Bloor Homes and Sandleford Farm Partnership

Proposed Residential Development

Lighting Assessment

Sandleford Park, Newbury

December 2019

Executive Park, Avalon Way, Anstey, Leicester, LE7 7GR
Tel: 0116 234 8000
Email: nigel.mann@wyg.com

Sandleford Park, Newbury

Lighting Assessment

Document Control

Project:	Sandleford Park, Newbury
Client:	Bloor Homes and Sandleford Farm Partnership
Job Number:	A106825
File Origin:	O:\Acoustics Air Quality and Noise\Active Projects\

Document Checking:

Prepared by:	Nathan Allen *Environmental Consultant*	Initialled:	NA

Checked by:	Daniel Clampin *Senior Environmental Consultant*	Initialled:	DC

Verified by:	Nigel Mann *Director*	Initialled:	NM

Issue	Date	Status
1	2nd March 2018	First Issue
2	14th March 2018	Second Issue
3	19th December 2019	Third Issue
4	20th December 2019	Fourth Issue
5		

Sandleford Park, Newbury

Lighting Assessment

Contents Page

Figures

Appendices

1.0 Introduction

WYG Environment Planning Transport (WYG) were commissioned by Bloor Homes and Sandleford Farm Partnership to undertake a Lighting Assessment in support of the planning application for a proposed residential development at Sandleford Park, Newbury.

1.1 Site Location and Context

The development site currently consists of Sandleford Park, the approximate national grid reference of which is 446672:164437. Bloor Homes and Sandleford Farm Partnership are seeking outline planning permission for the development of a 114 hectares (GIA) residential led mixed-use development.

The proposed site is bounded by:

- The River Enborne to the south;
- A339 to the east;
- Residential area along Andover Road to the west;
- Monks Lane to the north.

Reference should be made to Figure 1 for a visual representation of the application site and surrounding area.

1.2 Lighting Design and Assessment - Overview

The proposed development will require the installation of a number of luminaires that have the potential to increase existing light levels at sensitive locations within the vicinity of the site. The following stages have therefore been undertaken in order to produce a suitable lighting layout for the purposes of this assessment and assess potential impacts:

- Baseline survey;
- Quantitative assessment of potential lighting impacts at existing light sensitive receptors bordering the proposed development site, based on the proposed external lighting design;
- Formulation of appropriate mitigation measures, where necessary, in order to minimise the potentially detrimental impacts of the lighting scheme.

The results of the assessment are detailed in the following section of this report.

2.0 Policy, Legislation and Relevant Agencies

2.1 Documents Consulted

The following documents were consulted during the undertaking of this assessment:

- Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Professionals, 2011;
- National Planning Policy Framework, Ministry of Housing, Communities & Local Government, February 2019;
- Planning Practice Guidance on Light Pollution, Ministry of Housing, Communities & Local Government, 1st November 2019;
- The Conservation of Habitats and Species Regulations, 2010
- Environmental Protection Act, 1990;
- Statutory Nuisance from Insects and Artificial Light, Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005, DEFRA 2006;
- Artificial Lighting and Wildlife Interim Guidance: Recommendations to Help Minimise the Impact of Artificial Lighting, Bat Conservation Trust, 2014;
- BS EN 12464-2: Lighting of Work Places - Outdoor Work Places, British Standards Institute, 2007;
- BS EN 13201-4: Road Lighting – Methods of Measuring Lighting Performance, 2003;
- BS 5489-1: Code of Practice for the Design of Outdoor Lighting - Lighting of Roads and Public Amenity Areas, British Standards Institute, 2013;
- PLG 04- Guidance on Undertaking Environmental Lighting Impact Assessments, ILP, 2013; and,
- West Berkshire District Core Strategy adopted 18th September 2014;
- West Berkshire District Local Plan Saved Policies (1991-2006).

2.2 Legislative Framework

Light pollution was introduced within the Clean Neighbourhoods and Environment Act (2005) as a form of statutory nuisance under the Environmental Protection Act (1990), which was amended to include the following definition:

"(fb) artificial light emitted from premises so as to be prejudicial to health or nuisance;"

Although light was described as a statutory nuisance, no prescriptive limits or rules have been set for assessment. Guidance within the National Planning Policy Guidance with regards to Light pollution has been referred to while producing this assessment as well as documents produced by the International Commission on Illumination (CIE), Institution of Lighting Professionals (ILP) and the Chartered Institute of Building Services Engineers (CIBSE).

2.3 Design Standards

2.3.1 National Standards

The appropriate lighting design criteria for the scheme are contained within:

- BS EN 12464-2: Lighting of Work Places - Outdoor Work Places, 2014;
- BS 5489-1: Code of Practice for the Design of Outdoor Lighting - Lighting of Roads and Public Amenity Areas, 2013; and,
- BS EN 13201-2: Road Lighting - Performance Requirements, 2003.

Good lighting design also includes luminaires that have been selected to minimise light intrusion and glare to pedestrians and drivers, as discussed within the ILP document "Guidance Notes for the Reduction of Obtrusive Light".

2.3.2 Best Practice Design

As well as meeting the statutory design standards outlined in section 2.3.1, the external lighting design has sought to meet a number of criteria to ensure that the environmental effects of artificial lighting are managed to a high standard. These criteria are:

- All external lighting schemes must not have an upward lighting ratio (ULR) of more than 0.5%;
- All new column mounted street luminaires shall be fitted with flat glass where appropriate to aid 0% upward light discharge;

2.4 Planning Policy and Guidance

2.4.1 National Policy

The National Planning Policy Framework (NPPF), February 2019 principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policymaking. The NPPF broadly retains the principles of PPS 23: Planning and Pollution Control and with regard to light pollution, paragraph 180 states that;

> *"180 Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> > *c. limits the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

The National Planning Practice Guidance web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 and updated for lighting on the 1st November 2019 to support the National Planning Policy Framework and make it more accessible. It states that "for maximum benefit, the best use of artificial light is about getting the right light, in the right place and providing light at the right time". In light of this guidance, the assessment has considered the following implications of the proposed lighting design:

- *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.*
- *Will a new development, or a proposed change to an existing site, be likely to materially alter light levels in the environment around the site and/or have the potential to adversely affect the use or enjoyment of nearby buildings or open spaces?*
- *Will the impact of new lighting conflict with the needs of specialist facilities requiring low levels of surrounding light (such as observatories, airports and general aviation facilities)? Impacts on other activities that rely on low levels of light such as astronomy may also be a consideration*

but will need to be considered in terms of both their severity and alongside the wider benefits of the development.

- *Is the development in or near a protected area of dark sky or an intrinsically dark landscape where new lighting would be conspicuously out of keeping with local nocturnal light levels, making it desirable to minimise or avoid new lighting?*
- *Would new lighting have any safety impacts, for example in creating a hazard for road users?*
- *Is a proposal likely to have a significant impact on a protected site or species? This could be a particular concern where forms of artificial light with a potentially high impact on wildlife and ecosystems (e.g. white or ultraviolet light) are being proposed close to protected sites, sensitive wildlife receptors or areas, including where the light is likely to shine on water where bats feed.*
- *Does the proposed development include smooth, reflective building materials, including large horizontal expanses of glass, particularly near water bodies? (As it may change natural light, creating polarised light pollution that can affect wildlife behaviour.)*

If the answer to any of the above questions is 'yes', consideration should be made for:

- where the light shines;
- when the light shines;
- how much light shines; and
- possible ecological impact.

2.4.2 Local Policy

In accordance with the Core Strategy, adopted on 16th July 2012, *'The Core Strategy is the first development plan document (DPD) within West Berkshire's new Local Plan'.* It sets out the overall planning strategy to 2026. It replaces the previous Local Plan (1991-2006). However, policy OVS5 Environmental Nuisance and Pollution Control from the West Berkshire District Local Plan Amended on September 2007 remains applicable:

1.12 ENVIRONMENTAL NUISANCE AND POLLUTION CONTROL (OVS. 5)

'1.12.2 Structure Plan policy EN2 seeks protection from environmental nuisance. Development should not give rise to unacceptable levels of noise, smell, dust, fumes, light or noxious

emissions affecting areas beyond the site boundary, or to unacceptable levels of air or water pollution. In addition, uses sensitive to disturbance such as new houses, schools or hospitals should not be located in areas already subject to unacceptable levels of environmental nuisance. In areas affected by high noise levels, developments should be designed to minimise the nuisance which may be caused to future occupiers.'

This report will assess the potential for light pollution and the effectiveness of proposed mitigation measures against this policy.

3.0 Methodology

The Lighting Assessment includes the establishment of baseline ambient light conditions and an evaluation of impacts associated with the lighting design. This includes an assessment of change in light obtrusion at existing receptor locations.

Light modelling was undertaken using DIALux software, an independent lighting model which is capable of calculating daylight and artificial lighting scenes in interior and exterior scenarios. The model incorporates ILP, CIE 112 and BS EN 12464-2 calculation methodologies and is commonly used for lighting impact assessment.

3.1 Lighting Design

The lighting scheme for the proposed residential-led mixed use development was designed in accordance with the previously outlined standards and guidance, following consultation with WYG ecologists, SLR Consulting landscape consultants and West Berkshire Council. The design of the lighting has been undertaken in a manner such as to address two potentially conflicting needs; namely, on the one hand, to provide a safe environment for the movement of residents when the natural lighting levels fall and, on the other hand, to meet the light obtrusion limitations stated within the relevant standards and guidance in order to avoid any detriment to local amenity and wildlife.

3.2 Quantitative Lighting Assessment

3.2.1 Obtrusive Light

Baseline light conditions were determined during a site survey of the existing site and surrounding area. A lighting model was subsequently developed to represent the proposed external lighting scheme and to enable the obtrusive light from the proposed development to be calculated at local receptors.

The ILP has developed an Environmental Zone classification system for the categorisation of sensitive receptor locations based on typical levels of baseline obtrusive light. This is summarised in Table 1.

Table 1. Environmental Zone Classification

Category	Description	Examples
E0	Dark landscapes	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Intrinsically dark landscapes	National Parks, Areas of Outstanding National Beauty, etc
E2	Low district brightness areas	Village or relatively dark outer suburban urban locations
E3	Medium district brightness	Small town centres or suburban locations
E4	High district brightness areas	Town/city centres with high levels of night-time activity

For each Environmental Zone, recommended obtrusive light limits for exterior lighting installations have also been determined. These are summarised in Table 2.

Table 2. Obtrusive Light Limitations for Exterior Lighting Installations

Environmental Zone	Max Sky Glow ULR[a] (%)	Light Trespass (into Windows) Ev (lx)[b]		Source Intensity I (kcd)		Building Luminance Pre-curfew
		Pre-curfew[d]	Post-curfew[e]	Pre-curfew[d]	Post-curfew[e]	Average L[c] (Cd.m^{-2})
E0	0	0	0	0	0	0
E1	0	2	1[*]	2.5	0	0
E2	2.5	5	1	7.5	0.5	5
E3	5.0	10	2	10	1.0	10
E4	15.0	25	5	25	2.5	25

NOTE:
(a) Upward light ratio of the installation - maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.
(b) Vertical Illuminance measured flat at the glazing at the centre of the window.
(c) Luminance.
(d) Typically considered to be between 07:00 and 23:00
(e) Typically considered to be between 23:00 and 07:00
(*) Permitted only from public road light installations

The assessment determined the lighting levels and Environmental Zone classification in the vicinity of the proposed development through the baseline survey. Modelling of the lighting scheme was undertaken and predicted obtrusive light values compared with the relevant guidelines, as detailed within Table 2.

The potential environmental effects of the proposed development are identified, in so far as current knowledge of the site and development allows. The significance of potential environmental effects is assessed according to their scale (magnitude) and the sensitivity of the receptors.

For the purposes of this assessment the effects of the development are considered to be 'significant' if:

- The development is predicted to exceed the maximum sky glow ULR at any surrounding receptor;
- The development is predicted to cause either an exceedance of the ILP obtrusive light trespass limitation at a receptor, or if the development is predicted to cause an increase of more than 10% at an existing receptor where the ILP obtrusive light trespass limitation is already being exceeded.

4.0 Baseline

This section provides a review of the existing lighting levels at the site in order to provide a benchmark against which to assess potential impacts associated with the development.

4.1 Baseline Survey

4.1.1 Survey Conditions

A baseline lighting survey was undertaken on the 27th April 2015. An initial survey was undertaken between 19:30 hours and 22:30 hours to establish the existing pre-curfew lighting conditions and a further survey was undertaken after 23:00 to determine existing post curfew conditions. It should be noted that conditions were not noted to change between the pre-curfew and post-curfew periods.

The survey was conducted using a Digital Lux Meter which meets CIE photopic spectral response, with a maximum resolution of 0.01 lux. The survey was undertaken with a meter resolution of 0.01 lux.

4.1.2 Existing Light Sources

Existing light sources surrounding the site include regular street lighting along the A339 and Monks Lane as well as car park lighting from Newbury College, though light spill on to the site is obstructed by high hedgerows around Newbury College. There is no street lighting on Warren Road or Kendrick Road. The site is unlit at present.

4.1.3 Survey Locations

Light monitoring was undertaken at a number of survey locations to determine variations in baseline light levels within the vicinity of the site. Where possible, monitoring at the boundary of the receptor locations was undertaken to provide the best possible representation of existing light obtrusion. Where this was not possible, monitoring was undertaken at the most appropriate representative location. Reference should be made to Figure 2 for an illustrative site map of the monitoring locations.

The purpose of the survey is fourfold:

- The survey enables quantified light levels at (or as near as possible to) local sensitive receptor locations to be measured;
- The site survey also provides an understanding of any significant landforms and vegetation that can potentially provide a pathway screen between light sources and receptors;
- The survey enables the ILP environmental zone to be determined based on sound, quantified evidence; and,

- The survey enables existing significant sources of artificial light and natural screens to be accounted for outside of the quantified model predictions.

The survey therefore provides a robust understanding of the current artificial lighting illuminance levels currently experienced around the development site. The locations of all the light monitoring locations are summarised in Table 3 below and the results from the survey are contained in Table 4.

A series of measurements were taken at key points; a horizontal ground level measurement and four vertical measurements at 1.5m facing north east, south and west in general accordance with the recommended monitoring method in the statutory guidance issued by the ILP. Illuminance levels at a resolution of 0.01 lux can vary quite significantly over relatively small distances and even with slight changes in the plane of the lens. Therefore, the range of measurements taken over a monitoring length was recorded, in order to determine minimum and maximum illuminance at receptor façades.

Table 3. Baseline Light Monitoring Locations

Reference	Monitoring Location	Purpose of Survey	Key Local Sources of Light
L1	Kendrick Road	Establish baseline on Kendrick Road	No Light sources
L2	Kendrick Road	Establish baseline on Kendrick Road	No Light sources
L3	Kendrick Road	Establish baseline on Kendrick Road	No Light sources
L4	Within Site, rear of properties on Round End	Establish baseline within site	No Light sources
L5	Within Site	Establish baseline within site	No Light sources
L6	Within Site	Establish baseline within site	No Light sources
L7	Within Site	Establish baseline within site	No Light sources
L8	Within Site	Establish baseline within site	No Light sources
L9	Within Site	Establish baseline within site	No Light sources
L10	Within Site, by Park House School	Establish baseline within site	No Light sources
L11	Within Site, by Park House School	Establish baseline within site	No Light sources
L12	Within Site, by Progression Fitness Studio	Establish baseline within site	No Light sources
L13	Within Site, by Progression Fitness Studio	Establish baseline within site	No Light sources
L14	Within Site	Establish baseline within site	No Light sources
L15	Within Site, by Sports Pitches	Establish baseline within site	No Light sources
L16	Within Site, by Sports Pitches	Establish baseline within site	No Light sources
L17	On Monks Lane	Establish baseline on Monks Lane	Street Lighting on Monks Lane
L18	On Monks Lane	Establish baseline on Monks Lane	Street Lighting on Monks Lane
L19	On Monks Lane	Establish baseline on Monks Lane	Street Lighting on Monks Lane
L20	Within Site, by Newbury College	Establish baseline within site	Light spill from Car Park Lighting

Reference	Monitoring Location	Purpose of Survey	Key Local Sources of Light
L21	Within Site, by Newbury College	Establish baseline within site	Light spill from Car Park Lighting
L22	On A339	Establish baseline on A339	Street Lighting on A339
L23	On A339	Establish baseline on A339	Street Lighting on A339
L24	On A339	Establish baseline on A339	Street Lighting on A339
L25	On Monks Lane	Establish baseline on Monks Lane	Street Lighting on Monks Lane
L26	On Monks Lane	Establish baseline on Monks Lane	Street Lighting on Monks Lane
L27	On Warren Road	Establish baseline on Warren Road	Street Lighting on Warren Road

4.1.4 Survey Results

The results of the monitoring are displayed in Table 4.

Table 4. Survey Results

Reference	Recorded Illuminance (Lux)				
	Facing Up	Facing North	Facing East	Facing South	Facing West
L1	0.00	0.00	0.00	0.00	0.00
L2	0.00	0.00	0.00	0.00	0.00
L3	0.00	0.00	0.00	0.00	0.00
L4	0.00	0.00	0.00	0.00	0.00
L5	0.00	0.00	0.00	0.00	0.00
L6	0.00	0.00	0.00	0.00	0.00
L7	0.00	0.00	0.00	0.00	0.00
L8	0.00	0.00	0.00	0.00	0.00
L9	0.00	0.00	0.00	0.00	0.00
L10	0.00	0.00	0.00	0.00	0.00
L11	0.00	0.00	0.00	0.00	0.00
L12	0.00	0.00	0.00	0.00	0.00
L13	0.00	0.00	0.00	0.00	0.00
L14	0.00	0.00	0.00	0.00	0.00
L15	0.00	0.00	0.00	0.00	0.00
L16	0.00	0.00	0.00	0.00	0.00
L17	0.00	0.00	0.00	0.00	0.00
L18	0.00	0.00	0.00	0.00	0.00
L19	0.00	0.00	0.00	0.00	0.00
L20	0.00	0.00	0.00	0.00	0.00
L21	0.00	0.00	0.00	0.00	0.00
L22	0.10	0.30	0.00	0.00	0.20
L23	2.50	5.20	5.00	0.50	0.00

Reference	Recorded Illuminance (Lux)				
	Facing Up	Facing North	Facing East	Facing South	Facing West
L24	0.00	0.00	0.00	0.00	0.00
L25	7.30	2.50	0.40	4.40	2.20
L26	9.60	6.80	0.70	11.00	6.10
L27	3.90	6.00	0.50	0.30	0.50

Following the environmental lighting survey, it was concluded that the proposed development site and the surrounding area should be classified as 'Environmental Zone E2 – Low district brightness, in accordance with the ILP guidance limits outlined within Table 2, this is considered representative of relatively dark outer suburban locations. Therefore, the permitted light trespass limit at an offsite receptor in the pre-curfew period (typically considered to be 07:00-23:00) is 5 lux and in the post curfew period (typically considered to be 23:00-07:00) is 1 lux.

4.2 Receptors

The term 'receptors' includes any persons, locations or systems that may be susceptible to changes in environmental factors as a consequence of the development.

4.2.1 Residential Receptors

During the site survey key residential properties were identified which have the potential to be impacted by obtrusive light from the proposed development, as highlighted in Table A.1 in Appendix A. Reference should be made to Figure 4 for an illustration of the residential receptors used for the purposes of this assessment. All the identified residential receptors are considered to be within ILP Environmental Zone E2. Each receptor was input into the model at a height of 4.0m (bungalows and single storey building at height of 1.5m) at a distance of 10 cm from the building façade in order to represent illuminance at first floor window level, representing a typical bedroom, which is deemed to be the most sensitive receptor room.

4.2.2 Ecological Receptors

Lighting associated with the operational phase of the proposed development has the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2010) and subsequent amendments require competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Areas of Conservation). Following a review of the site and immediate surrounding area by WYG ecologists, the following ecological receptors were highlighted:

All of the woodlands on the site are designated as Wild Heritage Sites (WHS), these areas should not be impacted if possible, the central valley is sensitive and would be retained to allow for continued commuting and foraging of protected species.

In addition to these areas, Greenham and Crookham Commons Site of Special Scientific Interest (SSSI) lies to the east of the site. This site comprises of an extensive complex of heathland, grassland, gorse scrub, broadleaved woodland and alder-lined gullies. The site also includes on large ancient coppiced woodland, Peckmoor Copse.

Based on this, it was determined that a number of bat species utilise the hedgerows surrounding the development site for commuting/foraging purposes. In order to represent worst case scenario, the assessment has assumed that potential bat species on site will be highly sensitive to artificial light.

For the purposes of the assessment, ecological receptor locations have been included at a number of points along the length of hedgerows to the boundary and within the proposed site, at heights of 4m. Table A.2 in Appendix A provides a reference for these locations whilst a full spatial illustration of modelled ecological receptors is included in Figures 5 and 6.

5.0 Lighting Assessment

Potential impacts associated with the proposed lighting design at locations in the vicinity of the site were assessed as described in the following sections.

5.1 Obtrusive Light Modelling

Illustrative building plans were provided by the client for the development, Bloor Homes and Sandleford Farm Partnership. These were used with the indicative lighting design detailed in Figures 7 and 8 to develop a model within DIALux of the proposed development. Reference should be made to Figures 9 and 10 for a 3D representation of the proposed model.

It should be noted that this assessment has considered that there won't be any external lighting associated with the country park.

The model is only able to accurately represent the effects of solid structures such as buildings and walls on light obtrusion. Non solid barriers such as trees and hedges cannot be accurately modelled and therefore the effects of these are dealt with qualitatively outside the model calculations.

The assessment has looked at the effect of the proposed residential area in the pre-curfew and post-curfew periods. Both scenarios are based on all lighting associated with the proposed residential area being turned on during night time. This therefore represents 24-hour opening and can be viewed as worst case scenario within post-curfew periods (after 23:00).

The assessment consists of comparing the measured baseline illuminance levels at each of the receptor locations against the predicted light obtrusion from the proposed residential area lighting model. Where it was not practicable to measure existing illuminance at the receptor location, monitoring results from the nearest equivalent representative monitoring location are used.

The ULR of the proposed development has been calculated and referenced to the maximum permitted limitations for the relevant Environmental Zones of the receptor locations, as detailed in Table 2.

5.1.1 Model Results

Residential Receptors

Table A.3 in Appendix A compares the measured baseline data and the modelled lighting arrangements when in operation. These results are compared against the ILP pre-curfew and post-curfew criteria limits for ILP Environmental Zone E2, in accordance with the classifications detailed in Table 2.

The model predicts that there will be no increase in either the minimum or maximum baseline obtrusive light levels at any of the modelled receptors.

The ILP pre-curfew and post-curfew criteria for Environmental Zone E2 of 5 and 1 lux respectively, are not predicted to be exceeded as a result of the development. As such the proposed development is not predicted to result in any significant adverse impacts with respect to local sensitive residential locations.

Ecological Receptors

When determining the likely impacts of lighting associated with the proposed development on sensitive ecological receptors, the assessment has considered the effect of lighting pre-mitigation. Table A.4 in Appendix A presents the modelled light trespass values along sections of potential bat commuting/foraging routes. Impacts are considered potentially significant where predicted illuminance exceeds 1 lux at ecological receptors. If this is the case, further consideration should be given to mitigation measures.

While some bat species, such as Pipistrelle are more tolerant with light levels above this criterion, it reflects worst case assumptions concerning the sensitivity of those species present to background illuminance levels. It is believed that most bat emergence requires light levels below 1 lux for late emerging species, up to 14 lux for those that emerge earlier (Noctule and Pipistrelle). These lighting levels of 1 lux are required to ensure that bat commuting and foraging routes are not impacted and that dark corridors beyond the limits of the site are retained.

As such, the assessment criteria represents worst case scenario in terms of impacts on emergence, commuting and foraging (Bat Conservation Trust, 2011).

As illustrated by Table A.4 in Appendix A, light trespass associated with the proposed residential development does not exceed 1 lux at any of the modelled locations adjacent to the existing trees within the site or on the site boundary.

Furthermore light trespass associated with the proposed residential development does not exceed 1 lux at any of the modelled locations adjacent to the site boundary and inside the site. As such the proposed development is not predicted to result in any significant adverse impacts with respect to local sensitive ecological receptors.

5.1.2 Dark Sky Assessment

The model has been used to calculate the predicted Upward Lighting Ratio (ULR) of the proposed external lighting scheme. Model outputs predict a sky glow figure (ULR) of 0.0%. As illustrated in Table 2, the ILP sky glow limitation for an area classified as Environmental Zone E2 is 2.5% ULR. As such the indicative lighting scheme meets the ILP sky glow limitations and is therefore not considered to result in detrimental impacts on the dark sky landscape.

6.0 Further Discussion and Mitigation

In accordance with the ILP guidance, the area surrounding the proposed development site has been classified as an ILP E2 Environmental Zone and as such, the illuminance levels at the windows of residential properties should not exceed 5 lux in the pre-curfew period (typically considered to be 07:00 to 23:00) and 1 lux in the post-curfew period (typically considered to be 23:00 to 07:00).

A lighting strategy specifying mitigation options that should be followed during the construction and operational phase of the development during the reserved matters stage can be found in Appendix C.

Computer modelling of the proposed external lighting scheme shows all modelled residential locations are not predicted to experience light trespass in exceedance of the relevant criteria. In addition ecological habitat along the site boundary of the site and inside the site is not predicted to experience light trespass in exceedance of 1 lux.

It should also be noted that, as discussed at the beginning of section 5.1, the lighting model does not account for the additional mitigation offered by existing/proposed vegetation and it is therefore very much a worst case scenario assessment. Proposed vegetation and landscaping across the site is therefore likely to further reduce the light trespass levels predicted by the 3D model. The mitigation offered by such vegetation is particularly influential during spring and summer months during which vegetative screening is in leaf, which coincides with periods of peak bat activity.

With regard to the sensitive brook that traverses the site to the south of Slockett's Copse and High Wood, special consideration was given to potential light spill along its length. The indicative lighting scheme recommends illuminated bollards to be installed along any proposed bridge to allow for the safe movement of pedestrians while blocking light spill due to the low mounting level. The bridge is likely to have fences or barriers higher than the height of the proposed bollards which will negate light spill in to the valley.

7.0 Conclusions

Bloor Homes and Sandleford Farm Partnership commissioned WYG Environment Planning and Transport to prepare a Lighting Assessment in order to quantify potential impacts associated with a proposed residential development at Sandleford Park, Newbury.

The assessment has concluded that, the risk of the proposed scheme resulting in exceedances of either the ILP pre-curfew or post-curfew obtrusive light limitations at local residential receptors will be low. As such the proposed development is not predicted to result in any significant adverse impacts with respect to local sensitive residential locations.

Following the installation of an appropriate lighting scheme as detailed in this report, the risk of the proposed development resulting in significant exceedances of 1 lux along potential bat foraging/commuting routes is considered to be low. As such, dark corridors beyond the limits of the site are expected to be retained.

The assessment has concluded that, provided the specified lighting design is implemented, the sky glow levels associated with the development will not have a significant effect on the surrounding dark sky landscape.

Following the adoption of appropriate mitigation measures, the assessment demonstrates that the proposed development does not conflict with any national or local planning policies.

Units and Abbreviations Used

CIBSE	Chartered Institute of Building Services Engineers
CIE	Commission on Illumination
ILP	Institution of Lighting Professionals
LDF	Local Development Framework
LP	Local Plan
CS	Core Strategy
DPD	Adopted Development Plan Documents
SPD	Adopted Supplementary Planning Documents
SG	Endorsed Supplementary Guidance Documents
NGR	National Grid Reference
PPS	Planning Policy Statement
NPPF	National Planning Policy Framework
Lx	Lux
ULR	Upward Lighting Ratio
WYG	WYG Planning and Environment

Figures

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

Bloor Homes and Sandleford Farm Partnership

Drawing Title:

Figure 1: Site Boundary

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
LY	NA	19.12.18	B

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

Bloor Homes and Sandleford Farm Partnership

Drawing Title:

Figure 2: Monitoring Locations

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
NA	DC	14.03.18	B

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

Bloor Homes and Sandleford Farm Partnership

Drawing Title:

Figure 3: Section Areas. Western and Eastern

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
LY	NA	19.12.18	B

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

Bloor Homes and Sandleford Farm Partnership

Drawing Title:

Figure 4: Modelled Residential receptors. Eastern area

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
LY	NA	19.12.18	B

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

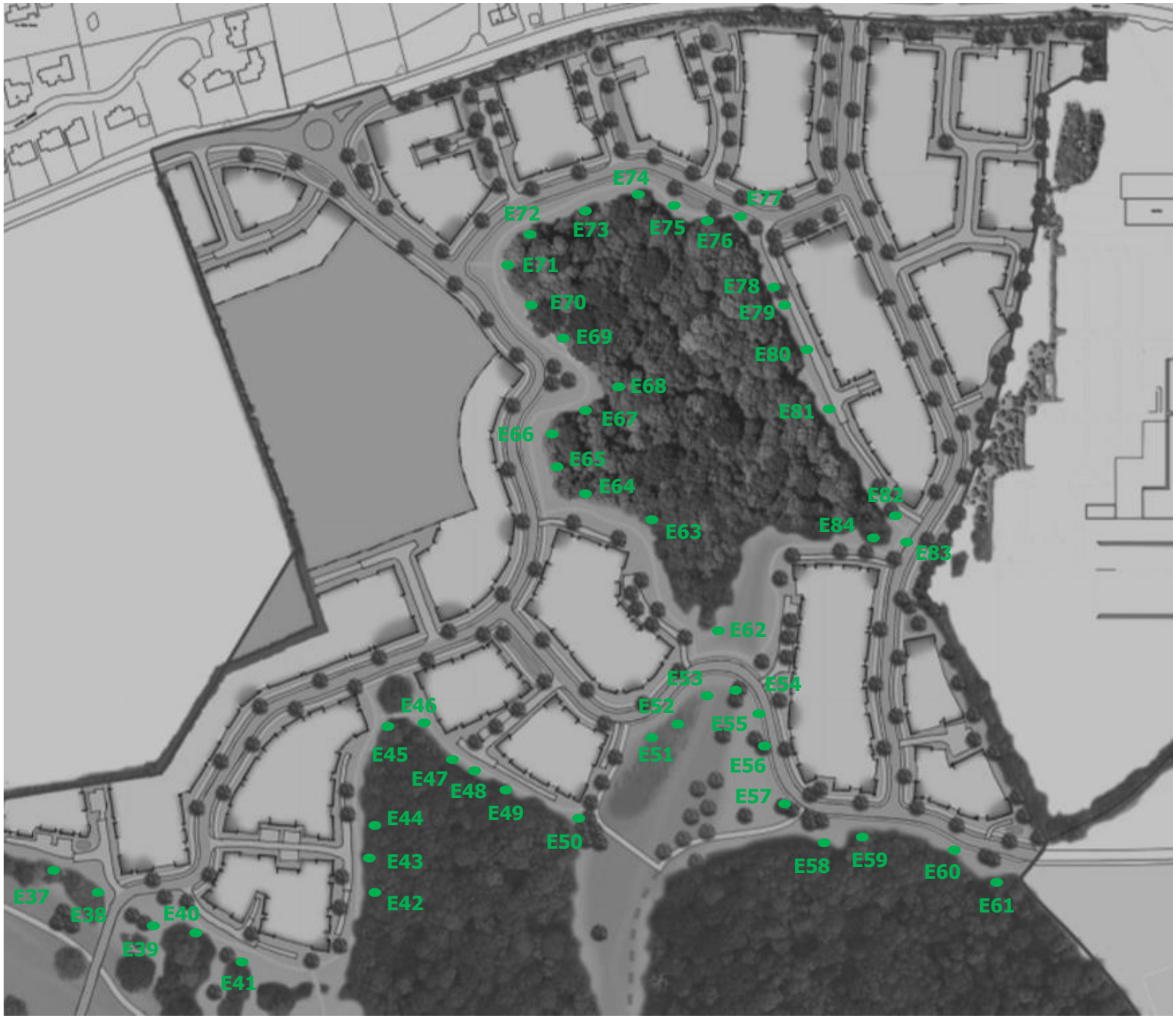
Bloor Homes and Sandleford Farm Partnership

Drawing Title:

Figure 5: Modelled Ecological receptors. Western area

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
LY	NA	19.12.18	B



Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

Bloor Homes and Sandleford Farm Partnership

Drawing Title:

Figure 6: Modelled Ecological receptors. Eastern area

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
LY	NA	19.12.18	B

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

Bloor Homes and Sandleford Farm Partnership

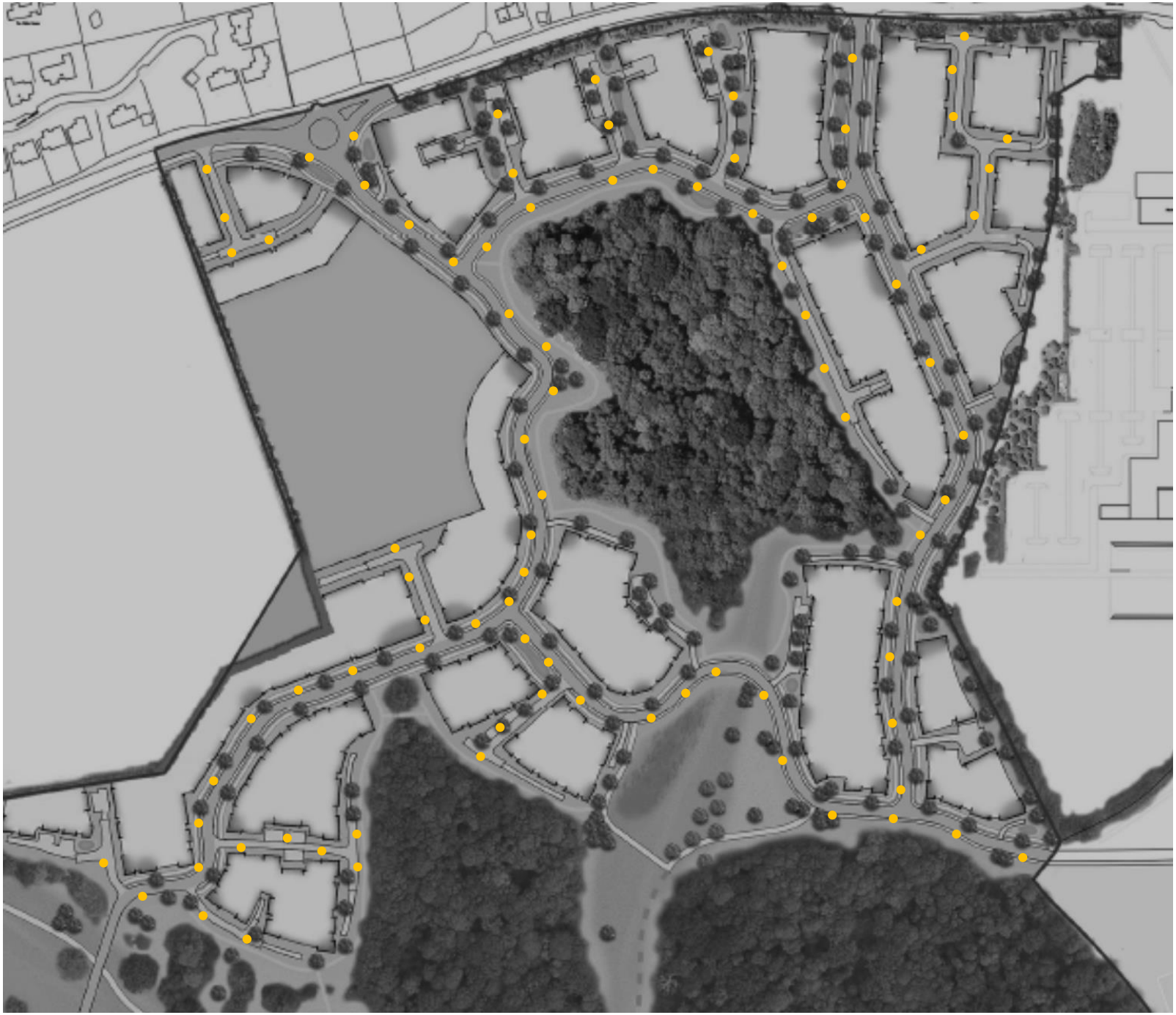
Drawing Title:

Figure 7: Recommended External Lighting Scheme. Western Area

Symbol	Luminaire
●	DW Windsor Kirium 1- 15LED-700mA-4kcct-35W-Residential Kirium 1 15LED RE 6m (4092lm)
●	DW Windsor PM2 WW PHAROLA MAX PM2 :- POLYCARBONATE GLAZING WITH 180° BACK SHIELD

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
LY	NA	19.12.18	B



Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

Bloor Homes and Sandleford Farm Partnership

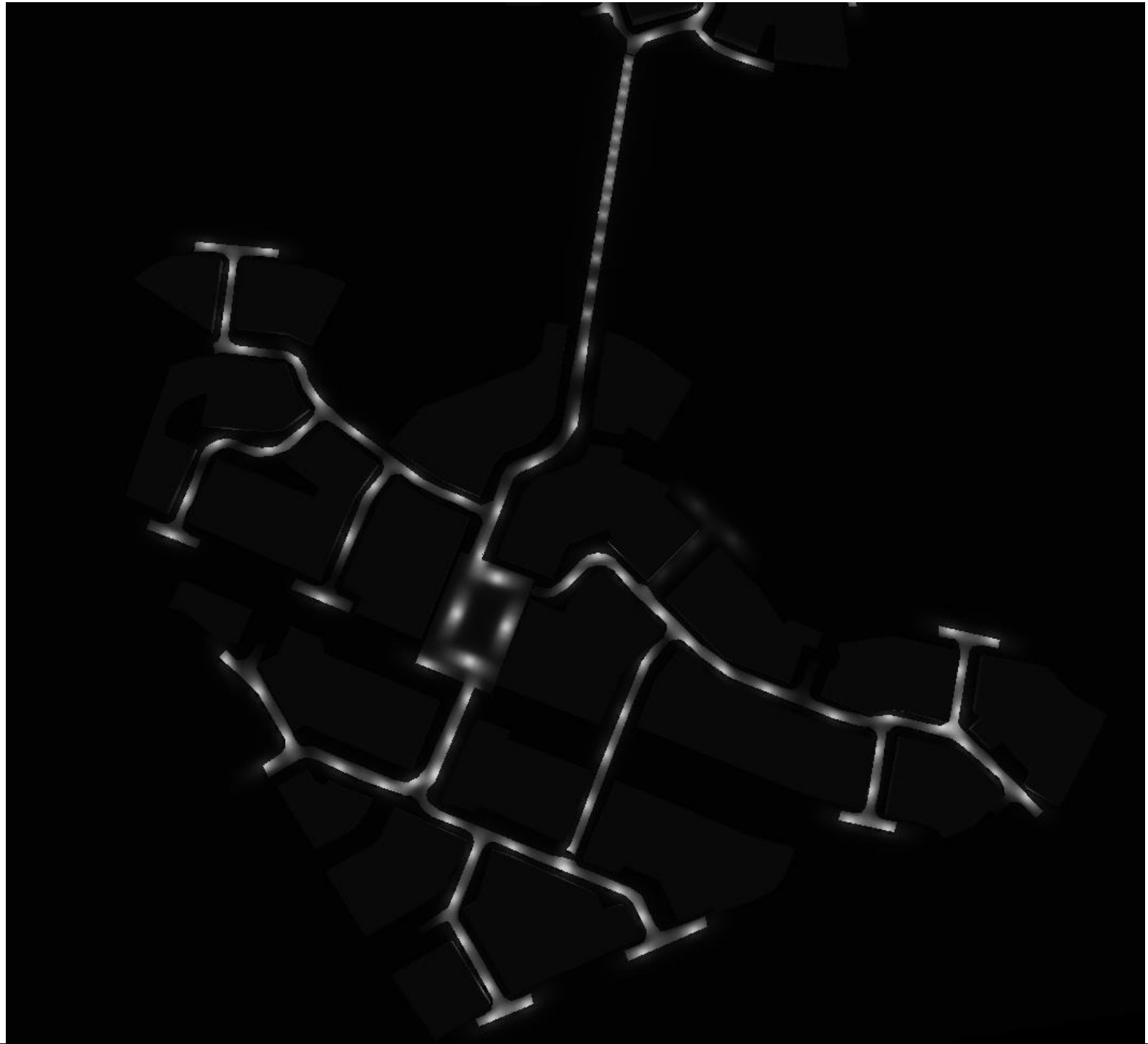
Drawing Title:

Figure 8: Recommended External Lighting Scheme. Eastern Area

Symbol	Luminaire
●	DW Windsor Kirium 1- 15LED-700mA-4kcct-35W-Residential Kirium 1 15LED RE 6m (4092lm)

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
LY	NA	19.12.18	B



Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

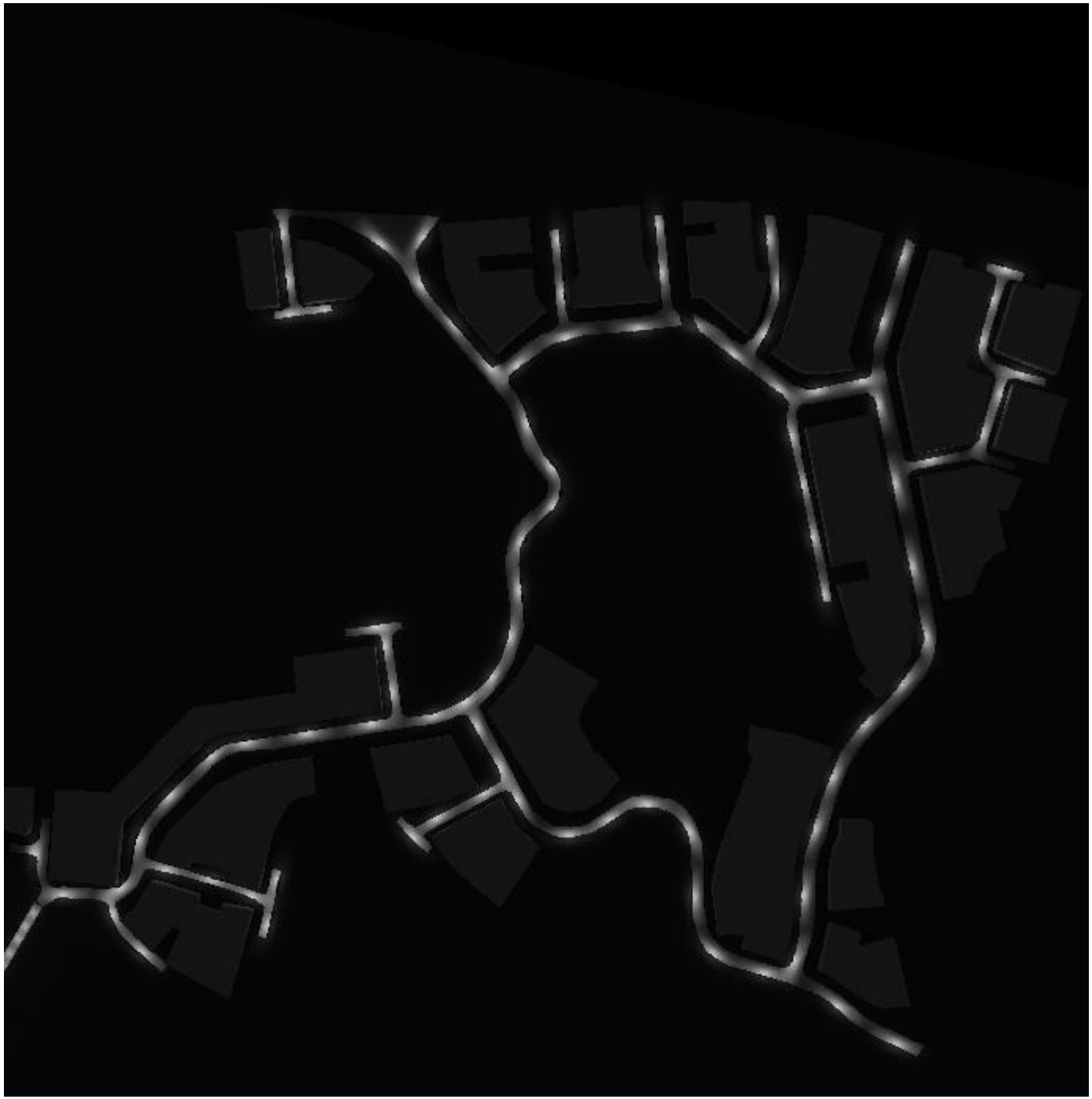
Bloor Homes and Sandleford Farm Partnership

Drawing Title:

Figure 9: Visual Representation of Proposed Model. Western area

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
NA	DC	20/12/19	C



Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 234 8000
Fax: 0116 234 8002
e-mail: leicester@wyg.com

WYG ENVIRONMENT

Project:

Sandleford Park, Newbury

Client:

Bloor Homes and Sandleford Farm Partnership

Drawing Title:

Figure 10: Visual Representation of Proposed Model. Eastern area

creative minds safe hands

DRAWN BY	CHECKED BY	DATE	REVISION
NA	DC	14.03.18	B

Appendices

Appendix A – Tables

Table A.1 Light-sensitive Receptors

ID	Description	ILP Environmental Zone
R01	12, Heather Gardens	E2
R02	24, Heather Gardens	E2
R03	23, Heather Gardens	E2
R04	42, Monk's Lane	E2
R05	37, Monk's Lane	E2
R06	1 to 6, Abbeydale, Monk's Lane	E2
R07	33, Monk's Lane	E2
R08	27, Monk's Lane	E2
R09	25, Monk's Lane	E2
R10	19, Monk's Lane	E2

Table A.2 Ecological Receptors

ID	Description
Eco 1	Western Area
Eco 2	Western Area
Eco 3	Western Area
Eco 4	Western Area
Eco 5	Western Area
Eco 6	Western Area
Eco 7	Western Area
Eco 8	Western Area
Eco 9	Western Area
Eco 10	Western Area
Eco 11	Western Area
Eco 12	Western Area
Eco 13	Western Area
Eco 14	Western Area
Eco 15	Western Area
Eco 16	Western Area
Eco 17	Western Area
Eco 18	Western Area
Eco 19	Western Area
Eco 20	Western Area
Eco 21	Western Area
Eco 22	Western Area
Eco 23	Western Area
Eco 24	Western Area
Eco 25	Western Area
Eco 26	Western Area
Eco 27	Western Area
Eco 28	Western Area

ID	Description
Eco 29	Western Area
Eco 30	Western Area
Eco 31	Western Area
Eco 32	Western Area
Eco 33	Western Area
Eco 34	Western Area
Eco 35	Western Area
Eco 36	Western Area
Eco 37	Eastern Area
Eco 38	Eastern Area
Eco 39	Eastern Area
Eco 40	Eastern Area
Eco 41	Eastern Area
Eco 42	Eastern Area
Eco 43	Eastern Area
Eco 44	Eastern Area
Eco 45	Eastern Area
Eco 46	Eastern Area
Eco 47	Eastern Area
Eco 48	Eastern Area
Eco 49	Eastern Area
Eco 50	Eastern Area
Eco 51	Eastern Area
Eco 52	Eastern Area
Eco 53	Eastern Area
Eco 54	Eastern Area
Eco 55	Eastern Area
Eco 56	Eastern Area
Eco 57	Eastern Area
Eco 58	Eastern Area

ID	Description
Eco 59	Eastern Area
Eco 60	Eastern Area
Eco 61	Eastern Area
Eco 62	Eastern Area
Eco 63	Eastern Area
Eco 64	Eastern Area
Eco 65	Eastern Area
Eco 66	Eastern Area
Eco 67	Eastern Area
Eco 68	Eastern Area
Eco 69	Eastern Area
Eco 70	Eastern Area
Eco 71	Eastern Area
Eco 72	Eastern Area
Eco 73	Eastern Area
Eco 74	Eastern Area
Eco 75	Eastern Area
Eco 76	Eastern Area
Eco 77	Eastern Area
Eco 78	Eastern Area
Eco 79	Eastern Area
Eco 80	Eastern Area
Eco 81	Eastern Area
Eco 82	Eastern Area
Eco 83	Eastern Area
Eco 84	Eastern Area

Table A.3 Residential Receptor Assessment Results

ID	ILP Pre-curfew Criteria (Lx)	ILP Post-curfew Criteria (Lx)	Measured Baseline Illuminance (lx)		Predicted Model Illuminance (lx)	Increase in Illuminance from Baseline to Proposed (lx)	
			Baseline Minimum	Baseline Maximum		Baseline Minimum	Baseline Maximum
R1	5	1	0.30	6.00	0.01	0.00	0.00
R2	5	1	0.70	11.00	0.03	0.00	0.00
R3	5	1	0.70	11.00	0.04	0.00	0.00
R4	5	1	0.70	11.00	0.01	0.00	0.00
R5	5	1	0.70	11.00	0.06	0.00	0.00
R6	5	1	0.70	11.00	0.07	0.00	0.00
R7	5	1	0.70	11.00	0.06	0.00	0.00
R8	5	1	0.70	11.00	0.02	0.00	0.00
R9	5	1	0.70	11.00	0.05	0.00	0.00
R10	5	1	0.70	11.00	0.02	0.00	0.00

Table A.4 Ecological Receptor Assessment Results

ID	Predicted Model Illuminance
Eco 1	0.01
Eco 2	0.02
Eco 3	0.25
Eco 4	0.19
Eco 5	0.04
Eco 6	0.01
Eco 7	0.01
Eco 8	0.15
Eco 9	0.19
Eco 10	0.07
Eco 11	0.01
Eco 12	0.24
Eco 13	0.19
Eco 14	0.07
Eco 15	0.01
Eco 16	0.24
Eco 17	0.12
Eco 18	0.00
Eco 19	0.12
Eco 20	0.25
Eco 21	0.04
Eco 22	0.02
Eco 23	0.08
Eco 24	0.15
Eco 25	0.12
Eco 26	0.34
Eco 27	0.33
Eco 28	0.31

ID	Predicted Model Illuminance
Eco 29	0.13
Eco 30	0.14
Eco 31	0.16
Eco 32	0.48
Eco 33	0.33
Eco 34	0.09
Eco 35	0.30
Eco 36	0.15
Eco 37	0.11
Eco 38	0.41
Eco 39	0.35
Eco 40	0.33
Eco 41	0.63
Eco 42	0.21
Eco 43	0.28
Eco 44	0.35
Eco 45	0.03
Eco 46	0.03
Eco 47	0.10
Eco 48	0.22
Eco 49	0.17
Eco 50	0.01
Eco 51	0.19
Eco 52	0.24
Eco 53	0.23
Eco 54	0.19
Eco 55	0.21
Eco 56	0.24
Eco 57	0.34
Eco 58	0.14

ID	Predicted Model Illuminance
Eco 59	0.33
Eco 60	0.34
Eco 61	0.09
Eco 62	0.10
Eco 63	0.01
Eco 64	0.04
Eco 65	0.20
Eco 66	0.21
Eco 67	0.07
Eco 68	0.03
Eco 69	0.20
Eco 70	0.15
Eco 71	0.16
Eco 72	0.38
Eco 73	0.21
Eco 74	0.17
Eco 75	0.15
Eco 76	0.19
Eco 77	0.52
Eco 78	0.55
Eco 79	0.47
Eco 80	0.54
Eco 81	0.28
Eco 82	0.06
Eco 83	0.24
Eco 84	0.06

Appendix B – Technical Lighting Specifications

Appendix C – Lighting Strategy

As the project is outline in nature this lighting strategy provides design guidance and identifies potential constraints and set parameters for all future lighting designs to consider during the reserved matters stage of the application. Therefore, the detailed lighting scheme will be secured by a planning condition.

Construction Lighting Management Plan

Lighting on construction sites is typically required as part of on-site security and health and safety requirements. However, the potential effects to surrounding receptors need to be minimised through the controlled application of lighting in accordance with current best practice standards.
It is anticipated that the key potential areas to be illuminated temporarily during the construction phase (i.e. the sources of light) will include the following:

- Floodlighting and security lighting associated with temporary car parking areas and within the construction compounds, which will be typically required for health and safety purposes;
- Security and health and safety lighting associated with ongoing working areas, where equipment is stored and safety hazards may be present;
- The potential for light spill and glare from internal lighting associated with any temporary office units in the construction compounds; and
- Lighting required for operational purposes associated with the demolition, earthworks and construction activities when working during the late afternoon in the winter period.

An installation of artificial lighting may result in light spill if lighting is poorly controlled. However, lighting provided during the construction phase will be limited to required areas of the Proposed Development at any one time being short/medium-term and temporary in nature.

Lighting effects associated with the construction phase will be mitigated by implementing good practice measures across the Site. Measures to be implemented include:

- The use of construction lighting outside normal working hours should be limited and kept to the minimum necessary for workforce, public safety and/or security.
- Lighting adjacent to public highways and footpaths should be appropriate for the safety of passing public and should ensure that light spillage, particularly onto highways, is limited to the minimum possible level necessary. The use of construction lighting shall be sited to minimise visual intrusion on nearby residential receptors.

- No artificial lighting should be placed in locations where it will cause light spillage on habitat corridors which are likely to be used by wildlife.
- Any temporary lighting used should be installed such that illumination is minimised and directional so that it is focussed on the specific location/s where it is required.
- Any temporary lighting should be switched off at all times when not required.
- All on Site light installations will be positioned sensitively and targeted away from nearby receptors as identified above.
- Glare from floodlighting will be minimised by positioning lights to less than 70 degrees from the vertical uplift and will be directed into the Site. This will reduce upward light spill and subsequently reduce the impact on the night sky.
- Appropriate shielding of all on-Site light sources will be fitted where necessary, particularly at the Site perimeter to minimise glow and light trespass beyond the Site. The implementation of the measures as outlined should ensure the temporary on-Site construction phase lighting will lead to a negligible risk of significant effects.

The locations of the contractor's compound, material storage areas, highway improvement works and temporary security/health and safety lighting required throughout the construction programme where possible will be designed to ensure that the siting of such features will consider the surrounding sensitive receptors on the edge of the site.

Operational Lighting Strategy

Any future detailed lighting design should be undertaken in a manner such as to address two potentially conflicting needs; namely, on the one hand, to provide a safe environment for the movement of residents when the natural lighting levels fall and, on the other hand, to meet the light obtrusion limitations stated within the relevant standards and guidance in order to avoid any detriment to local amenity, and wildlife.

Future detailed lighting design on site should follow the national standards below;

7.1.1 National Standards

- BS EN 12464-2: Lighting of Work Places - Outdoor Work Places, 2014;
- BS 5489-1: Code of Practice for the Design of Outdoor Lighting - Lighting of Roads and Public Amenity Areas, 2013; and,
- BS EN 13201-2: Road Lighting - Performance Requirements, 2003;

7.1.2 Best Practice Design

As well as meeting the statutory design standards outlined above, the future lighting design should seek to meet a number of criteria to ensure that the environmental effects of artificial lighting are managed to a high standard. These criteria are:

- In accordance with the ILP guidance, the area surrounding the proposed development site has been classified as an ILP E2 Environmental Zone and as such, the illuminance levels at the windows of residential properties should not exceed 5 lux in the pre-curfew period (typically considered to be 07:00 to 23:00) and 1 lux in the post-curfew period (typically considered to be 23:00 to 07:00);
- All external lighting schemes must not have an upward lighting ratio (ULR) of more than 1%;
- All new column mounted luminaires should be fitted with flat glass where appropriate to aid 0% upward light discharge;
- Where appropriate, luminaires on the site boundary should be fitted with light baffles to prevent light spill;
- Lighting should be controlled via light level sensors;
- The location and design of luminaires will be such as to minimise the impact on light sensitive ecology areas throughout the site;
- The use of directional LED lights within any future design is recommended as these can minimise light spillage beyond the boundaries of the site and can provide a more focused beam of light for areas which require lighting;
- The proposed schemes of lighting should include provisions for white light sources (4000k). The lighting assessment shows compliance with guidance by the Bat Conservation Trust which specifies lights to be < 4200 kelvin in colour to avoid white and blue wavelengths of the light spectrum which serves to reduce insect attraction;
- Lighting along the roads should be uniform and achieve the criteria set out in BS EN 13201-2: Road Lighting - Performance Requirements, 2003 for residential roads;