

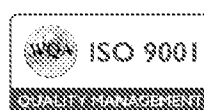
LIGHTING IMPACT ASSESSMENT

PROJECT: LAND NORTH OF WATERLANE, ANGMERING

PREPARED FOR: CALA HOMES

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Designs for Lighting Ltd

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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 assessment for a residential housing development for a residential housing development at the land off Water Lane, Angmering.
- 1.1.2 This document is provided by Design for Lighting Ltd a specialist lighting design consultancy with experience in lighting impact assessments, mitigation, and lighting design for the protection of amenity and ecology.
- 1.1.3 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 environment and potentially sensitive receptors.
- 1.1.4 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's lighting guidance (PLG) 04 (2013) 'Guidance of undertaking Environmental Lighting Impact Assessment'.
- 1.1.5 The Application Site comprises approximately 3 no agriculture fields known as land off Water Lane, Angmering, West Sussex (**Figure 1**).
- 1.1.6 Please refer to supporting planning statement for full details regarding the Application Site Context and Proposed Development description.
- 1.1.7 The Proposed Development can be seen in **Figure 2**.
- 1.1.8 The Proposed Development will require lighting to enable use during the hours of darkness.
- 1.1.9 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 within 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 relevant standards and guidance.
- 1.1.10 The Lighting Strategy for the Proposed Development can be found in **Appendix 1**.

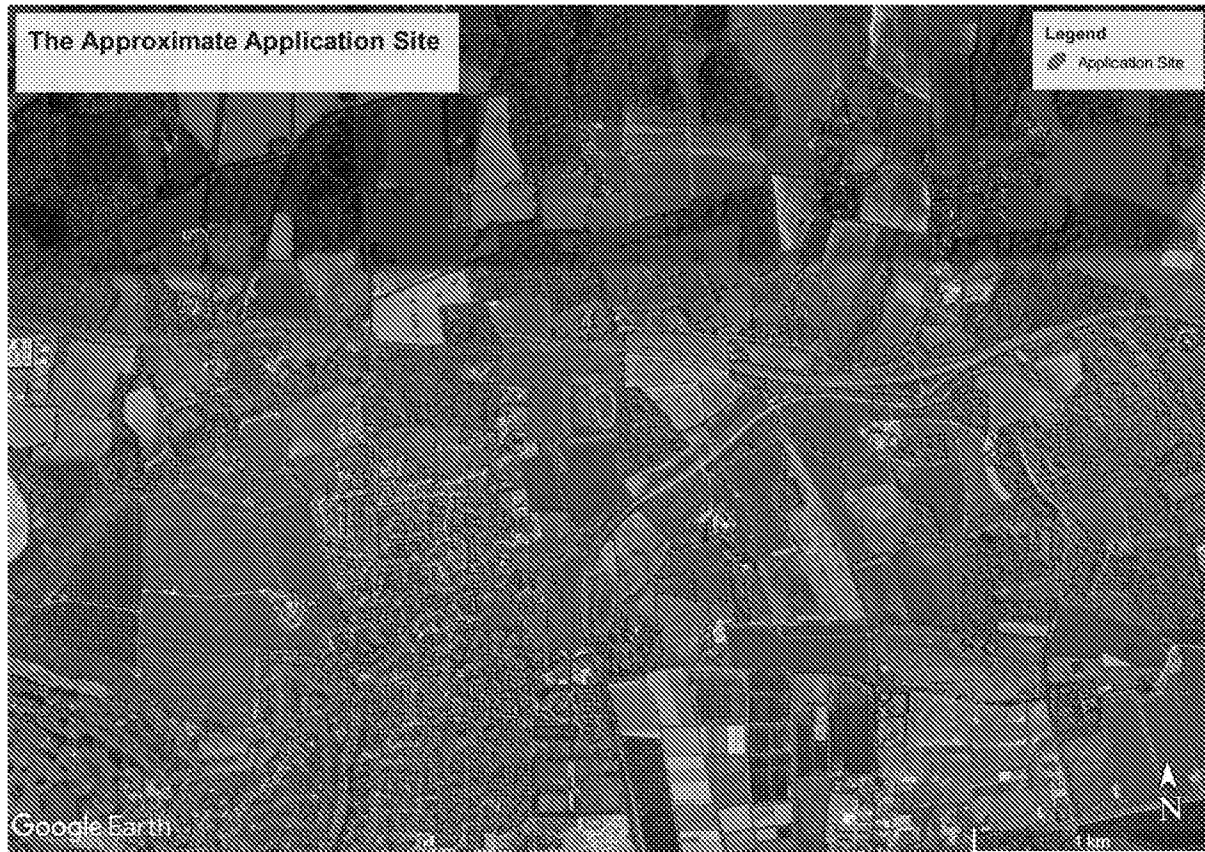


Figure 1: The Approximate Application Site.

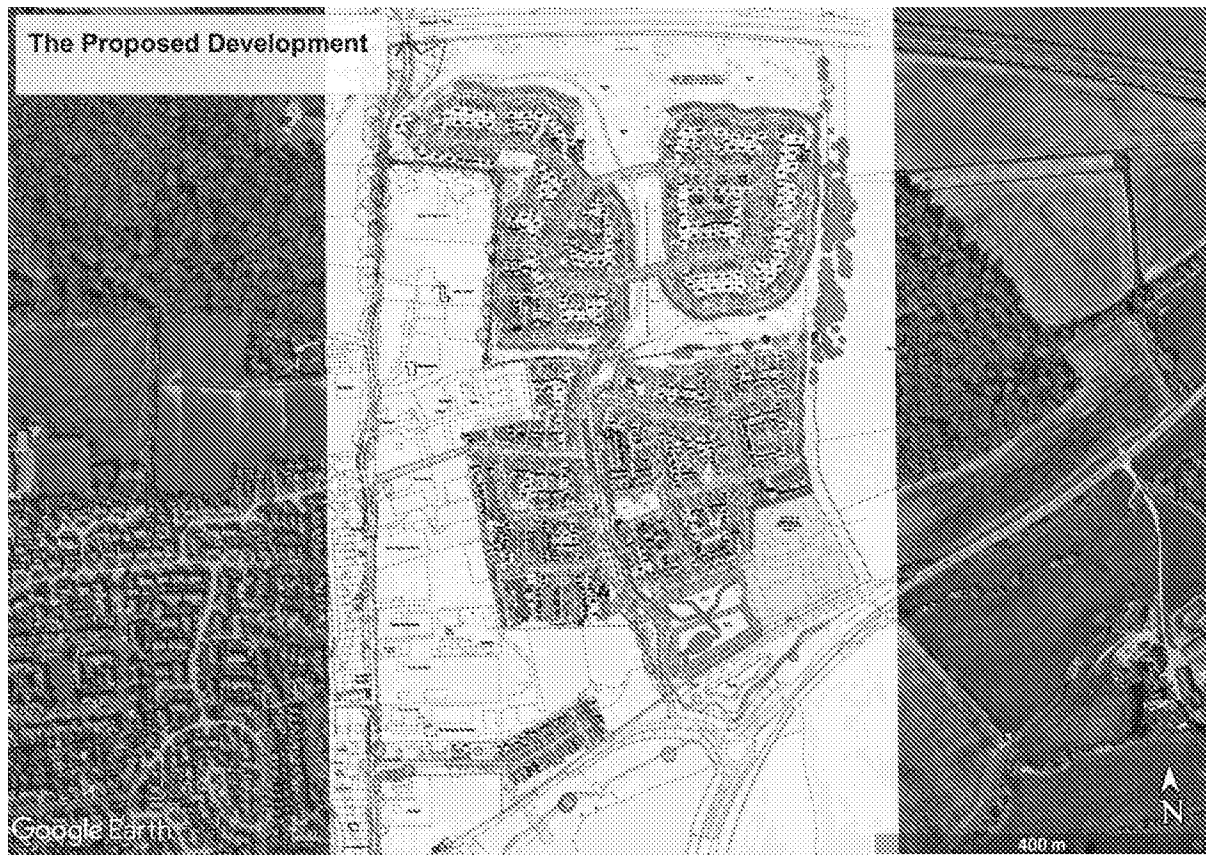


Figure 2: The Proposed Development.

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 November 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 Relevant Local Policies

2.2.1 The district authority for the Application Site is Arun District Council, and as such policies within the Arun District Council Local Plan 2011-2031 (adopted July 2018) apply to the Proposed development. The most relevant policies from the Arun District Local Plan are as follows;

Policy QE DM2

“Light pollution

Planning permission for proposals which involve outdoor lighting must be accompanied by a lighting scheme prepared according to the latest national design guidance and relevant British Standards publications. Outdoor lighting schemes will be considered against the following criteria:

- a. No adverse impact on neighbouring uses or the wider landscape, particularly with regard to the South Downs International Dark Sky Reserve designation;*
- b. Light levels being the minimum required for security and working purposes;*
- c. Minimising the potential glare and spillage; and*
- d. The degree to which outdoor lighting can be powered by on-site renewable sources.*

Where appropriate, the Local Planning Authority will seek to control the times of illumination.”

2.2.2 The Application Site also sits within the boundary of the South Downs National Park. The South Downs Local Plan 2014-2033 (adopted 2nd July 2019) will inform this assessment. The most relevant policies within the South Downs Local Plan 2014-2033 are;

2.2.3 Strategic Policy **SD6**: the purpose of the policy is to ensure that development does not harm views or landmarks, to encourage conservation and enhancement of key view types and patterns, and to ensure development does not detract from the visual integrity, identity and scenic quality that are characteristic of the National Park.

Policy SD6:

- 1. “Development proposals will only be permitted where they preserve the visual integrity, identity and scenic quality of the National Park, in particular by conserving and enhancing key views and views of key landmarks within the National Park.*
- 2. Development proposals will be permitted that conserve and enhance the following view types and patterns identified in the Viewshed Characterisation & Analysis Study:*
 - a) Landmark views to and from viewpoints and tourism and recreational destinations;*
 - b) Views from publically accessible areas which are within, to and from settlements which contribute to the viewers’ enjoyment of the National Park;*
 - c) Views from public rights of way, open access land and other publically accessible areas; and*
 - d) Views which include or otherwise relate to specific features relevant to the National Park and its special qualities, such as key landmarks including those identified in Appendix 2 of the Viewshed Characterisation & Analysis Study, heritage assets (either in view or the view from) and biodiversity features.*
- 3. Development proposals will be permitted provided they conserve and enhance sequential views, and do not result in adverse cumulative impacts within views.”*

- 2.2.4 Strategic Policy **SD7**: the purpose of this policy is to ensure that development does not harm the relative tranquillity of the National Park and to encourage the conservation and enhancement of positive tranquillity factors.

Policy SD7:

1. *“Development proposals will only be permitted where they conserve and enhance relative tranquillity and should consider the following impacts:*
 - a) *Direct impacts that the proposals are likely to cause by changes in the visual and aural environment in the immediate vicinity of the proposals;*
 - b) *Indirect impacts that may be caused within the National Park that are remote from the location of the proposals themselves such as vehicular movements; and*
 - c) *Experience of users of the PRoW network and other publicly accessible locations.*
2. *Development proposals in highly tranquil and intermediate tranquillity areas should conserve and enhance, and not cause harm to, relative tranquillity.*
3. *Development proposals in poor tranquillity areas should take opportunities to enhance relative tranquillity where these exist.”*

- 2.2.5 Strategic Policy **SD8**: Dark Night Skies applies to any proposal which involves the installation of external lighting, and where the design of developments may result in light spill from internal lighting, which could adversely affect the Dark Night Sky.

Policy SD8:

- (1) *“Development proposals will be permitted where they conserve and enhance the intrinsic quality of dark night skies and the integrity of the Dark Sky Core as shown on the Policies Map.*
- (2) *Development proposals must demonstrate that all opportunities to reduce light pollution have been taken, and must ensure that the measured and observed sky quality in the surrounding area is not negatively affected, having due regard to the following hierarchy:*
 - (a) *The installation of lighting is avoided;*
 - (b) *If lighting cannot be avoided, it is demonstrated to be necessary and appropriate, for its intended purpose or use:*
 - (i) *any adverse impacts are avoided; or*
 - (ii) *if that is not achievable, then adverse impacts are mitigated to the greatest reasonable extent.”*

- 2.2.6 Paragraph 5.59 goes on to state the following:

“The Authority will encourage further reductions, for example towards the limits of an E0 dark sky zone, or by removing below or near horizontal light paths from fixtures. Often this can be achieved with little further disruption. Examples of how this can be done include:

- *Lighting should be subject to control measures to reduce unnecessary light pollution. Examples include:*
 - *Curfews’ or automatic timers;*
 - *Proximity ‘PIR’ sensors, timers or any additional shielding or coving, including angling the front surface of lights to the horizontal;*
 - *Different surface types to reduce the amount of reflectivity;*
 - *Appropriate use of glazing to reduce light transmittance; and*
 - *Screening or shielding to reduce the impact of reflectivity.”*

Location	Requirements for level of protection				
Dark Sky Zone description	ILP guidance	Landscape impact	Maximum Lux level (suggested 10 Lux)	Preferred lights-off curfew	Astronomic al darkness curfew
E0 Dark Sky Core and areas outside this zone with SQM of 20.5+	✓	✓	✓		✓
E1(a) 2km Buffer zone and areas outside this and the above zone which are of intrinsic rural darkness with a SQM range of 20 to 20.5	✓	✓	✓	✓	
E1 (b) Transition Zone and areas outside this and the above zones with a SQM range of ~15 to 20	✓	✓	✓		
E3/4 Urban zone with an SQM of <15	✓	✓			
4. Outdoor lighting proposals are required to provide a statement to justify why the propose lighting is required					

Table 1: Policy SD8

- 2.2.7 The South Downs Technical Advice Note “Dark Skies” (May 2021) is also applicable to the Proposed Development, as it provides supplementary guidance to SDNP Policy SD8. Specifically, the guidance advises on key principles that help towards achieving the principles of the Local Plan policy.
- 2.2.8 The adoptable authority for the Application Site is West Sussex County Council in partnership with SSE. As the lighting within the Proposed Development is intended to be adopted (as outlined in **Appendix 2**) the West Sussex adoptable specification has been followed in the Lighting Strategy (**Appendix 1**).

3. Standards and Guidance

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

- 3.1.1 Guidance notes produced by the Institution of Lighting Professionals (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.

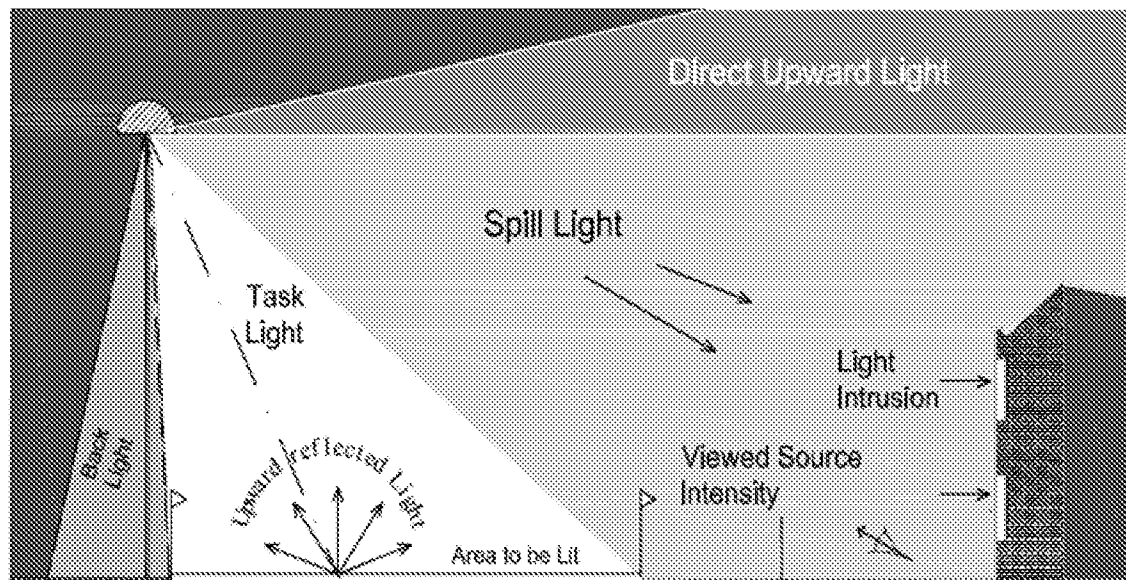


Figure 3 Obtrusive light diagram

- 3.1.7 The Application Site is located within an area described as having rural surroundings, where the district brightness of the background lighting levels is considered low. This is supported by **Table 2**, which is extracted from the ILP Guidance Notes for the Reduction of Obtrusive Light GN01/21.

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 2 ILP Definitions of Environmental Zones (GN01)

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.

- 3.1.8 Maximum values of vertical illuminance onto properties are defined by GN01:2021 Table 3 (CIE 150 Table 2), with limitations observed for an **E2** environmental zone shown in **Table 2**.

Light technical parameter	Application conditions	Environmental Zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (Lux) (E _v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

Table 3 Maximum values of vertical illuminance on properties (GN01)

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

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

- 3.1.9 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).”

4. Lighting Assessment

4.1 Proposals

- 4.1.1 Please refer to supporting planning statement for full details regarding the Application Site Context and Proposed Development description.
- 4.1.2 Lighting is to be provided for the proposed developments access, Spine Roads, and further subsidiary roads within the Proposed development in accordance with the Lighting Strategy set out in **Appendix 1**.
- 4.1.3 A plan of the Proposed Development is presented in **Figure 2**.
- 4.1.4 This assessment will focus on the impact of the Proposed Development on receptors identified in the surrounding areas and on the dwellings within the Proposed Development.

4.2 Baseline Conditions

- 4.2.1 The Application Site is located on the Northeast boundary of Angmering with the Littlehampton district of West Sussex, adjacent to the illuminated roads; Arundel Roads (A228) and Water Lane
- 4.2.2 Existing lighting is present in the area surrounding the Application Site, with the most significant source of night-time illumination A27
- 4.2.3 The approximate position of the Proposed Development is shown in **Figure 1 and 4**.
- 4.2.4 The Application Site sits within the boundary of a recognised national planning designation South Downs National Park and sits within a designated transition zone of the South Downs Dark Sky reserve and is broadly consistent with the conditions for an **E2** Environmental Zone, as defined within ILP GN01:2021.
- 4.2.5 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 4**:

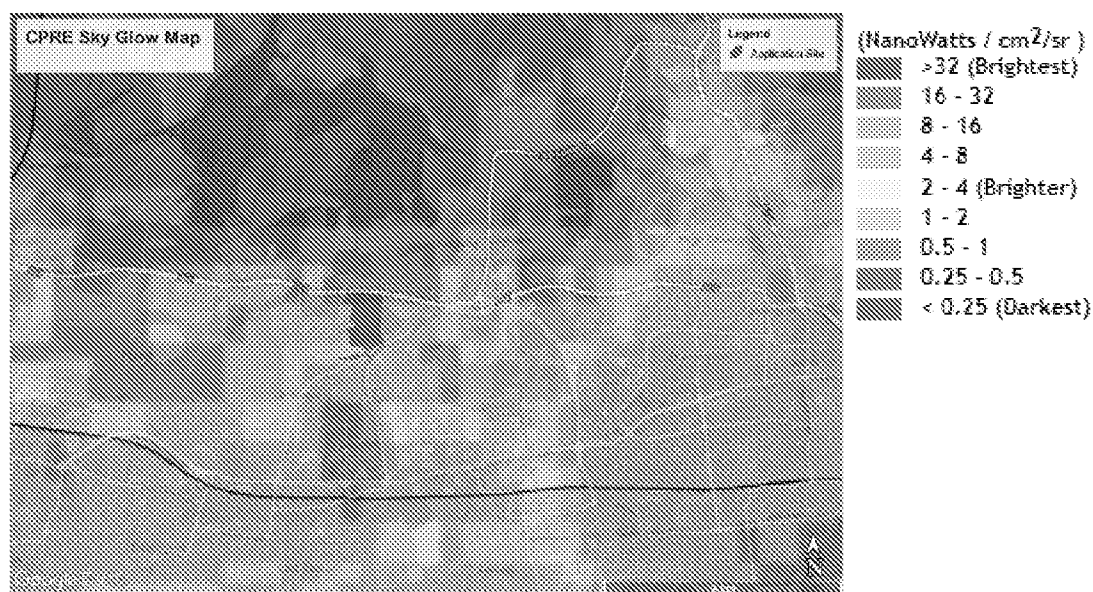


Figure 4 CPRE Night Blight Mapping. Application Site position shown in Red. Night light measured in NanoWatts / cm² / sr.

- 4.2.6 Night blight mapping further indicates that the Application Site is broadly consistent with the criteria for an **E2** Environmental Zone.
- 4.2.7 The medium levels of skyward radiance within and in the immediate area surrounding the Application Site can be attributed to the existing lighting installed within and surrounding the Application Site.

4.3 Existing Lighting

- 4.3.1 Existing artificial lighting have been identified within the Application Site where it covers the A280 and Water Lane (**Figures 5 -7**).

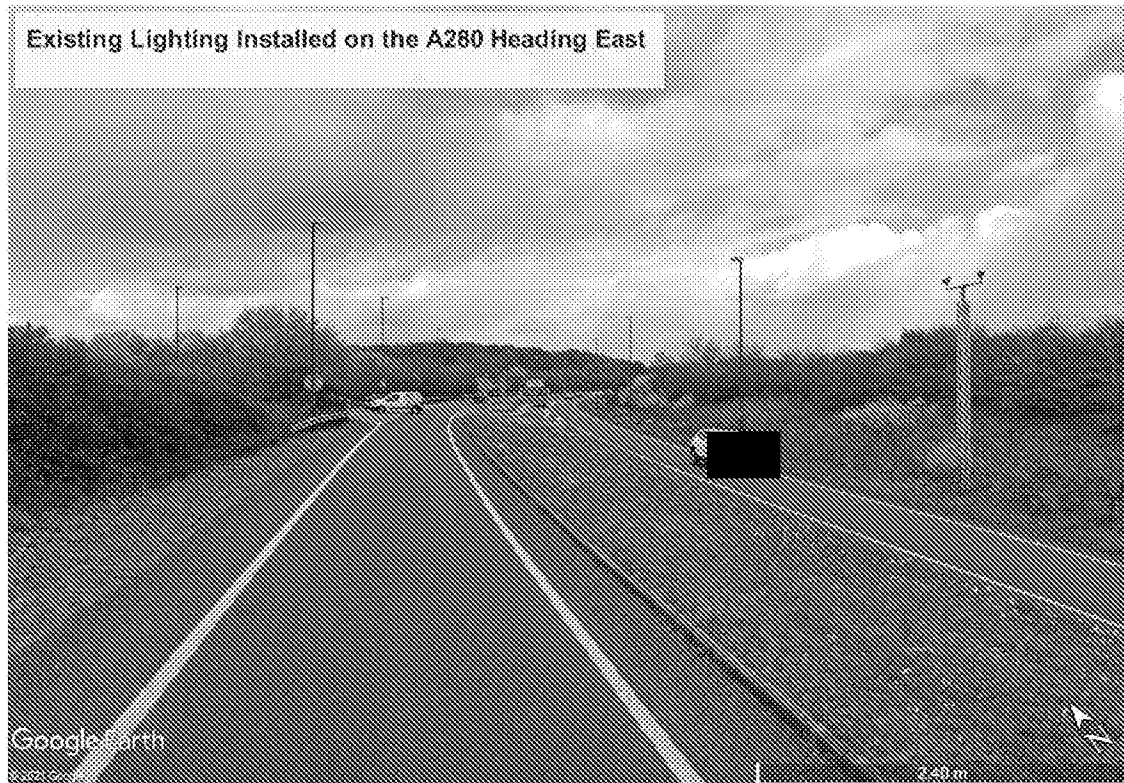


Figure 5 The existing lighting installed on the A280 heading east.

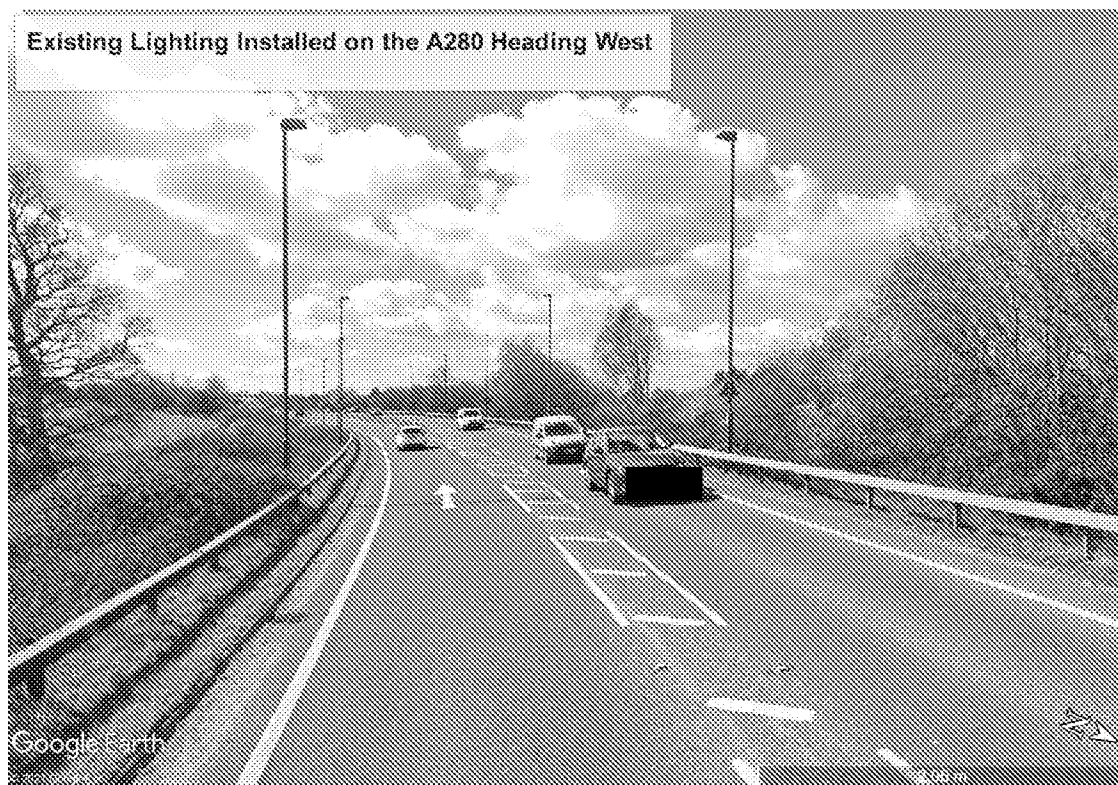


Figure 6 The existing lighting installed on the A280 heading west.

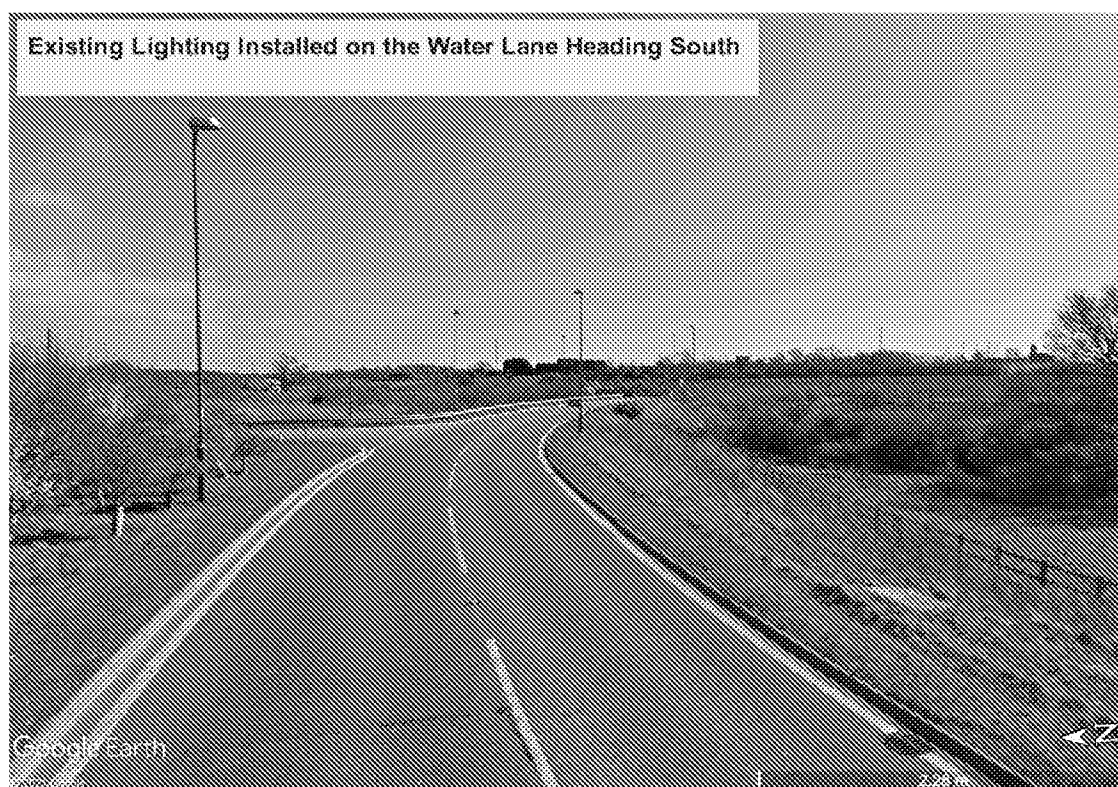


Figure 7 The existing lighting installed on Water Lane heading south.

- 4.3.2 The existing lighting installed on the A280 and Water Lane, as shown in **Figures 5-7** will be upgraded as part of the Proposed Development. The upgrade will result in the installation of current LED street lighting luminaires which exhibit improved control of the light distribution.
- 4.3.3 No further existing lighting has been confirmed within the Application Site, however it is expected that existing external artificial lighting is installed within Angmering Motorsports Centre.
- 4.3.4 Existing street lighting has been identified in the area surround the Application Site, namely along Water Lane heading west (luminaires a shown in **Figure 7**), and within the residential development located approximately 190m west of the Application Site west boundary (**Figures 8 and 9**).



Figure 8 The existing lighting installed Merryfield Crescent heading west.



Figure 9 The existing lighting installed Greenacres Ring heading south.

- 4.3.5 The existing lighting installed to the west of the Application Site is typically traditional streetlighting luminaires installed with varying degrees of tilt and varying distributions.

4.4 Site features

- 4.4.1 The Application Site is currently home to approximately 3 agriculture fields, Angmering Motor Sports Club, and Gleam Car, and periodically house events including those organised by Sussex Model Car Club.
- 4.4.2 The current use of the Application Site means there are several planted boundaries that contain existing mature trees, as can be seen in **Figures 10 and 11**.



Figure 10 View into the Application Site from Arundal Road (A27) facing southeast.



Figure 11 View into the Application Site from Arundal Road (A27) facing southwest.

- 4.4.3 As can be seen from **Figures 10 and 11** there is considerable existing boundary and hedge row planting within the Application Site. Several of these areas will be retained and improved upon with more planted areas being added to the site for habitat creation.

4.5 Site Ecology

- 4.5.1 Several areas of planting within the Application Site are being retained or improved upon as part of the Proposed Development for habitat creation. These areas and some outside the Application Site have been identified by Ethos Environmental Planning as having the potential to contain roosting and/or foraging bats, as such they will require protection from the proposed lighting as outlined in ILP GN08:18.
- 4.5.2 Historic records show low numbers of Noctule Bats, Pipistrelle, Common Pipistrelle, Nathusius Pipistrelle, Soprano Pipistrelle, Brown Long-eared Bat
- 4.5.3 The areas within and outside the Application Site identified by Ethos Environmental Planning as sensitive to lighting can be seen in **Appendix 5**.

4.6 Sensitive Receptors

- 4.6.1 To determine the potential effects of additional lighting on potentially sensitive receptors, it is appropriate to consider assessment criteria used within the Assessment of Environmental Lighting Impacts. **Table 4** outlines the sensitivity criteria.

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 4 Receptor Sensitivity Criteria

- 4.6.2 The potentially sensitive human (amenity/safety) receptors to the Proposed Development are residential properties, identified surrounding the Proposed Development and may have 1st floor bedroom windows facing in the direction of the Application Site, starting at heights of approximately 3.8 metres. These receptors are considered to have a **medium** sensitivity to changes in lighting.
- 4.6.3 The potentially sensitive human safety receptors are Arundel Road (A27) and Dapper's Lane and these has a sensitivity to changes in lighting of **medium**. Water Lane and the A280 are not included as receptors as areas of these roads are within the Application Site boundary and their structure and installed lighting will be updated as part of the Proposed Development.
- 4.6.4 The potentially sensitive ecological receptors to the Proposed Development are predominantly bats, who use existing hedgerows within the Application Site as commuting and foraging routes and the surrounding areas of woodland. These wooded/planted areas have been identified as receptors with sensitivities to changes in lighting of **high**.
- 4.6.5 Potentially sensitive receptors are shown in **Appendix 4** and are summarised in **Table 5**.

Receptor Type	Receptor NO. (See Appendix 2)	Description	Sensitivity
Ecological	R001	Area of woodland- Key Bat habitat - Ancient Woodland/ Bat routes and Roosts (Grooms Copes)	High
Human Safety – Amenity	R002	Arundel Road (A27 south bound)	Medium
Human Amenity- Residential	R003	Residential Properties to the west of Dapper's Lane 01 (Dapper's Lane)	Medium
Human Amenity- Residential	R004	Residential Properties to the west of Dapper's Lane 02 (Dapper's Lane)	Medium
Human Amenity- Residential	R005	Residential Properties to the west of Dapper's Lane 03 (Dapper's Lane)	Medium
Human Amenity- Residential	R006	Residential Properties to the west of Dapper's Lane 04 (Dapper's Lane)	Medium
Human Amenity- Residential	R007	Residential Properties to the west of Dapper's Lane 05 (Dapper's Lane)	Medium
Human Amenity- Residential	R008	Residential Property on Brackenside (Dapper's Lane)	Medium
Human Amenity- Residential	R009	Residential Properties South of Water Lane	Medium
Ecological	R010	Acorns Campsite Wood	High

Receptor Type	Receptor NO. (See Appendix 2)	Description	Sensitivity
Ecological	R011	Hedgerow habitats – Buffer - Green Corridors Zone (Appendix 3)	High
Human Safety – Amenity	R012	Dapper's Lane	Medium

Table 5 Potentially Sensitive Receptors

- 4.6.6 To determine the potential significance of effects from the increase in lighting, the magnitude of the change is considered. Criteria associated with this is outlined in **Table 6**.

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 intrusion 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, when compared to background levels.

Table 7 Magnitude of Change Criteria

4.7 Light Spill Modelling

4.7.1 Modelling of the proposed lighting was undertaken to determine the potential levels of vertical illuminance at the identified potentially sensitive receptors.

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

Receptor (See Appendix 4)	Pre-curfew limit	Post-curfew limit	Vertical Illuminance (Average)	Vertical Illuminance (Maximum)
Receptor 001 - Grooms Copes	0.40 Lux	0.40 Lux	0.02	0.36
			0.01	0.08
Receptor 002 - Arundel Road (A27)	5.00 Lux	1.00 Lux	0.00	0.00
Receptor 003 - Residential Properties along Dappers Lane 01	5.00 Lux	1.00 Lux	0.00	0.02
			0.00	0.01
Receptor 004 - Residential Properties along Dappers Lane 02	5.00 Lux	1.00 Lux	0.01	0.29
Receptor 005 - Residential Properties along Dappers Lane 03	5.00 Lux	1.00 Lux	0.01	0.29
Receptor 006 - Residential Properties along Dappers Lane 04	5.00 Lux	1.00 Lux	0.01	0.29
Receptor 007 - Residential Properties along Dappers Lane 05	5.00 Lux	1.00 Lux	0.00	0.07
Receptor 008 - Residential Property on Brackenside	5.00 Lux	1.00 Lux	0.00	0.04

Receptor (See Appendix 4)	Pre- curfew limit	Post- curfew limit	Vertical Illuminance (Average)	Vertical Illuminance (Maximum)
Receptor 009 - Residential Properties South of Water Lane	5.00 Lux	1.00 Lux	0.01	0.17
Receptor 010 - Acorns Campsite Woodland	0.40 Lux	0.40 Lux	0.00	0.07
			0.00	0.02
Receptor 011 - Proposed Development Areas Sensitive to Lighting	0.40 Lux	0.40 Lux	0.00	0.02
			0.01	0.16
			0.01	0.31
			0.01	0.15
			0.01	0.23
			0.06	0.87
			0.00	0.07
			0.00	0.02
			0.03	0.41
			0.07	0.78
			0.07	0.55
			0.02	0.21
			0.02	0.36
			0.05	0.94
			0.09	0.88
			0.04	0.38
			0.01	0.08
			0.00	0.02
Receptor 012 – Dapper's Lane	5.00 Lux	1.00 Lux	0.00	0.02
			0.00	0.01
			0.00	0.07

Table 8 Modelled levels of Vertical Illuminance onto nearby residential receptors

- 4.7.3 The magnitude of change to Receptor Locations 1 – 10, and 12 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.

4.7.4 The magnitude of change to the ecologically sensitive site areas highlighting by Ethos Environmental Planning is considered 'Negligible' in the majority of cases, as modelled vertical illuminance falls below the 0.40 Lux Vertical Illuminance limit identified in ILP GN08:2018. Several calculation grids show maximum vertical illuminance levels above those stipulated in GN08:18, these are as follows:

- Light Sensitive Zone 06 (0.87 Max);
- Light Sensitive Zone 09 (0.41 Max);
- Light Sensitive Zone 10 (0.78 Max);
- Light Sensitive Zone 11 (0.55 Max);
- Light Sensitive Zone 13 (0.94 Max); and
- Light Sensitive Zone 14 (0.88 Max).

4.7.5 As outlined in the lighting strategy the luminaire colour temperate for the subsidiary roads within the Proposed Development will use correlated colour temperatures (CCT) of 3000K rather than 4000K because of the identification of light sensitive ecology within the boundaries of the Application Site, and it should be noted these maximum levels do not reach above 2m from ground level, and thus are not within the typical flight path of bats. As such the magnitude of change results from the results above can be considered as follows;

- Light Sensitive Zone 06 (0.87 Max): Low;
- Light Sensitive Zone 09 (0.41 Max): Low;
- Light Sensitive Zone 10 (0.78 Max): Low;
- Light Sensitive Zone 11 (0.55 Max): Low;
- Light Sensitive Zone 13 (0.94 Max): Low; and
- Light Sensitive Zone 14 (0.88 Max): Low.

4.7.6 In the majority of cases the modelled lighting levels would be compliant with the criteria outlined in **Table 2** and are unlikely to create a magnitude of change that would equate to a 'Medium' level because the change will not breach limits and standards, as demonstrated in **Table 9**.

4.7.7 Modelling presents the absolute adverse scenario, considering all luminaires switched on 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. This approach ensures that the model presents the worst-case scenario, and that actual levels of Vertical Illuminance will be lower than those stated.

4.7.8 To determine the significance of change, the matrix provided in **Table 10** is used.

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 10 Significance Matrix

4.7.9 In accordance with **Table 10**, the significance of the change from the proposed lighting before mitigation is shown in **Table 11**.

Receptor Location	Sensitivity	Magnitude of Change	Significance of Change
Area of woodland- Key Bat habitat - Ancient Woodland/ Bat routes and Roosts (<i>Grooms Copes</i>)	High	Negligible	Negligible
Arundel Road (<i>A27 south bound</i>)	Medium	Negligible	Negligible
Residential Properties to the west of Dapper's Lane 01 (<i>Dapper's Lane</i>)	Medium	Negligible	Negligible
Residential Properties to the west of Dapper's Lane 02 (<i>Dapper's Lane</i>)	Medium	Negligible	Negligible
Residential Properties to the west of Dapper's Lane 03 (<i>Dapper's Lane</i>)	Medium	Negligible	Negligible
Residential Properties to the west of Dapper's Lane 04 (<i>Dapper's Lane</i>)	Medium	Negligible	Negligible
Residential Properties to the west of Dapper's Lane 05 (<i>Dapper's Lane</i>)	Medium	Negligible	Negligible

Residential Property on Brackenside <i>(Dapper's Lane)</i>	Medium	Negligible	Negligible
Residential Properties South of Water Lane	Medium	Negligible	Negligible
Acorns Campsite Wood	High	Negligible	Negligible
Hedgerow habitats – Buffer - Green Corridors Zone (Appendix 3)	High	Negligible	Negligible
		Low	Moderate
Dapper's Lane	Medium	Negligible	Negligible

Table 11 Significance of change to each receptor location before mitigation

4.7.10 Further criteria are given in **Table 12** which aim to assess the significance of the effects of the change in lighting. In this case, the effects of the change in lighting on human and ecology receptors would be classified as **Neutral** in the majority of cases.

4.7.11 There is a single instance where the pre-curfew light levels can be considered to have a **Moderate** effect on the Hedgerow habitats – Buffer - Green Corridors Zone (**Appendix 3**) boundary. However, this effect will be reduced by the installation of light shields (**Appendix 5**). As such, after mitigation this effect can be considered **Minor**.

Significance Criteria	Significance Criteria
Major beneficial	Substantial reduction in obtrusive light at sensitive receptors and/or users of the Application 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 Application 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 Application 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 Application Site such as an increase in Glare, Light Intrusion 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 Application Site such as an increase in Glare, Light Intrusion 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 Application Site .
Major adverse	Major increase in obtrusive light at sensitive receptors and / or users of the Application Site such as an increase in Glare, Light Intrusion 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 12 Significance Criteria

4.7.12 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 significant adverse effects due to the results of modelling undertaken of the proposed lighting.

4.7.13 The Isolux contours generated by the modelling of the Proposed Development's spine and subsidiary road lighting are presented in **Appendix 5**.

5. Conclusion

5.1 Brief

- 5.1.1 This lighting assessment is presented to evaluate the potential effects of the Proposed Development's proposed lighting.
- 5.1.2 The objective of the assessment is to provide an independent report on the suitability of the proposed street lighting in accordance with guidance outlined in the Institution of Lighting Professionals (ILP) Professional Lighting Guide (PLG) 04 (2013).
- 5.1.3 Lighting is proposed 100 dwellings front and rears, subsidiary roads, and the A280 Water Lane Junction which is to be subject to the lighting strategy outlined in **Appendix 1**.
- 5.1.4 The Application Site is located in an **E2** Environmental Zone, where the typical background luminance within the area would be described as 'Medium'. Existing lighting is present in the area surrounding the Application Site and would typically have been designed in accordance with the West Sussex County Council adoptable specification.

5.2 Lighting Strategy

- 5.2.1 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.
- 5.2.2 This lighting strategy is presented in **Appendix 1**.

5.3 Sensitive Receptors

- 5.3.1 Potentially sensitive human amenity and ecological receptors were identified within the assessment, with their sensitivity described as '*medium*' and '*high*'. The magnitude of change is assessed as being '*neutral*' in the majority of cases given the compliant nature of the proposed lighting and the degree to which levels fall below the identified limits. There is a single instance of a residual effect on a receptor representing a '*minor adverse*' effect the mitigation outlined in **Appendix 1 and 5**.
- 5.3.2 Modelling of the installed lighting was undertaken to determine the levels of vertical and horizontal Illuminance at the identified receptor locations. This modelling determined that the likely levels of vertical and horizontal Illuminance fall below the pre-curfew and post-curfew limits for the Environmental Zone in which the Application Site is located (GN01:21).
- 5.3.3 Where the required limits for ecological sensitivity were not met suitable mitigation has been proposed (**Appendix 1 and 5**), which will ensure the proposed lighting has a significance of '*neutral*' and in the worst instance '*minor adverse*' – both of which not considered to be significant.

5.4 Assessment Outcome

- 5.4.1 The modelled lighting levels associated with the Proposed Development would be compliant with the criteria outlined in **Table 3** and are unlikely to create a magnitude of change that would equate to a 'Low' level because the change is highly unlikely to breach limits and standards, as demonstrated in **Table 8**.
- 5.4.2 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.
- 5.4.3 In conclusion, there are unlikely to be significant negative effects from the Proposed Developments' proposed lighting.

Appendix 1 – Lighting Strategy

1. Lighting Strategy

1.1 Brief

- 1.1.1 The Proposed Development will require lighting for safety, amenity, and task lighting at limited times 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, adjacent to Water Lane, Angmering, West Sussex within the direct of Littlehampton.
- 1.1.3 Further afield, the Application Site is set within a semi-urban area. Whilst the site itself is currently semi-developed, it is located within the village of Angmering; and approximately 3.7 miles east of the centre of the town of Littlehampton
- 1.1.4 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.
- 1.1.5 This lighting strategy will focus on the below areas of the Proposed Development.
 - Frontages and rears of the private properties;
 - Spine road;
 - Subsidiary roads; and
 - Conflict areas (roundabout).
- 1.1.6 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 5**.
- 1.1.7 The results of the vertical illuminance calculations conducted as part of the Proposed Developments' modelling can be found in **Appendix 6**, and the locations of these calculation grids can be found in **Appendix 7**.

1.2 A280 Water Lane Junction (Conflict Area (Roundabout))

- 1.2.1 The A280 Water Lane Junction will require lighting in accordance with *BS EN 13201-2:2015* as outline in **Table 1.1**.

Class	Horizontal Illuminance	
	$\bar{E}$ [minimum maintained] lx	U_o [Minimum]
C0	50	0.40
C1	30	0.40
C2	20.0	0.40
C3	15.0	0.40
C4	10.0	0.40
C5	7.50	0.40

Table 1.1 BS EN 13201:2015 Table 2

- 1.2.2 Luminaires in this location will comply with the West Sussex County Council adoptable specification.
- 1.2.3 Luminaire performance parameters for the A280 Water Lane Junction are outlined in **Table 1.2**.

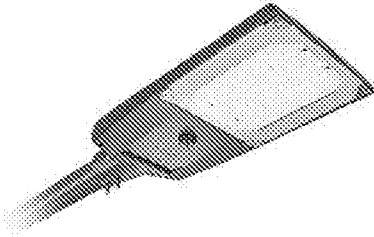
<u>Equipment Specification</u>	<u>Description</u>
Location	The A280 Water Lane Junction
Correlated Colour Temperature (Kelvin)	4000K (maximum)
Luminaire Manufacturer	Signify (Phillips) (or similar approved)
Luminaire Model	Luma Gen2 Mini (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	8m (maximum)
Mounting Arrangement	Post Top
Luminaire Tilt	0 degrees from horizontal
Upward Light Ratio (ULR)	0% (System)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	BS EN 13201:2015 – C4
Lighting Design Criteria	Average: 10 lux, Uniformity: 0.40
Controls	Mayflower complete lighting control DALI sub-master control node

Table 1.2 Performance and Installation Requirements for The A280 Water Lane Junction

1.3 Adoptable Subsidiary Roads Throughout the Proposed Development

- 1.3.1 The roadways throughout the Proposed Development will require lighting in accordance with *BS 5489-1:2020* and *BS EN 13201:2015*. Light spill onto boundary features will be restricted by orientating luminaires' apertures such that they focus light where needed during the hours of darkness.
- 1.3.2 Subsidiary roadways through the Proposed Development will be lit to the requirements outlined in *BS 5489-1:2020* and *BS EN 13201:2015*.
- 1.3.3 A P5 lighting class has been selected based on Table A.5 from *BS 5489-1:2020* for an E2 environmental zone with a road way experiencing normal/quiet traffic flow with a speed limit of ≤ 30 mph.
- 1.3.4 These roadways are required to be lit to the West Sussex County Council adoptable specification, which requires luminaires to have correlated colour temperatures (CCT) of 4000K. This CCT requirement has been adhered to for the subsidiary roads located at St Deny's Nursery, however areas within the rest of the Proposed Development have been identified as suitable for photosensitive ecology (bats). Therefore, the remaining adoptable roadways will be illuminated using luminaires that comply with the West Sussex adoptable specification in all ways other than they will use CCTs of 3000K.
- 1.3.5 This will provide the required lighting level and colour rendering for those using the subsidiary roads, while reducing the quality of blue light (approximately 400nm – 500nm) produced by the proposed lighting reducing the impact of the proposed lighting on the identified photosensitive ecology.
- 1.3.6 The specified lantern required is Signify 'Mico luma' post top mounted, 12-20 LED, lumen outputs as required for designs, wired for Dali control and fitted with a mayflower internal GPS node.
- 1.3.7 *'Every lighting scheme is required to install one Mayflower complete lighting control DALI sub-master unit to control nodes and link to central management systems'*
- 1.3.8 Subsidiary roads throughout the Proposed Development will require lighting in accordance with *BS EN 13201:2015* (**Table 1.3**).

Class	Horizontal Illuminance		Additional Requirements if facial recognition is necessary	
	$\bar{E}_a$ [Minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15.0	3.00	5.0	5.0
P2	10.0	2.00	3.0	2.0
P3	7.50	1.50	2.5	1.5
P4	5.00	1.00	1.5	1.0
P5	3.00	0.60	1.0	0.6
P6	2.00	0.40	0.6	0.2
P7	performance not determined	performance not determined		
a. To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1.5 times the minimum $\bar{E}$ value indicated for the class.				

Table 1.3 BS EN 13201:2015 Table 3

- 1.3.9 Luminaire performance parameters for the subsidiary roads throughout the Proposed Development are outlined in **Tables 1.4 and 1.5**.

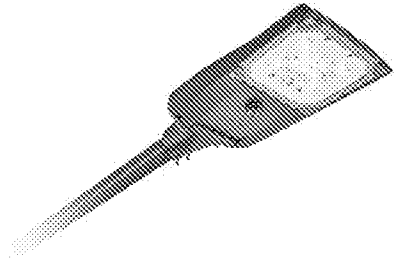
<u>Equipment Specification</u>	<u>Description</u>
Location	Subsidiary Roads at St Deny's Nursery
Correlated Colour Temperature (Kelvin)	4000K (maximum)
Luminaire Manufacturer	Signify (Phillips) (or similar approved)
Luminaire Model	Luma Gen2 Micro (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	6m (maximum)
Mounting Arrangement	Post Top
Luminaire Tilt	0 degrees from horizontal
Upward Light Ratio (ULR)	0% (System)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	BS EN 13201:2015 – P5
Lighting Design Criteria	Average 13 lx, Minimum 0.6 lx
Controls	Mayflower complete lighting control DALI sub-master control node

Table 1.4 Performance and Installation Requirements for the subsidiary roads at St Deny's Nursery

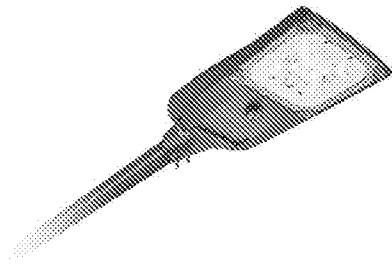
<u>Equipment Specification</u>	<u>Description</u>
Location	Remaining Adoptable Subsidiary Roads Throughout the Proposed Development
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	Signify (Phillips) (or similar approved)
Luminaire Model	Luma Gen2 Micro (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	6m (maximum)
Mounting Arrangement	Post Top
Luminaire Tilt	0 degrees from horizontal
Upward Light Ratio (ULR)	0% (System)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	BS EN 13201:2015 – P5
Lighting Design Criteria	Average: 3 lx, Minimum 0.6 lx
Controls	Mayflower complete lighting control DALI sub-master control node

Table 1.5 Performance and Installation Requirements for the remaining adoptable subsidiary roads throughout the Proposed Development

1.4 Unadoptable Subsidiary Roads Throughout the Proposed Development

1.4.1 As areas within the Proposed Development have been identified as suitable of photosensitive ecology (bats) several roads within the Proposed Development will remain unadopted by West Sussex County Council, as shown in **Appendix 2**.

1.4.2 These roads will be lit to the same lighting class as the adoptable roads within the Proposed Development (**Table 1.6**).

Class	Horizontal Illuminance		Additional Requirements if facial recognition is necessary	
	$\bar{E}_a$ [Minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15.0	3.00	5.0	5.0
P2	10.0	2.00	3.0	2.0
P3	7.50	1.50	2.5	1.5
P4	5.00	1.00	1.5	1.0
P5	3.00	0.60	1.0	0.6
P6	2.00	0.40	0.6	0.2
P7	performance not determined	performance not determined		
a. To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum $\bar{E}$ value indicated for the class.				

Table 1.6 BS EN 13201:2015 Table 3

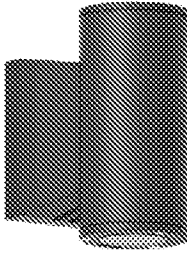
1.4.3 Luminaire performance parameters for the unadoptable subsidiary roads within Proposed Development are outlined in **Tables 1.7**.

<u>Equipment Specification</u>	<u>Description</u>
Location	Unadoptable Subsidiary Roads
Correlated Colour Temperature (Kelvin)	2700K (maximum)
Luminaire Manufacturer	Urbis Schreder (or similar approved)
Luminaire Model	AXIA 2.1 5166 8 OSLO SQUARE GIANT (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	6m (maximum)
Mounting Arrangement	Post Top
Luminaire Tilt	0 degrees from horizontal
Upward Light Ratio (ULR)	0% (System)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	BS EN 13201:2015 – P5
Lighting Design Criteria	Average: 3 lx, Minimum 0.6 lx
Controls	Mayflower complete lighting control DALI sub-master control node

Table 1.7 Performance and Installation Requirements for the unadoptable subsidiary roads within Proposed Development

1.5 Private Property Frontage and Rears

- 1.5.1 The frontages and rears of residential properties throughout the site will be illuminated for safety, amenity, and security during the hours of darkness. The lighting for these areas will be owned and maintained privately by the owners of each residential unit.
- 1.5.2 Lighting is to be applied sensitively, with a single luminaire to the front and to the rear of each property
- 1.5.3 Luminaires will distribute light downwards only to reduce the potential for light spill onto the boundaries surrounding the building and upwards towards the sky. Luminaires will not be mounted above 2m in height to ensure that light is maintained at a low level
- 1.5.4 Luminaires will be located adjacent to doorways, and under porches where relevant focussed downwards. Luminaires are to be of a reasonably low lumens outputs, to ensure light spill onto the Application Site boundaries is minimised
- 1.5.5 Luminaires' performance for the lighting to property frontages and rears are outlined in **Table 1.8**

<u>Equipment Specification</u>	<u>Description</u>
Location	1.5 Private Property Frontage and Rears
Correlated Colour Temperature (Kelvin)	2700K (maximum)
Luminaire Manufacturer	Ligman (or similar approved)
Luminaire Model	Jet 31 (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	2m (maximum)
Mounting Arrangement	Wall Mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Ratio (ULR)	0% (System)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	Wayfinding
Lighting Design Criteria	N/A
Controls	PIR motion sensor (off) and internal switching

Appendix 2 – Areas of The Proposed Development Not For Adoption By The West Sussex

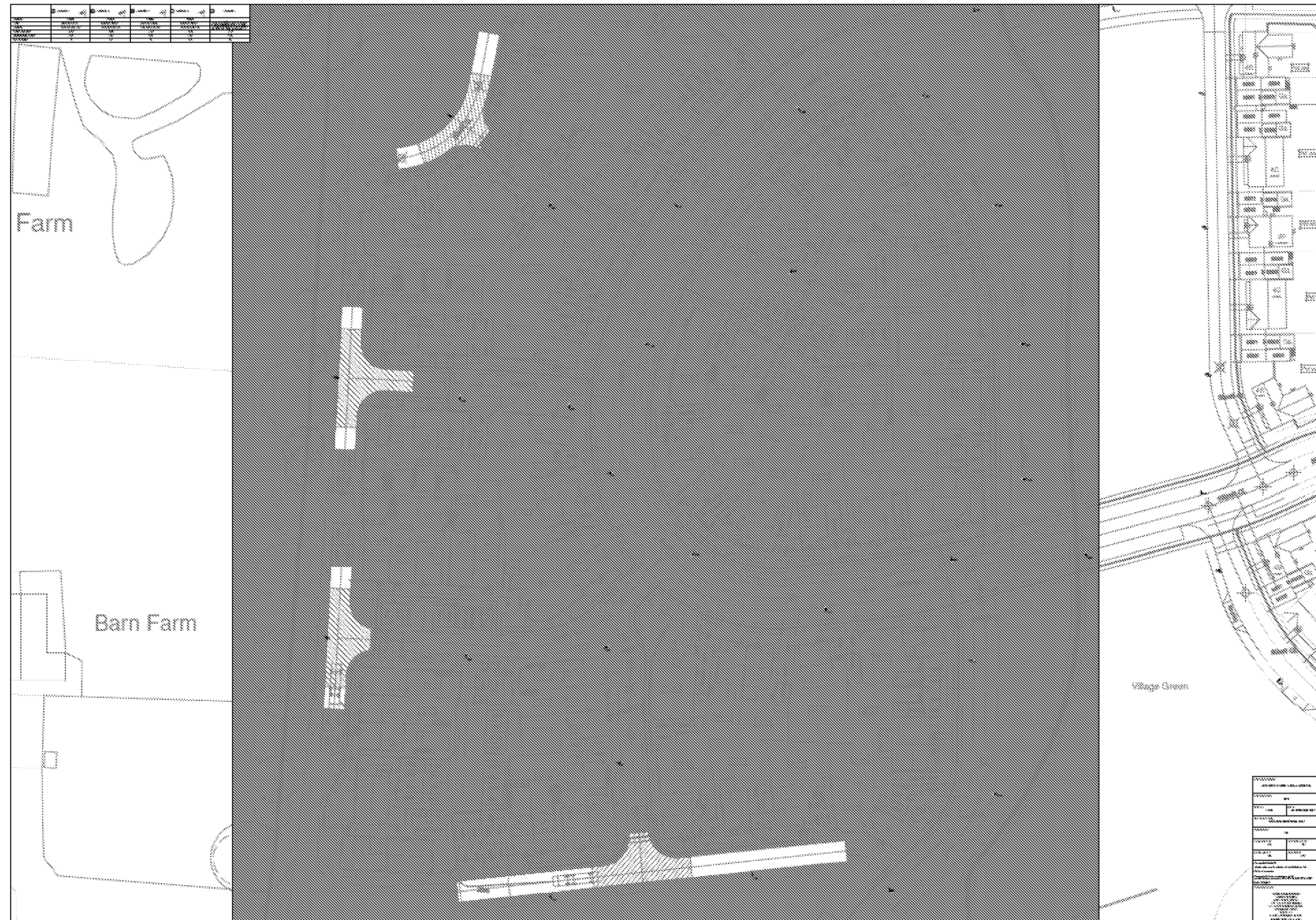
See Separate File: 2215-DFL-ELG-XX-CA-EO-13007-S3-P01



See Separate File: 2215-DFL-ELG-XX-CA-EO-13008-S3-P01



See Separate File: 2215-DFL-ELG-XX-CA-EO-13009-S3-P01



See Separate File: 2215-DFL-ELG-XX-CA-EO-13010-S3-P01

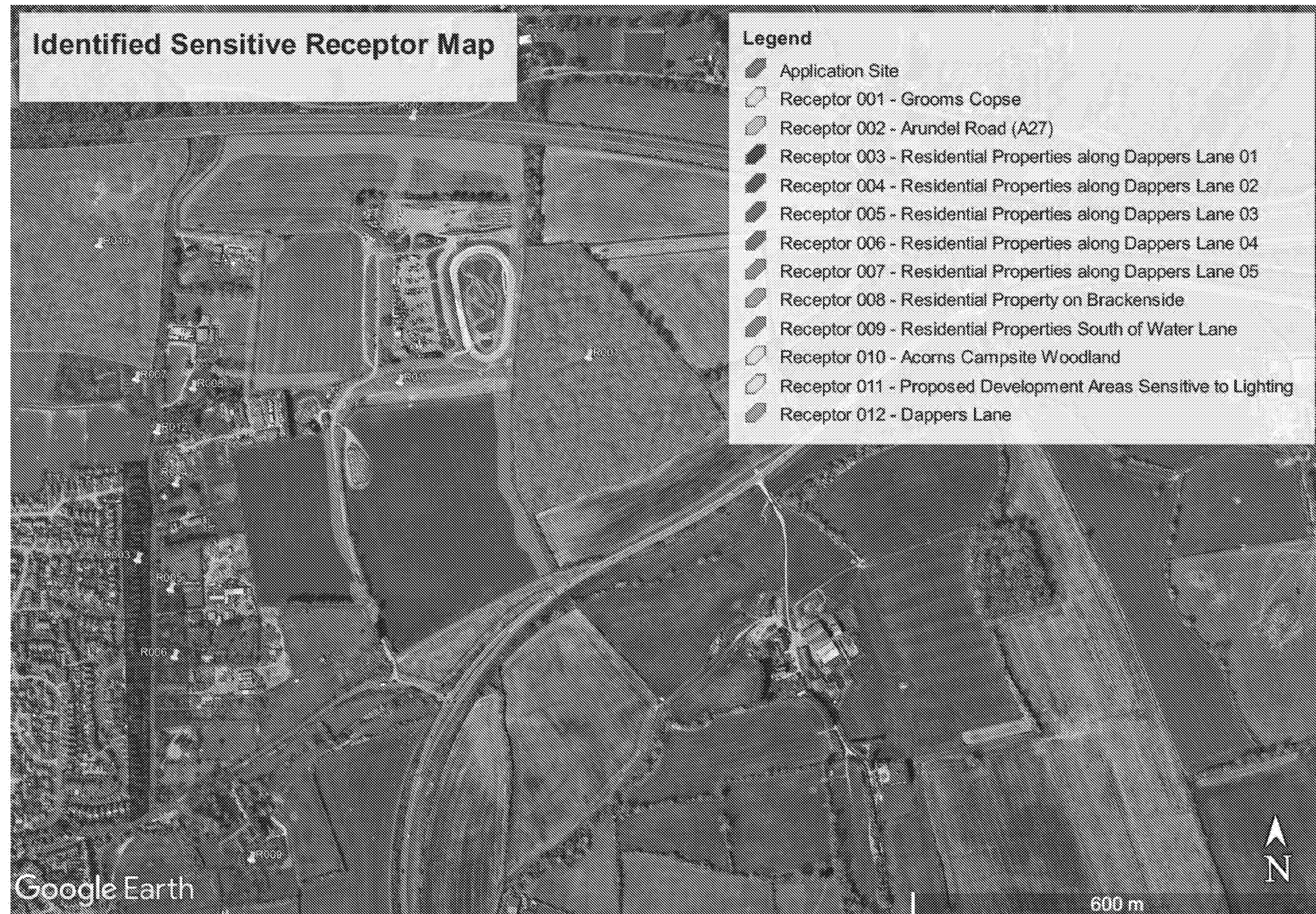


Appendix 3 – Application Site Areas Identified as Having Potential For Bat Activity



Appendix 4 – Identified Sensitive Receptor Map

Receptor numbers to match *Table 5*



Appendix 5 – Indicative Light Shield Zones

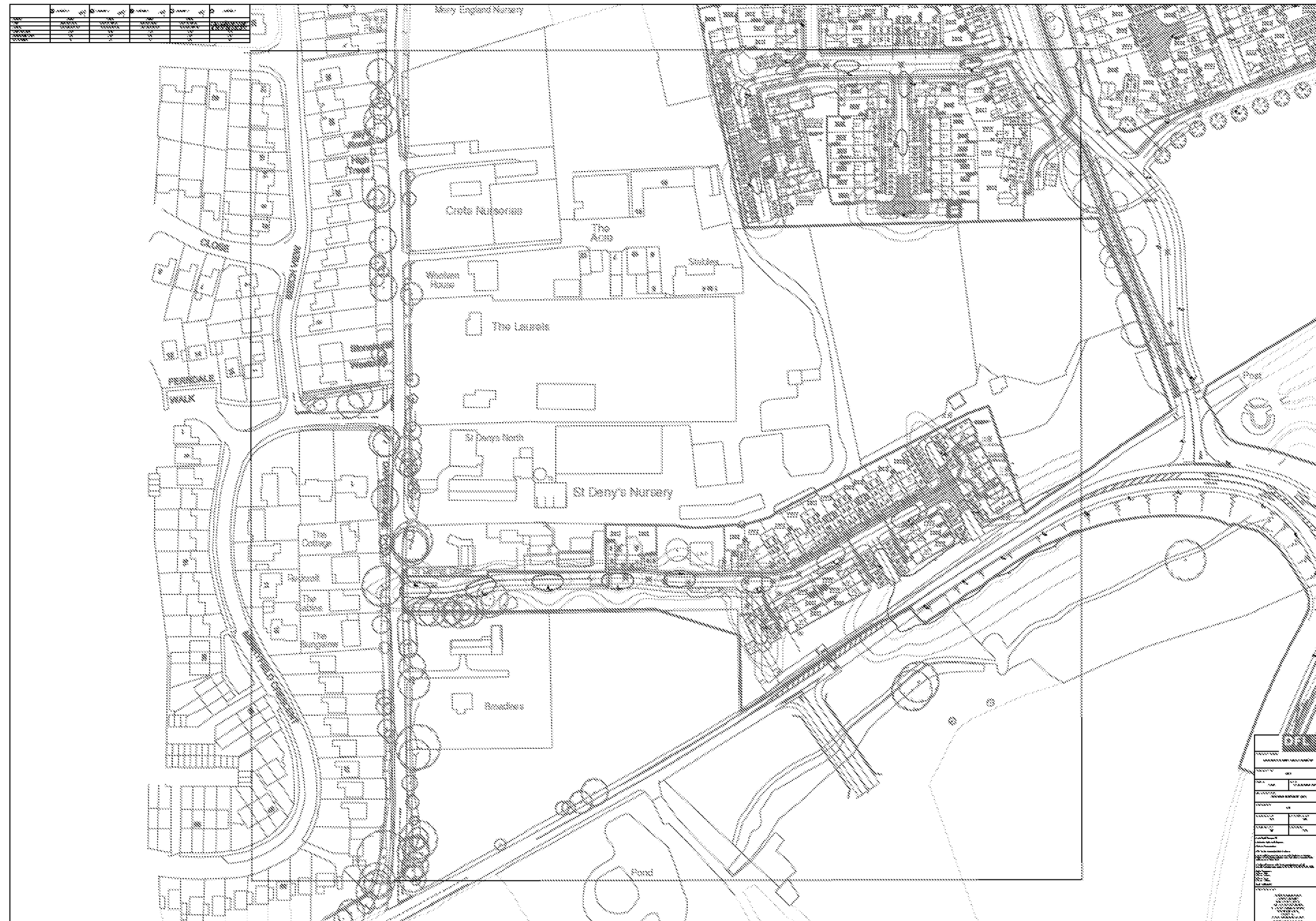


Appendix 5 – Indicative Light Spill Diagrams

See Separate File: 2215-DFL-ELG-XX-CA-EO-13001-S3-P01



See Separate File: 2215-DFL-ELG-XX-CA-EO-13002-S3-P01



See Separate File: 2215-DFL-ELG-XX-CA-EO-13003-S3-P01



See Separate File: 2215-DFL-ELG-XX-CA-EO-13004-S3-P01



See Separate File: 2215-DFL-ELG-XX-CA-EO-13005-S3-P01



See Separate File: 2215-DFL-ELG-XX-CA-EO-13006-S3-P01



Appendix 6 – Vertical Illuminance Calculation Results

Vertical Illuminance Results		
Maintenance Factor: 1		
Calculation Grid Name	E _{v ave}	E _{v max}
North Boundary 01	0.00	0.00
East Boundary 01	0.02	0.36
East Boundary 02	0.01	0.08
East Boundary 03	0.00	0.02
South Boundary 01	0.15	1.12
South Boundary 02	0.11	0.83
South Boundary 03	0.10	0.67
South Boundary 04	0.01	0.17
West Boundary 01	0.02	0.18
West Boundary 02	0.02	0.66
West Boundary 03	0.01	0.29
West Boundary 04	0.01	0.51
West Boundary 05	0.01	0.07
West Boundary 06	0.00	0.04
West Boundary 07	0.00	0.01
West Boundary 08	0.00	0.02
Dapper's Lane 01	0.00	0.02
Dapper's Lane 02	0.00	0.01
Dapper's Lane 03	0.00	0.07
Light Sensitive Zone 01	0.00	0.02
Light Sensitive Zone 02	0.01	0.16
Light Sensitive Zone 03	0.01	0.31
Light Sensitive Zone 04	0.01	0.15
Light Sensitive Zone 05	0.01	0.23
Light Sensitive Zone 06	0.06	0.87
Light Sensitive Zone 07	0.00	0.07
Light Sensitive Zone 08	0.00	0.02
Light Sensitive Zone 09	0.03	0.41
Light Sensitive Zone 10	0.07	0.78
Light Sensitive Zone 11	0.07	0.55
Light Sensitive Zone 12	0.02	0.21
Light Sensitive Zone 13	0.05	0.94
Light Sensitive Zone 14	0.09	0.88
Light Sensitive Zone 15	0.04	0.38

Appendix 7 – Vertical Illuminance Calculation Grid Locations

