1.3 The following criteria seeks to ensure that the lighting is not outside of the obtrusive light limits for the Environmental Zone in which the Application Site is located, is sensitive to the area and provides a recognised standard level of lighting for all areas requiring illumination.

1.1.4 This Lighting Strategy will focus on the below areas of the Proposed Development:

- Primary Roads,
- Secondary Roads, and;
- Building Entrances.

1.2 Construction Lighting

1.2.1 Construction lighting will be provided in compliance with the guidance within *BS EN 12464-2: 2014*; which defines appropriate lighting levels for outdoor work tasks. The levels required will vary depending upon the task being undertaken and will be assessed on a task-by-task basis. Construction lighting will not significantly exceed the relevant lighting standard for the task being undertaken in order to limit the visibility of construction lighting within the landscape.

1.2.2 Construction lighting will be maintained at a low level and focussed into the site, onto the task being undertaken. Where possible, construction lighting is to be provided by handheld sources or headtorches, ensuring the lowest possible amount of light is used for the task at hand.

1.2.3 Where this is not possible, construction lighting will be mounted an appropriate distance from the task being performed to ensure the required minimum illuminance levels and uniformity is achieved without the need to tilt the luminaires. Additionally, luminaires will be fitted with baffles or shields where necessary to ensure that light spill is not directed towards potentially sensitive receptors.

1.2.4 Construction tasks will predominantly be undertaken during the hours of daylight and as such, there is a limited requirement for construction lighting throughout the construction phase of the Proposed Development. Construction tasks are not anticipated to be undertaken for significant periods during the hours of darkness.

1.2.5 To limit the visibility of construction lighting within the landscape, it will be switched off when not in use. Task lighting for construction tasks is to be controlled by timed switches, ensuring that task lighting is only provided when needed and does not operate outside the hours of use.

1.2.6 Security lighting to the construction compound will be provided by luminaires fixed to site infrastructure, such as cabins or scaffolding poles, will be oriented downwards only and will be focussed into the site only to reduce the levels of light spill leaving the site.

1.2.7 Security lighting will be controlled via photosensor and Passive Infra-red Motion Sensor (PIR), ensuring that lighting is only operational during the hours of darkness and when required.

1.2.8 Detailed construction lighting requirements will be provided in the CEMP accompanying the application. Through the implementation of the CEMP, potentially impacts associated with construction lighting will be minimised.

1.3 Primary and Secondary Roads

1.3.1 The Residential Roads require lighting in accordance with *BS 5489-1:2020* and *BS EN 13201:2015*.

1.3.2 A P5 lighting class has been selected based on the expected mixed use by pedestrians and personal vehicles, and a levels of traffic flow described as "*quiet"* within *BS 5489-1:2020*

1.3.3 Light spill onto boundary features will be restricted by orientating luminaries' appropriately such that they focus light where needed during the hours of darkness.

1.3.4 All luminaires and lighting columns used for the roadway within the Proposed Development will confirm to the Suffolk County Council adoptable specification.

1.3.5 Luminaire Correlated Colour Temperature will deviate from the Adoptable Specification and will be 3000K rather than 3000K. This is to ensure minimal impact on the light sensitive species identified within the area surrounding the Application Site.

1.3.6 Where required to reduced levels of light spill, luminaires will be fitting with back light shields (**Appendix 6**).

1.3.7 Luminaire performance parameters for the Residential Roads are outlined in **Table 1.1**.

Equipment Specification	**Description**
Location	Primaryl Roads
Correlated Colour Temperature (Kelvin)	3000 Kelvin (Maximum).
Luminaire Manufacturer	Philips (or equivalent approved)
Luminaire Model	BGP 702 (or equivalent approved)
Light Source	LED
Height	6m (Maximum)
Mounting Arrangement	Post Top
Luminaire Tilt	0° (Maximum)
Upward Light Output Ratio (ULOR)	0% (Maximum)
G Class	G3 (Minimum)
Example Luminaire Image	
Design Guidance	
Lighting Class	BS 5489-1:2020 – P5
Lighting Design Criteria	Average (Minimum Maintain):3lx Minimum (Maintained): 0.6lx F_{ti} (Maximum): 30%

Controls	Part night as per the Suffolk County Council Specification
Accessories	Back Light Shields as per **Appendix 6**

Table 8.1 Performance and Installation Requirements – Primary Roads

Equipment Specification	**Description**
Location	Secondary Roads
Correlated Colour Temperature (Kelvin)	3000 Kelvin (Maximum).
Luminaire Manufacturer	Philips (or equivalent approved)
Luminaire Model	BGP 702 (or equivalent approved)
Light Source	LED
Height	5m (Maximum)
Mounting Arrangement	Post Top
Luminaire Tilt	0° (Maximum)
Upward Light Output Ratio (ULOR)	0% (Maximum)
G Class	G3 (Minimum)
Example Luminaire Image	
Design Guidance	
Lighting Class	BS 5489-1:2020 – P5
Lighting Design Criteria	Average (Minimum Maintain):3lx Minimum (Maintained): 0.6lx F_{ti} (Maximum): 30%
Controls	Part night as per the Suffolk County Council Specification
Accessories	Back Light Shields as per **Appendix 6**

Table 9.1 Performance and Installation Requirements – Secondary Road

1.4 Building Entrances

1.4.1 Lighting will be provided to the dwelling fronts and rears to enable wayfinding for access to entrances.

1.4.2 These luminaires will be wall mounted and will direct light downward only with no upward light component, they will use a correlated colour temperature of 2700K, and will use integral light sources (LED) which have a maximum beam angle of 20 degrees. This is to ensure the impact of external lighting on the night sky and the identified ecology is mitigated as far as possible.

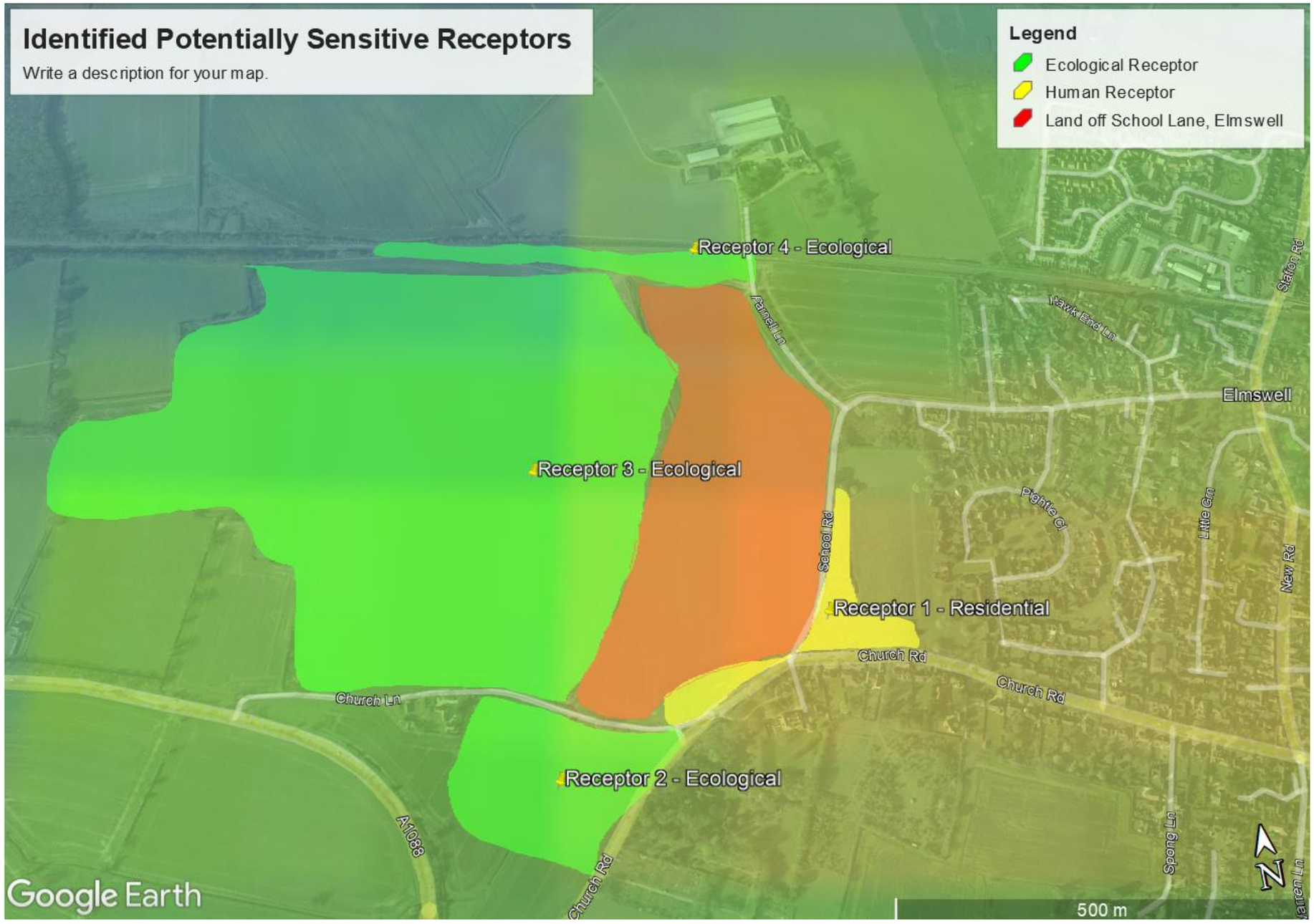
1.4.3 Luminaire performance parameters for the building entrances are outlined in **Table 1.2**.

Equipment Specification	Description
Location	Building Entrances
Correlated Colour Temperature (Kelvin)	2700 Kelvin (Maximum).
Luminaire Manufacturer	LIGMAN (Or equivalent approved)
Luminaire Model	JET 31 - 30351(Or equivalent approved)
Light Source	LED
Beam angle	20° (Maximum)
Height	2m (Maximum)
Mounting Arrangement	Wall Mounted
G Class	G6 (Minimum)
Luminaire Tilt	0° (Maximum)
Upward Light Ratio (ULR)	0% (Maximum)
Example Luminaire Image	
Design Guidance	
Lighting Class	N/A
Lighting Design Criteria	N/A
Controls	Passive Infrared Motion Sensor (PIR) Internal Switching

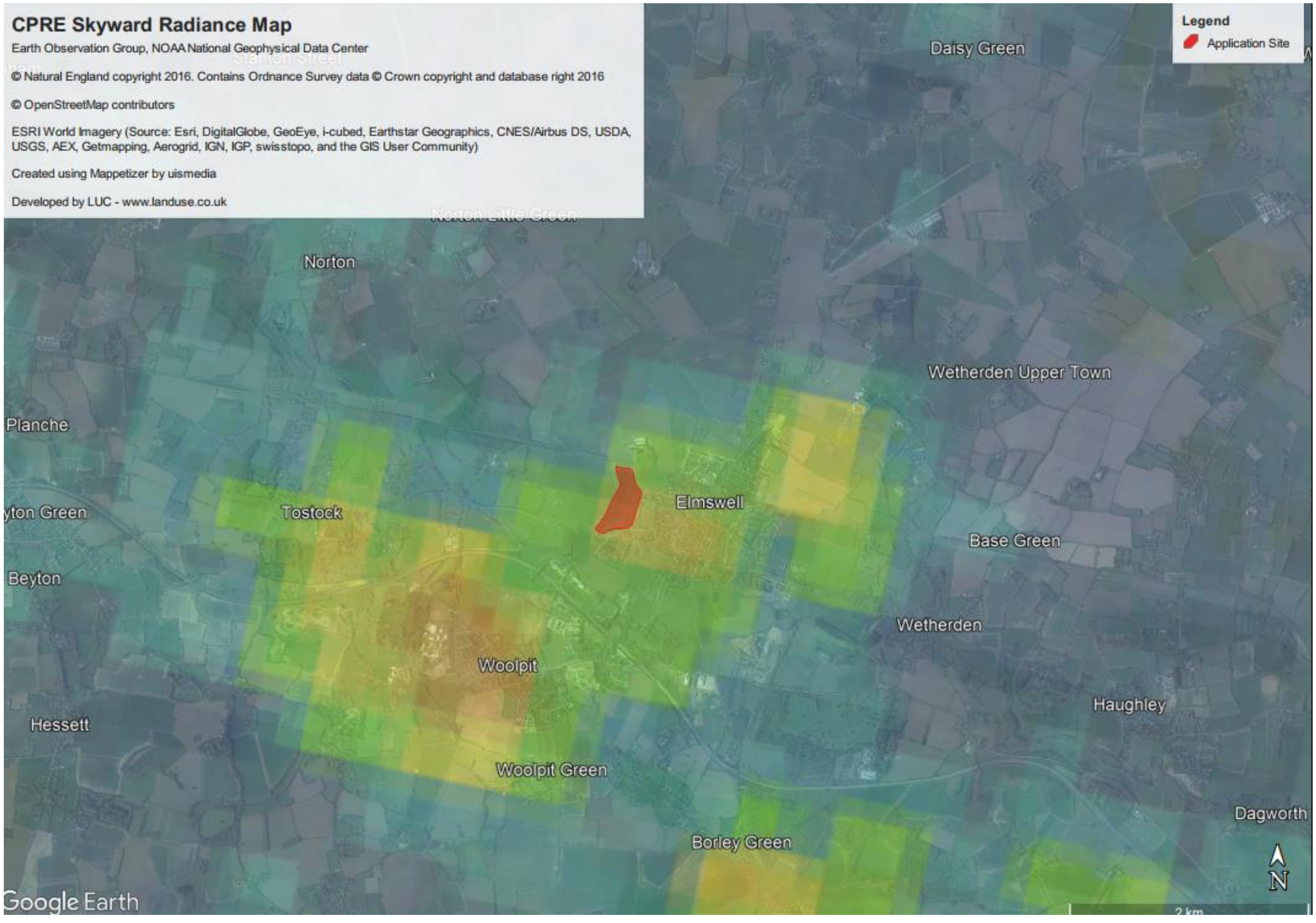
Table 9.2 Performance and Installation Requirements Building Entrances

Appendix 2 – Proposed Development Master Plan

Appendix 3 – Potentially Sensitive Receptors



Appendix 4 – CPRE Sky Glow Map



(NanoWatts / cm^2/sr)
- >32 (Brightest)
- 16 - 32
- 8 - 16
- 4 - 8
- 2 - 4 (Brighter)
- 1 - 2
- 0.5 - 1
- 0.25 - 0.5
- < 0.25 (Darkest)

Appendix 5 – Indicative Light Spill Diagram

See separate file: *2595-DFL-ELG-XX-LD-EO-13001-S3-P02*

Appendix 6 - Vertical Grid References and Results

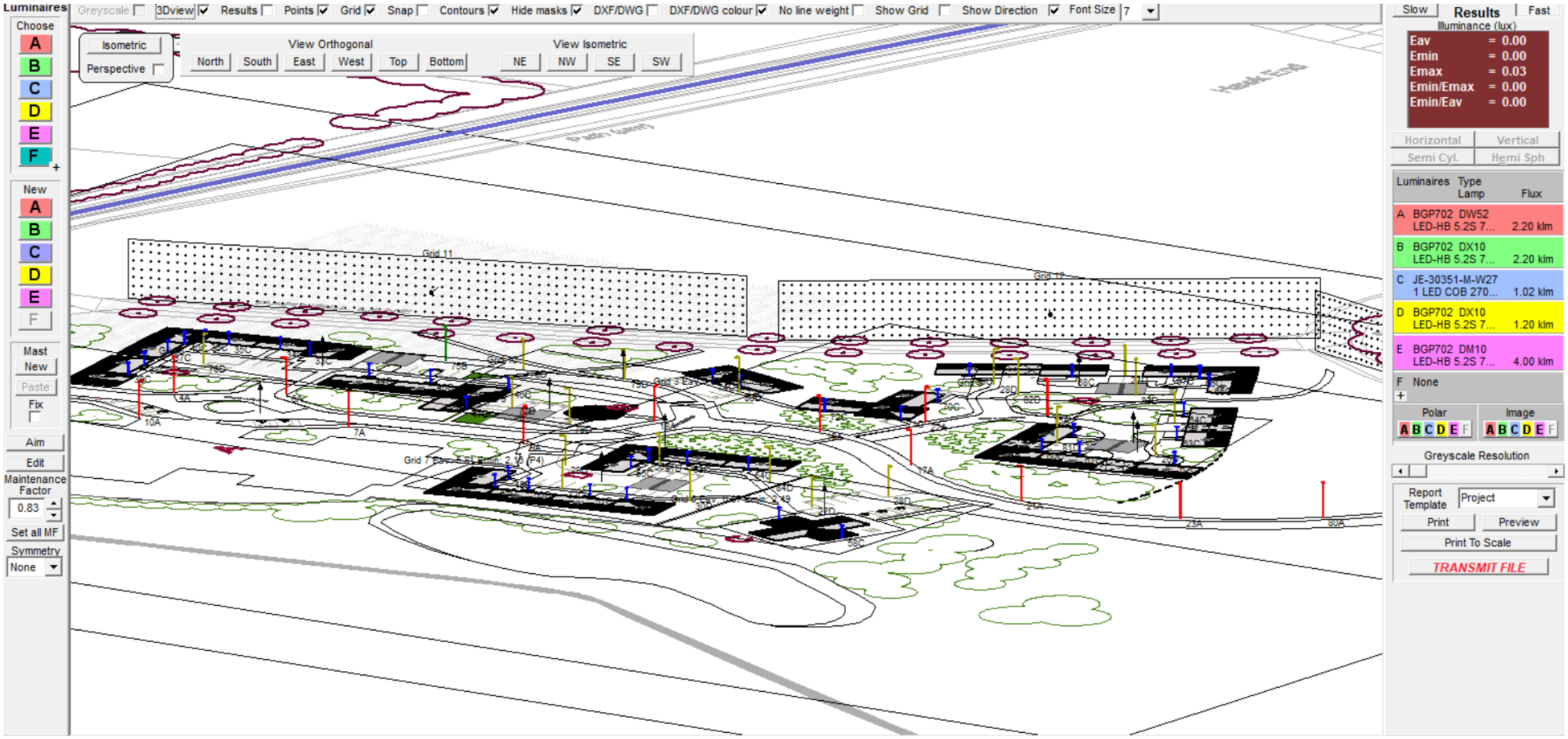


Figure 10: Vertical Grids facing towards the site on the eastern perimeter

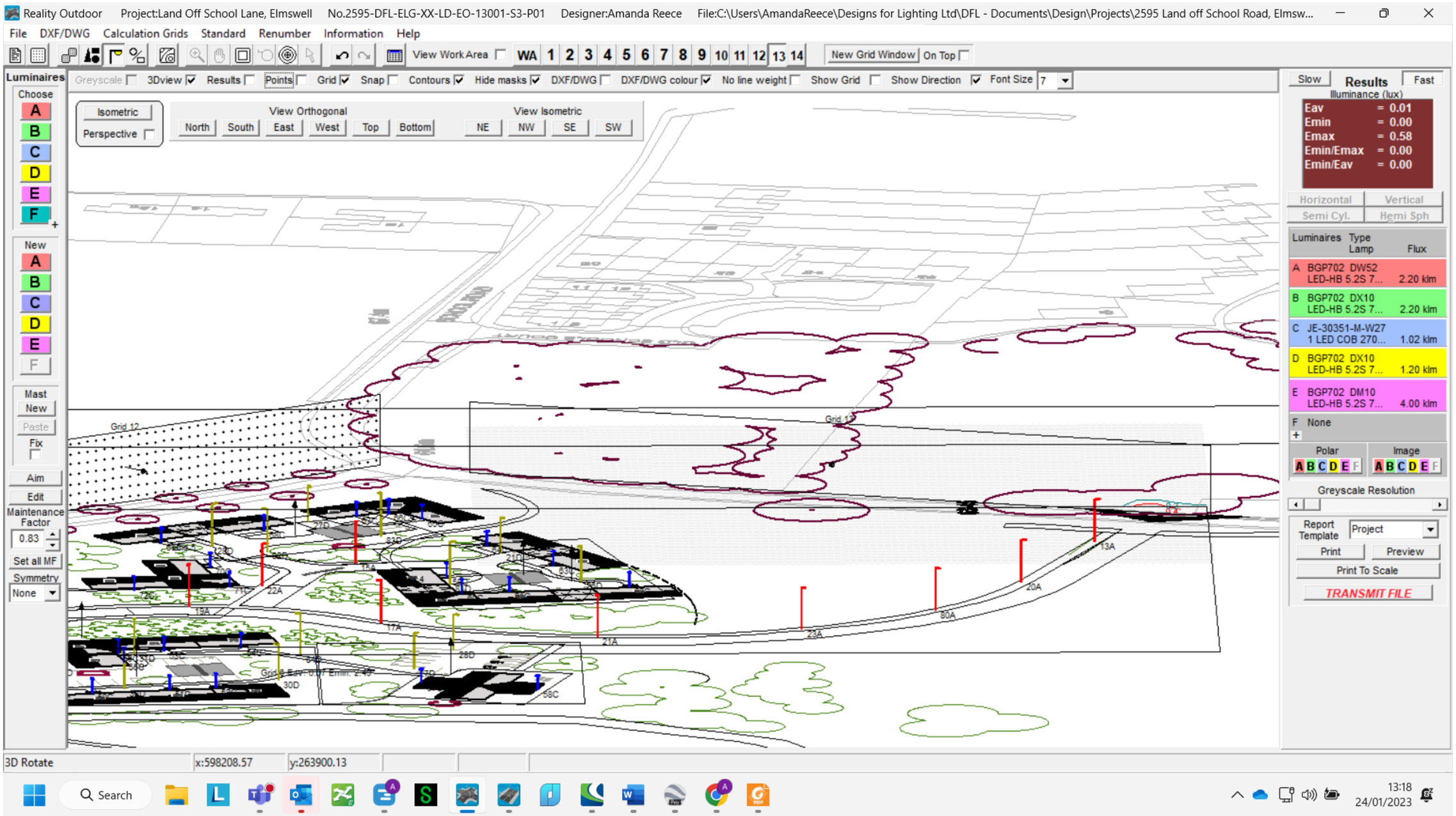


Figure 11: Vertical Grid southeast of the Site.