LIGHTING IMPACT ASSESSMENT

PROJECT: HENFIELD ROAD, ALBOURNE

PREPARED FOR: CROUDACE

JULY 2022

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1 Introduction

1.1 General

1.1.1 Designs for Lighting Ltd have been commissioned to develop a sensitive Lighting Strategy and undertake a Lighting Impact Assessment for residential development of 120 dwellings, parkland, and a community orchard at Land at Henfield Road, Albourne, West Sussex.

1.1.2 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 environmental and potentially sensitive human receptors.

1.1.3 The objective of the lighting assessment report 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 of undertaking Environmental Lighting Impact Assessments'.

1.1.4 The Application Site comprises of two parcels of land adjacent to Henfield Road. Further afield the area is of predominantly agricultural land to the north, west, and south with residential space to the east. The Application Site sits to the immediate west of the town of Albourne, West Sussex. (See **Figure 1**).

1.1.5 The Proposed Development consist of 120 dwellings, public open spaces, and community facilities at Land at Henfield Road, Albourne, West Sussex.

1.1.6 The Proposed Development Masterplan is provided in **Figure 2**.

1.1.7 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 accordance with the predetermined obtrusive light limits for the Environmental Zone in which the Application Site is located. This can be achieved through the implementation of a carefully planned and implemented lighting design strategy informed by the relevant British Standards and lighting industry guidance.

1.1.8 The Lighting Strategy for the Proposed Development is provided in **Appendix 1**.

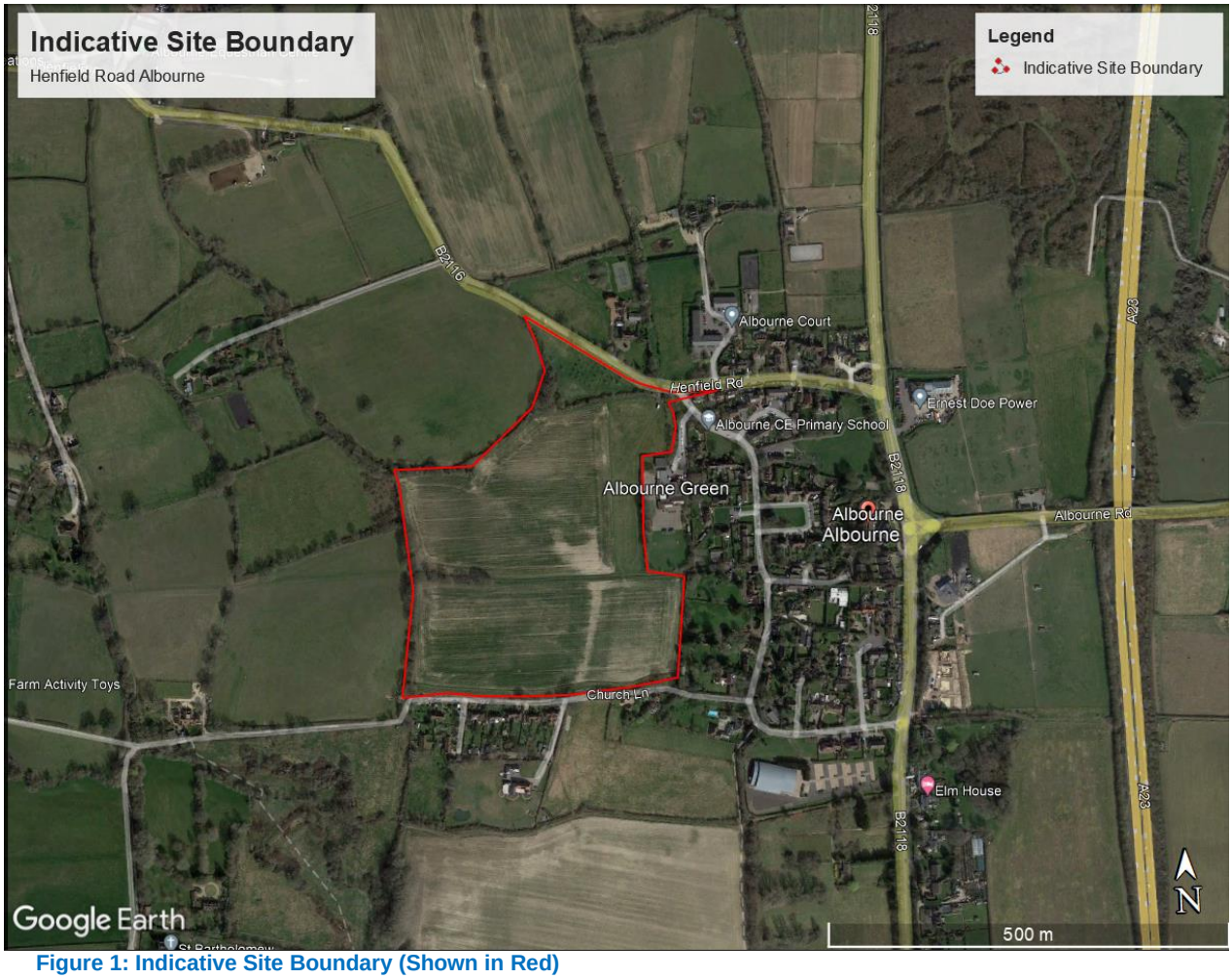


Figure 1: Indicative Site Boundary (Shown in Red)

Figure 2: Proposed Development Masterplan

2 Legislative and Policy Frameworks

2.1 Relevant National Policies

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 Policies

2.2.1 The relevant local authority for Application Site is Mid Sussex District Council, with the most relevant planning guidance prepared by Mid Sussex District Council being the Mid Sussex District Plan (2014-2031) and the Mid Sussex Design Plan (Adopted November 2020). The most relevant Local polices to lighting are Policy **DP29** (District Plan) and **DG29** and **DG48** (Design Plan).

DP29: Noise, Air and Light Pollution

''The environment, including nationally designated environmental sites, nationally protected landscapes, areas of nature conservation or geological interest, wildlife habitats, and the quality of people's life will be protected from unacceptable levels of noise, light, and air pollution by only permitting development where:

Light pollution:

• The impact on local amenity, intrinsically dark landscapes, and nature conservation areas of artificial lighting proposals (including floodlighting) are minimised, in terms of intensity and number of fittings;

• The applicant can demonstrate good design including fittings to restrict emissions from proposed lighting schemes;"

Principle DG29: Deliver a coordinated public realm with high quality landscape

"Applicants should ensure that the public realm is designed in a coordinated manner using a consistent palette of high quality and robust materials in combination with appropriate soft landscaping and avoiding cluttering the street with excessive furniture or signage.

Surface materials and street furniture should be informed by their appearance in relation to excising character of an area, their intended purpose, and their maintenance, management, and technical requirements. This should help to create coherent environment and sense of place that can stand the test of time.

Surface materials: Natural stone either as flags, setts or cobbles or brick may be the most appropriate, especially in historic and rural locations. Concreate or tarmac should normally be coordinated with other surface materials as well as soft landscaping as otherwise their uniform appearance and sharp finish can undermine the character of a new development.

Street Furniture: Street Furniture should be simple, high quality, robust and responsive to its setting and integral to the landscape design. It should be restricted to essential items and functions and combined where possible. For example, attaching signs to lamp posts, mounting streets signs and or lighting on buildings

Lighting: Light fittings should be low energy and be designed to avoid causing light pollution particularly in sensitive and dark sky rural areas.

Utilise: Applicants should consider utility requirements such as supply boxes, cable runs and maintenance access and the location of EV charging points at an early stage of the design process to avoid conflicts between these and landscape features tree planning and public realm design.

Public Art: on larger schemes there is often an opportunity to incorporate public art in the proposals. This should be considered at an early stage in design process and carefully integrated to ensure it is well related to development proposals"

Principle DG48: Design to minimise the impact of noise, air, and light pollution

"Noise Disturbance and air/light pollution can be reduced careful design including the following measures:

Orientation or organising buildings so that the principle habitable rooms and sitting out areas face away from the source of pollution;

Incorporating design features such as recessed balconies and acoustic lobbies;

Constructing barriers such as garages or walls between the source of the pollution and dwellings;

Using the landscape features (including tree and earth mounding) to absorb noise/air pollution and defect light; and

Avoiding parking where it ill creates noise and headlight nuisance from vehicle movements."

4 British Standards and Guidance

4.1 Guidance Notes for the Reduction of Obtrusive Light (GN01:2021)

4.1.1 This Lighting Impact Assessment is informed by industry guidance notes which aim to reduce the potential for obtrusive light to occur, caused by poorly designed and installed exterior artificial lighting. This Lighting Impact Assessment is informed by the most relevant sections of GN01/21 that has been published to reduce the potential for obtrusive light from a wide range of exterior lighting applications. Notably, the updated guidance has been specifically aimed at systems of flood lighting, as such some sections relating to luminaire source intensity are not applicable to this Lighting Strategy.

The Environmental Zone criteria detailed within **Table 1** and **Table 2** will form the basis of the Lighting Impact Assessment.

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 Zone Descriptions

Notes to Table:
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

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
E1	0	2	0 (1*)	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 2: Obtrusive Light Criteria

Notes to Table:
- ***ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky.***
- ***E_v is Vertical Illuminance in Lux.***
- ***L is Luminance in Candelas per square metre; and***
- ***Curfew refers to a time when the local planning authority has agreed that the lighting installation should be switched off; this typically refers to 23h00 – 07h00.***
- ***(*) Permitted only from public road lighting installations up to a maximum of 1.0 lux.***

4.2 GN08/18 Bats and Artificial Lighting in the UK – Bat Conservation Trust and Institution of Lighting Professionals.

4.2.1 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 adverse behaviour (Stone, 2012)."

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

4.3.1 PLG 04 is used to ensure that the Lighting Impact Assessment is correctly conducted:

"...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."

4.4 British Standards

4.4.1 The most applicable British Standards for lighting that relate to the approved development are:

- **BS-EN-5489 1:2020** – *Designs of Road Lighting.* This guidance is applicable for roadways throughout the development.
- **BS-EN 12464 2:2014**- *Light and Lighting – Lighting of workplaces – Part 2: Outdoor workplaces* – Car Parking Areas – Table 5.9

4.5 Assumptions and Limitations

4.5.1 This assessment assumes that design and installation associated with the Proposed Development will be undertaken by suitably qualified and experienced designers and contractors, who are capable of conducting such works.

4.5.2 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 mapping. Modelling demonstrates the absolute adverse scenario (worst case) that ensures lighting levels are not higher than those assessed.

5 Assessment Methodology and Significance Criteria

5.1 Methodology

5.1.1 The assessment has been conducted in accordance with the published guidance documents from the ILP. They quantify the levels of direct upward light, light intrusion, and glare regarded as acceptable for Environmental Zone **E2.**

5.1.2 The Lighting Impact Assessment is informed by a Baseline Survey and a desk-top assessment; with the methodology employed for this assessment being appropriate to the location of the site.

5.1.3 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.

5.1.4 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.

5.2 Study Area

5.2.1 The desktop study area (highlighted in Appendix 2/3) was determined by assessing the potential receptors that could be affected by a change in artificial lighting in line with the criteria outlined in **Tables 1-2**. This included nearby existing residential development, roadways, and any identified ecology.

5.3 Potential Effects from Artificial Light

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

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

5.3.2 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

5.3.3 Table 4 within ILP GN01/21 (**Table 2** within the document) 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)

5.3.4 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 site lies.

5.3.5 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

5.3.6 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

5.3.7 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.

5.3.8 In addition to causing disturbance to bat 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.

5.4 Significance Criteria

5.4.1 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.

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

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

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

5.4.5 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) 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 Impact	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 too exceedingly 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 Impact

Magnitude of Impact	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

6 Baseline Survey

6.1 Development Context

6.1.1 Proposals consist of 120 dwellings, public open spaces, and community facilities at Land at Henfield Road, Albourne, West Sussex.

6.1.2 Lighting is to be provided to the Front and Rear of the proposed dwellings, as well as the roadways throughout the development in accordance with the Lighting Strategy set out in **Appendix 1**.

6.1.3 The Proposed Site layout is presented in **Figure 2**.

6.1.4 The Application Site is located to the West of Albourne, West Sussex. The Application Site is bordered by Henfield Road to the north and agricultural land to the north, south, and west.

6.1.5 Further afield, the site is approximately 5 miles southwest of Burgess Hill, and 10 miles northwest of Brighton City Centre.

6.2 Environmental Zone

6.2.1 The Application Site is consistent with the conditions for an **E2** Environmental Zone, as defined within ILP GN01:2021. CPRE night blight mapping (available online https://nightblight.cpre.org.uk/maps/) indicates low levels of skyward radiance in the surrounds of the site. Night blight mapping of the area is shown in **Figure 3**:

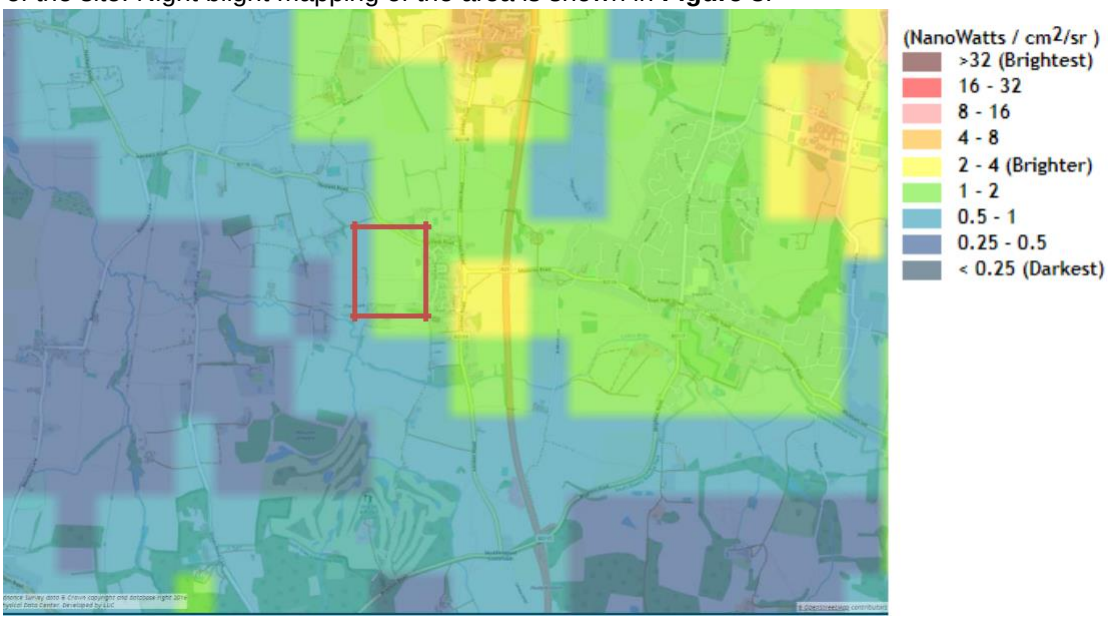


Figure 3: CPRE Light Pollution Mapping (The Approximate Application Site Location is Highlighted in Red)

6.2.2 Ensuring that the lighting associated with the Proposed Development is compliant with **E2** Environmental Zone criteria will ensure the impact of the Proposed Development on the surrounding area is reduced. This will be achieved by restricting the levels of ULR, Pre-curfew and Post-curfew light trespass, and building luminance to the levels outlined in **Table 2**.

6.3 Baseline Lighting Survey

6.3.1 A baseline survey of the Application Site was undertaken during the evening of the 13th of April 2022 by lighting professionals experienced and qualified to undertake such surveys.

6.3.2 The survey was undertaken following the onset of astronomical dusk (21:10 hours). Weather conditions were good with clear skies and the moon was 87% Visible (as taken from (https://www.moonphases.co.uk).

6.3.3 Illuminance measurements were taken in the horizontal plane and in vertical planes facing north, east, south, and west, providing 5 illuminance readings per measurement location.

6.3.4 Measurements were taken using a Hagner T-10 illuminance meter (serial number: 55611050) which had a valid calibration certificate (certificate No: LB201401) and is widely regarded as the standard instrument for providing a consistent level of accuracy at the low illuminance levels associated with site measurements in locations with typically low ambient luminance.

6.3.5 The majority of the Application Site was considered dark, with readings below 0.20 lux in the horizontal plane and 0.40 lux in the vertical plane. The highest reading taken during the baseline survey was 0.13 lux.

6.3.6 From the readings gathered, and the desktop assessment undertaken prior to the baseline survey, it was determined that the site is consistent with the conditions for an **E2** Environmental Zone.

6.3.7 The results of the baseline survey are presented in **Appendix 5**.

6.3.8 Photography of the Application Site is presented in **Appendix 6**.

6.4 Sensitive Receptors

6.4.1 During the desktop assessment several potential Sensitive Receptors have been identified surrounding the Application Site.

6.4.2 Where multiple receptors are sited in the same direction relative to sources of lighting, the closest of those receptors will be considered; as the magnitude of change at receptor positions will diminish as the distance from the Application Site increases. This is due to the reduction in illuminance levels proportional to the square of the distance from the light source.

6.4.3 A map of the potentially sensitive human receptors is presented in **Appendix 3**.

6.4.4 A map of the potentially sensitive ecological receptors is presented in **Appendix 2**.

6.4.5 Potentially sensitive human amenity receptors to the Proposed Development will consist of residential properties, with this assessment considering first 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 to have a **medium** sensitivity to changes in lighting.

6.4.6 Potentially sensitive human safety receptors to the Proposed Development will consist of road users on roadways adjacent to the Application Site. For the purposes of this assessment road users are considered to have **Low** sensitivity to changes in lighting.

6.4.7 Potentially sensitive receptors are shown in **Appendix 2** & **Appendix 3** and are summarised in **Table 7**.

Receptor Type	Receptor No. (Appendix 2&3	Description	Sensitivity
Human Amenity	01	Albourne CE Primary School (west of Application Site)	Medium
Human Amenity	02	The Street Properties (west of Application Site)	Medium
Human Amenity	03	Church Lane Properties (South of Application Site)	Medium
Human Safety	04	Adjacent Henfield Road (Road users)	Low
Human Safety	05	Adjacent Church Lane (Road Users)	Low
Ecology	06	Potentially Sensitive Boundary Habitat (north, east, west, and south of Application Site)	High

Table 7: Potentially Sensitive Receptors

7 Lighting Requirements

7.1 Construction Lighting

7.1.1 Lighting will be required during the construction phase of the Proposed Development to facilitate the safe transit and use of the site for limited periods during the hours of darkness.

7.1.2 Construction lighting will be temporary in nature, as it will be removed once the Proposed Development is completed.

7.1.3 Lighting levels for construction lighting will be defined on a task-by-task basis, in accordance with the relevant guidance and lighting levels set out in **BS EN 5489:2020**.

7.1.4 **Appendix 1** contains the requires for construction lighting within the Application Site.

7.2 Operational Lighting

7.2.1 Amenity lighting is to be provided to Roadway throughout the development and property frontages and rears, for the purposes of safety and amenity; and to enable wayfinding during the hours of darkness.

7.2.2 Lighting will be provided at a CCT of 4000K, in accordance with recommendations set out in '*Lighting of Developer promoted highway schemes in West Sussex*'.

7.2.3 **Appendix 1** contains the requires for operational lighting for the Proposed Development.

8 Potential Effects

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

8.1.1 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.

8.1.2 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.

8.1.3 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.

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

- Light spill onto windows: this is typical of wall mounted luminaires with 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
- Intrusive light affecting ecology: caused by excessive height and tilt.

8.1.5 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 **Section 8** are implemented.

8.2 Potential Effects from Operational Artificial Lighting (without mitigation)

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

8.2.2 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. This also has the potential of producing high levels of vertical illuminance.

8.2.3 Poorly designed lighting can contribute to the following obtrusive light components:

- Light spill onto windows;
- Upward light causing sky glow;
- Glare: due to high light source intensity from floodlights; and
- Intrusive light affecting ecology.

8.2.4 The potential effects without mitigation are likely to be 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 **Section 9** are implemented.

9 Scope of Mitigation

9.1 Mitigation by Design – Construction

9.1.1 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.

9.1.2 Construction lighting will be maintained at a low level and focussed into the site, onto the task being undertaken.

9.1.3 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.

9.1.4 Luminaires used for construction lighting will be fitted with baffles or shields where necessary to ensure that lighting is not directed towards potentially sensitive receptors.

9.1.5 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.

9.1.6 Security lighting to the construction compound will be provided by luminaires fixed to site infrastructure, such as cabins or scaffolding pole and will be oriented downwards only.

9.1.7 Security lighting will be controlled via photosensor, ensuring that lighting is only operational during the hours of darkness.

9.1.8 To reduce the levels of light spill leaving the site, security lighting will be focussed into the site only.

9.2 Mitigation by Design - Operation

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

9.2.2 The Lighting Strategy (**Appendix 1**) sets out the types, positions, heights, outputs, and specification of luminaires to be used throughout the Proposed Development.

9.2.3 Measures as outlined in ILP GN01:2021 will be implemented to ensure the Proposed Development does not adversely impact nearby potentially sensitive receptors.

9.2.4 Lighting will be implemented at a low level, with lighting designed such that it does not significantly exceed the requirements for the lighting standards proposed throughout the Application Site.

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

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

9.2.7 Fixtures will have good optical control and light spill will be limited by directing light only where it is needed.

10 Residual Effects Assessment

10.1 Brief

10.1.1 Effects caused by lighting for the Proposed Development will be mitigated by the implementation of the Lighting Strategy detailed within **Appendix 1**, and the mitigation detailed within **Section 9**.

10.2 Light Spill modelling

10.2.1 Indicative modelling of the Proposed Development was undertaken to determine the potential levels of horizontal and vertical illuminance at the identified potentially sensitive receptors.

10.2.2 Light spill diagrams showing indicative levels of horizontal illuminance are shown in **Appendix 4**.

10.2.3 The levels of vertical Illuminance onto nearby potentially sensitive receptors are summarised in **Table 8**:

Receptor No. (Appendix 2&3	Pre-curfew limit (lux)	Post-curfew limit (lux)	Vertical Illuminance (Average)	Vertical Illuminance (Maximum)
01	2.00	<0.1 to 1.00	0.00	0.11
02	2.00	<0.1 to 1.00	0.00	0.00
03	2.00	<0.1 to 1.0	0.00	0.00
04	N/A	N/A	0.00	0.33
05	N/A	N/A	0.00	0.00
06	0.4	0.4	0.00	0.03

Table 8: Modelled levels of Vertical Illuminance onto nearby residential receptors.

10.2.4 The magnitude of change to Receptor Locations 01 – 03 is considered 'Negligible', as modelled vertical illuminance is significantly lower than the pre- and post-curfew limits for the Environmental Zone in which the Application Site is located.

10.2.5 The magnitude of change to Human Safety receptors at Henfield Road and Church Lane 'Negligible' as lighting will be implemented to minimise discomfort or disability glare for road users in accordance with the Lighting Strategy set out in **Appendix 1**.

10.2.6 The magnitude of change to potentially sensitive ecological receptors at the boundaries of the Application Site is considered 'Negligible,' as modelled vertical illuminance is significantly lower than the restrictions for lighting onto ecology outlined in relevant industry guidance.

10.2.7 For all receptors, the modelled lighting levels are compliant with the criteria outlined in **Table 2** and are unlikely to create a magnitude of change that would equate to a 'Low' level because the change will not breach limits and standards, as demonstrated in **Table 8**.

10.2.8 Modelling presents the absolute adverse scenario, representing luminaire output at the start of luminaire life. Modelling does not include boundary features such as planting and as a result, actual lighting levels are likely to be lower than those modelled.

10.3 Construction Lighting

10.3.1 Glare from inappropriately oriented flood lighting associated with the construction phase of the project has the 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.

10.3.2 Construction lighting is to be implemented within the Application Site in accordance with the construction lighting section of the Lighting Strategy, presented in **Appendix 1**.

10.3.3 Through the implementation of this Lighting Strategy, the potential impact from construction lighting will be minimised.

10.3.4 The potential impacts of construction lighting are temporary in nature, as construction lighting will be removed once the Proposed Development is completed.

10.3.5 The magnitude of change to Human Safety receptors is considered 'Negligible' as lighting will be implemented to minimise discomfort or disability glare for road users in accordance with the Lighting Strategy set out in **Appendix 1**.

10.4 Summary

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

Receptor Location	Sensitivity	Magnitude of Change	Significance of Change
01	Medium	Negligible	Negligible
02	Medium	Negligible	Negligible
03	Medium	Negligible	Negligible
04	Medium	Negligible	Negligible
05	Low	Negligible	Negligible
06	High	Negligible	Negligible

Table 9: Significance of Change to Each Receptor Location

10.4.2 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 all of the potentially sensitive receptors, the effects of the change in lighting on human and ecology receptors would be classified as **Neutral** in all cases.

11 Conclusion

11.1 Brief

11.1.1 This Lighting Impact Assessment is presented to evaluate the potential effects of the Proposed Development's artificial lighting.

11.1.2 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).

11.1.3 Lighting is proposed to frontages and rears of the dwellings and the Roadways throughout the Proposed Development, which is to be subject to the Lighting Strategy outlined in **Appendix 1**.

11.1.4 Lighting is also proposed for the construction phase of the project, which is also to be subject to the Lighting Strategy outlined in **Appendix 1**.

11.1.5 The Application Site is located in an **E2** Environmental Zone, where the typical background luminance within the area would be described as '*Low*'. Limited existing lighting is present in the area surrounding the Application Site, predominantly associated with nearby dwellings.

11.2 Lighting Strategy

11.2.1 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.

11.2.2 This Lighting Strategy is presented in **Appendix 1**.

11.3 Sensitive Receptors

11.3.1 Potentially sensitive human amenity, human safety and ecological receptors were identified within the assessment, with their sensitivity described as either *'*low*,' '*medium' or *'*high'. The magnitude of change is assessed as being *'*negligible' in all cases given the compliant nature of the proposed lighting and the degree to which levels fall below the identified limits.

11.3.2 Modelling of the installed lighting was undertaken to determine the levels of vertical illuminance at the identified receptor locations.

11.4 Assessment Outcome

11.4.1 The modelled lighting levels associated with the Proposed Development are compliant with the criteria outlined in **Table 2**.

11.4.2 Modelling represents the absolute adverse scenario, with a 'worst-case' presented. Due to luminaire lumen depreciation; and blocking features that have not been modelled, lighting levels are likely to fall below the levels modelled. This approach ensures that the worst-case scenario is considered, and the compliance demonstrated is likely to be significantly improved upon by the installed design.

11.4.3 In conclusion, through the implementation of the Lighting Strategy, there are unlikely to be effects from lighting associated with the Proposed Development that would be considered as significant.

Appendix 1 – Lighting Strategy

12 Lighting Strategy

12.1 Brief

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

12.1.2 The Application Site is broadly set within an **E2** Environmental Zone, to the West of the town of Albourne, West Sussex.

12.1.3 The environment surrounding the Application Site to the north, east, and south is rural land, which is predominantly agricultural in nature. To the west of the site is the town of Albourne, West Sussex.

12.1.4 Further afield, the Application Site is approximately 5.0 miles to the west of Burgess Hill and 9.5 miles to the North of Brighton City Centre.

12.1.5 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.

12.1.6 This Lighting Strategy will focus on the below areas of the Proposed Development.

- Property frontages and rears,
- Roadways throughout the development; and
- Car parks throughout the development.

12.1.7 Indicative light spill diagrams showing the worst-case scenario for the levels of horizontal illuminance resulting from the Proposed Development can be found in **Appendix 4**.

12.2 Construction Lighting

12.2.1 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.

12.2.2 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.

12.2.3 Luminaires used for construction lighting will be fitted with baffles or shields where necessary to ensure that lighting is not directed towards potentially sensitive receptors.

12.2.4 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.

12.2.5 Security lighting to the construction compound will be provided by luminaires fixed to site infrastructure, such as cabins or scaffolding pole, and will be oriented downwards only.

12.2.6 Security lighting will be controlled via photosensor, ensuring that lighting is only operational during the hours of darkness.

12.2.7 To reduce the levels of light spill leaving the site, security lighting will be focussed into the site only.

12.3 Lighting to the Roadways throughout the Proposed Development

12.3.1 Lighting to the roadways within the Proposed Development will be provided to enable safe use and enhance safety and security during the hours of darkness.

12.3.2 Lighting will be applied using well controlled LED luminaires, lighting columns are to be mounted near the frontages and rears of the property.

12.3.3 In accordance with guidance set out in the adoptable specification, lighting is to be provided at a maximum correlated colour temperature of 4000 Kelvin.

12.3.4 The relevant British Standard to be applied to the roadways throughout the Proposed Development is *BS-EN-5489 1:2020 – Designs of Road Lighting.*

12.3.5 Proposed lighting is to comply with the specification requirements set out in **Table 11.2**.

Equipment Specification	**Description**
Location	Roadway throughout the Proposed Development
Correlated Colour Temperature (Kelvin)	4000 Kelvin (Maximum)
Luminaire Manufacturer	Philips (in accordance with West Sussex adoptable specification)
Luminaire Type	Micro Luma (in accordance with West Sussex adoptable Specification)
Height	6m (Maximum)
Mounting Arrangement	Post Top
Luminaire Tilt	0° (Maximum)
Upward Light Output Ratio (ULOR)	0% (Maximum)
Example Luminaire Image	
Design Guidance	
Lighting Design Criteria	P5: Average maintained luminance: 3.00-4.50 Lux, Minimum Illuminance: 0.60 Lux
Controls	Central Management System Control: Dusk – 00:00: ON (100% Output) 00:00 – 05:30: OFF 05:30 – Dawn: ON (100% Output) As specified in 'Lighting of Developer Promoted Highway Schemes in West Sussex' 2019"

Table 11.2: Installation and Performance requirements

12.4 Lighting for Property Frontages and Rears

12.4.1 Lighting for Property Frontages and Rears within the Proposed Development will be provided to enable provided to enable safe use and enhance safety and security during the hours of darkness.

12.4.2 Lighting will be applied minimally, with a single luminaire to the Front and the rear of each dwelling.

12.4.3 Proposed lighting is to comply with the specification requirements set out in **Table 11.4.**

Equipment Specification	Description
Location	Property frontages and Rears
Correlated Colour Temperature (Kelvin)	2700 Kelvin (Maximum)
Luminaire Manufacturer	UniLamp (or equivalent approved)
Luminaire Type	Mira (or equivalent approved)
Height	2m (Maximum)
Mounting Arrangement	Wall Mounted
Luminaire Tilt	0° (Maximum)
Upward Light Output Ratio (ULOR)	0% (Maximum)
Example Luminaire Image	
Design Guidance	
Lighting Design Criteria	N/A wayfinding purposes
Controls	To be controlled via photocell and PIR Sensor to the following regime: Daylight: OFF Dusk – Dawn: OFF (Switch ON @ 100% for 2mins upon PIR activation)

Table 11.4: Installation and Performance requirements

12.5 Lighting for Development Car Park

12.5.1 Lighting will be required for the Car Parking area that forms part of the Proposed Development and will be required for safety and amenity during the hours of darkness.

12.5.2 Luminaires will be post-top mounted with an Upward Light Ratio (ULR) of 0% when installed with a tilt angle of 0°. The light distribution of these luminaires will ensure that lighting is directed only where needed, limiting the amount of light leaving the Application Site boundary.

12.5.3 Luminaries will be fitted with back shields to ensure light spill is reduced to the surrounding residential receptors.

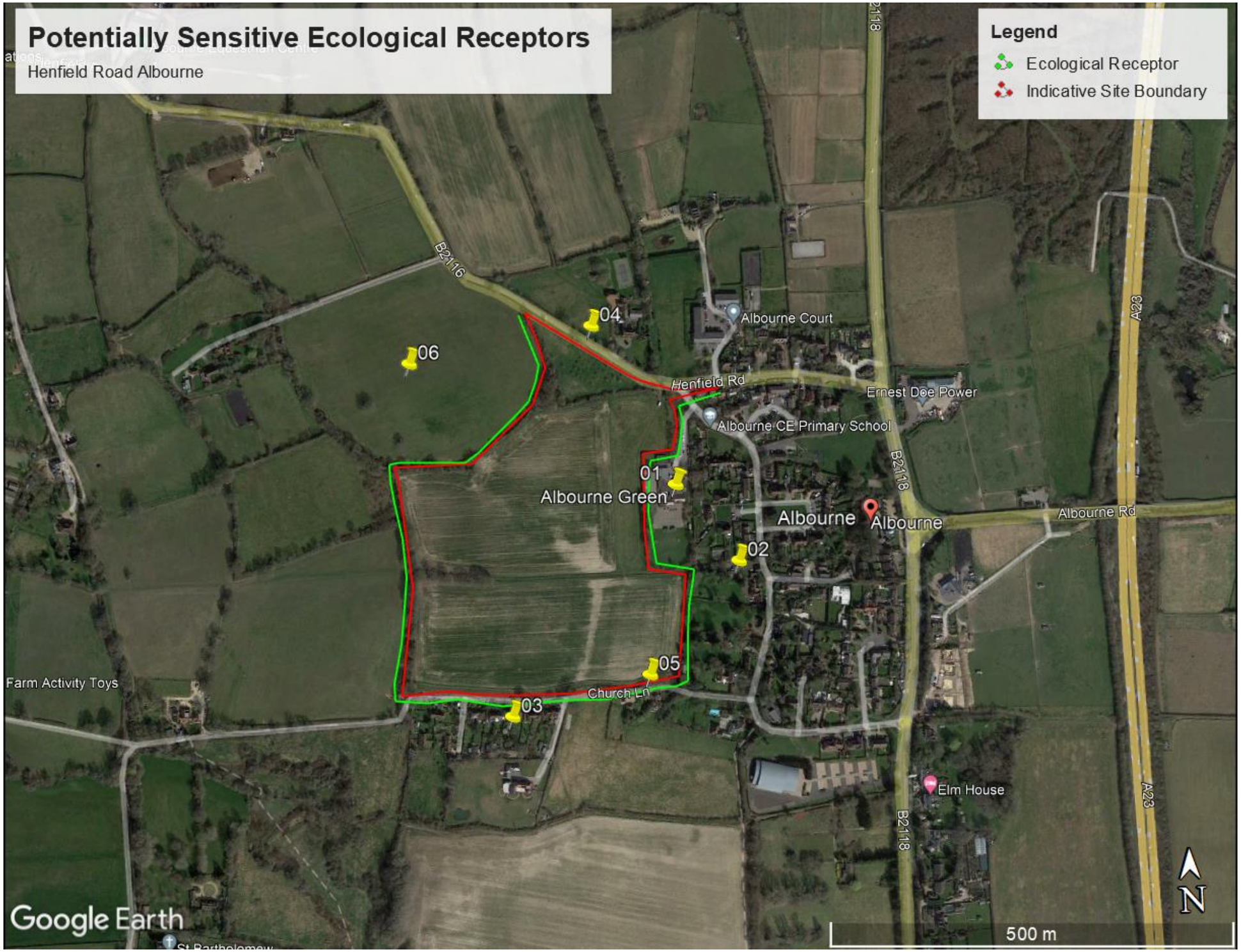
12.5.4 The relevant British Standard to be applied to the Car Parking area within the Proposed Development is *BS-EN 12464 2:2014- Design of Road Lighting – Part 1: Lighting of roads and public amenity areas – Car Parking Areas – Table 5.9*.

12.5.5 Proposed Lighting is to comply with the standards set out in **Table 11.5**.

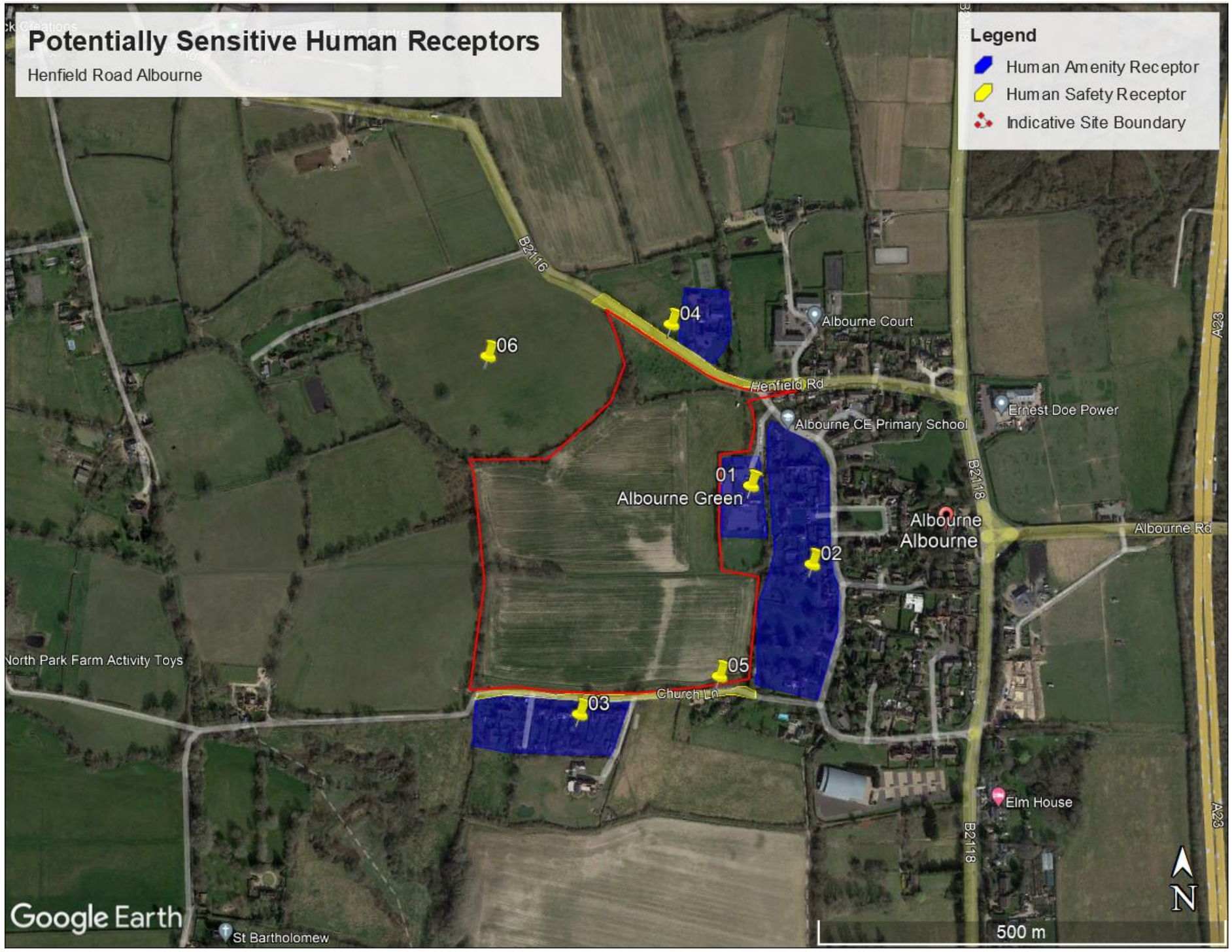
Equipment Specification	**Description**
Location	Development Car Park
Correlated Colour Temperature (Kelvin)	4000 Kelvin (Maximum)
Luminaire Manufacturer	Phillips (or equivalent approved)
Luminaire Type	Micro Luma (or equivalent approved)
Height	5m (Maximum)
Mounting Arrangement	Post Top
Luminaire Tilt	0° (Maximum)
Upward Light Output Ratio (ULOR)	0% (Maximum)
Example Luminaire Image	
Design Guidance	
Lighting Design Criteria	Average maintained luminance: 5 Lux, Uniformity: 0.25
Controls	To be controlled via photocell and timeclock

Table 11.5: Installation and Performance requirements

Appendix 2– Potentially Sensitive Ecological Receptors



Appendix 3 – Potentially Sensitive Human Receptors



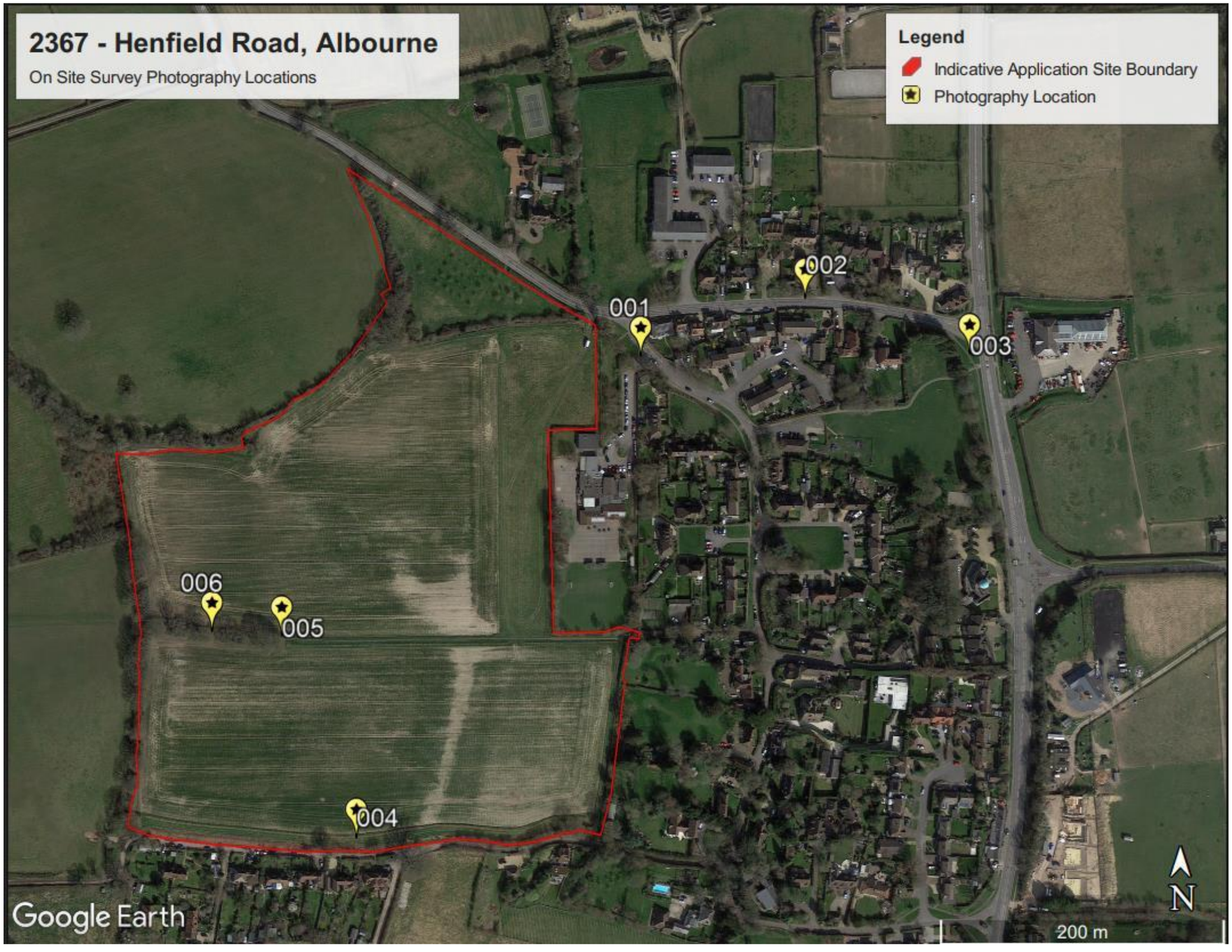
Appendix 4 – Indicative Light Spill Diagrams

See Separate File: 2367-DFL-ELG-XX-CA-EO-13001-S3-P01

Appendix 5- Baseline Survey Data

Measurement Position	Horizontal Illuminance at ground level (lux)	Vertical Illuminance at 2.00m (lux)			
		North	East	South	West
1	0.09	0.01	0.08	0.08	0.02
2	0.01	0.03	0.09	0.09	0.01
3	0.08	0.02	0.07	0.08	0.03
4	0.11	0.01	0.05	0.07	0.02
5	0.1	0.02	0.07	0.09	0.01
6	0.09	0.01	0.07	0.12	0.01
7	0.09	0	0.02	0.01	0.02
8	0.09	0.02	0.01	0.07	0.04
9	0.1	0.01	0.07	0.02	0.01
10	0.1	0.02	0.08	0.01	0.02
11	0.1	0.01	0.07	0.1	0.05
12	0.13	0.04	0.07	0.13	0.01
13	0.12	0.02	0.09	0.1	0.02
14	0.09	0.01	0.09	0.02	0
15	0.07	0	0.07	0.08	0
16	0.07	0.01	0.1	0.1	0
17	0.12	0.01	0.08	0.12	0.01
18	0.07	0	0.05	0.01	0
19	0.08	0	0.05	0.08	0
20	0.1	0	0.07	0.1	0.02
21	0.07	0	0.07	0.07	0.01
22	0.1	0.01	0.07	0.1	0.02
23	0.07	0.02	0.08	0.1	0.02
24	0.07	0	0.01	0.07	0.01
25	0.08	0	0.01	0.8	0.01
26	0.07	0	0.01	0.1	0
27	0.09	0.01	0.08	0.09	0
28	0.07	0.02	0.08	0.07	0
29	0.1	0.1	0.08	0.07	0.01

Appendix 6- Baseline Survey Photography



Baseline Survey Photography Locations Map

Image 1: Location 4

Image 2: Location 2

Image 3: Location 3

Image 4: Location 5

Image 5: Location 6

Image 6: Location 1