



One Horton Heath

Internal Distributer Road Lighting Impact Assessment

*For One Horton Heath on behalf of Eastleigh
Borough Council*

Date *20 December 2023*

Doc ref *24755-HYD-XX-XX-RP-Y-5007*

Document control sheet

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		Project name	One Horton Heath
		Title	Internal Distributer Road Lighting Impact Assessment
		Doc ref	24755-HYD-XX-XX-RP-Y-5007
		Project number	24755
		Status	S3
		Date	20/12/2023

Document production record		
Issue number	P05	Name
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Document revision record			
Issue number	Status	Date	Revision details
P01	S2	13/04/23	Lighting Impact Assessment
P02	S2	31/07/23	Lighting Impact Assessment
P03	S2	02/08/23	Lighting Impact Assessment
P04	S2	17/11/23	Planning Information Updated
P05	S3	20/12/23	Planning Information Updated

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Appendix A: Glossary of Terms

1. One Horton Heath (RM Secondary Roads) Masterplan

1.1 Introduction

Hydrock Consultants has been appointed by the One Horton Heath on behalf of Eastleigh Borough Council to provide planning stage advisory services in relation to the design and construction of the proposed residential development in Horton Heath, Eastleigh. This document forms part of the Full Planning Application of the One Horton Heath Internal Distributer Roads and will inform the Eastleigh Borough Council (EBC) Planning Department, Natural England, and other consultees of the lighting impact that the proposed development will have on the area and its surroundings.

1.2 Purpose of Report

This report has been produced in support of a full planning application, where the following design statement is provided for planning purposes to describe an ecological and existing appraisal of the site. The report will stipulate requirements and methods of mitigation to the external lighting installation in order to minimise the impact to surrounding ecology and existing residents.

This statement will serve as a guide to ensure the future external lighting scheme is as unobtrusive as possible, complies with guidelines for the reduction of light pollution, key statutory regulations and policy requirements with respect to lighting and biodiversity, to satisfy the local planners and the local community.

1.3 Development Details

The indicative masterplan of the whole site consists of a planned 2,500 new dwellings, a mixed-use local centre which will benefit from a café, transport hub, shops, and community buildings.

The site plan for the internal distributor roads is shown in Figure 1, with the 4a SID secondary road site boundary illustrated by the red line.

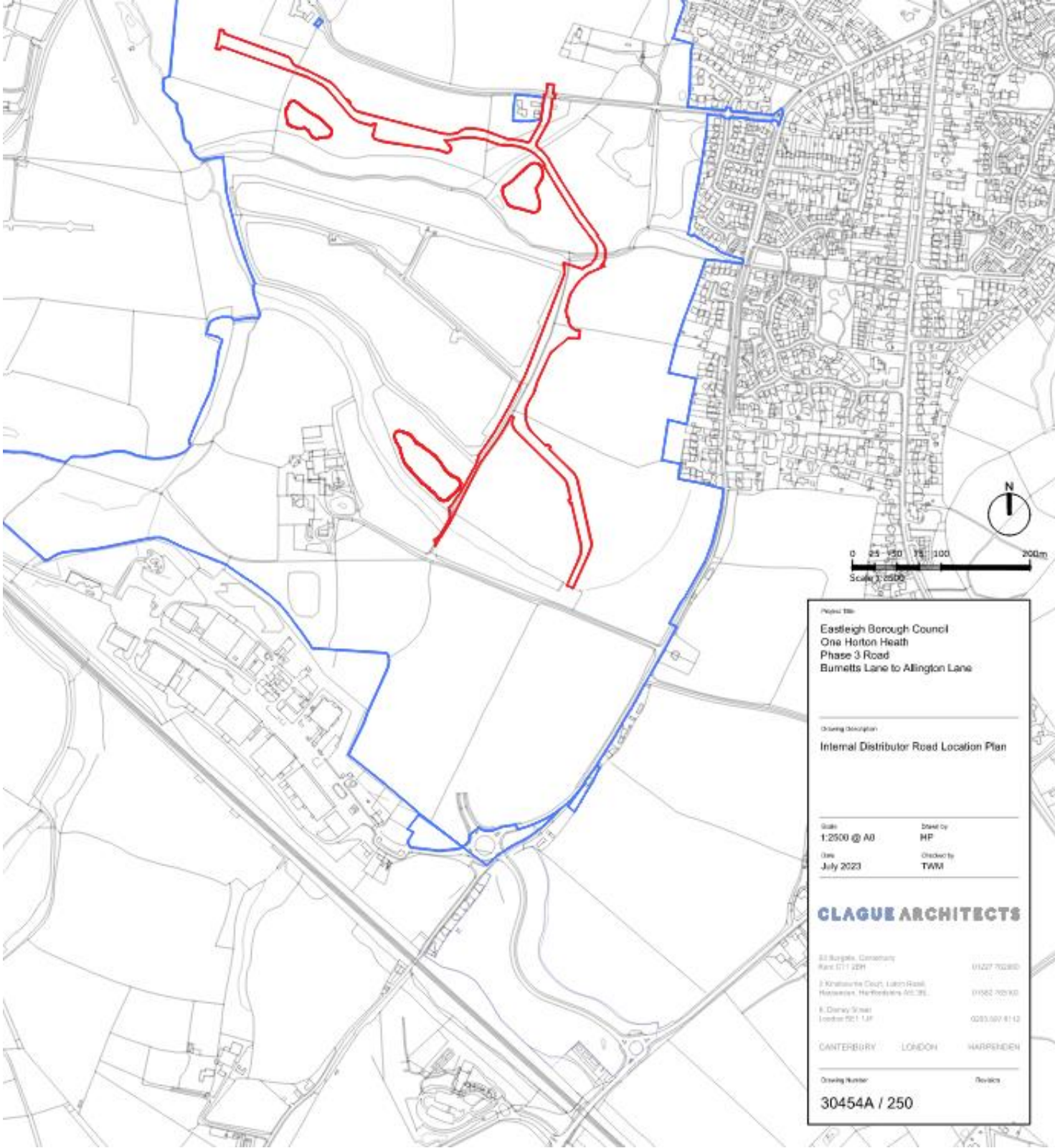


Figure 1: One Horton Heath (Secondary Road Layout Plan)

2. Legislation, Policy and Guidance

2.1 National Legislation

National Legislation is given in the following documents:

- » Wildlife and Countryside Act 1981;
- » Environmental Protection Act 1990;
- » Protection of Badgers Act 1992;
- » Clean Neighbourhood and Environment Act 2005; and
- » The Conservation of Habitats and Species Regulations 2017.

The statutory regime within these documents has been amended to include the light spill glare from lighting installations within different premises: 'artificial light emitted from premises so as to be prejudicial to health and nuisance'.

Under Section 79 of the Environmental Protection Act 1990, local authorities have a duty to take notice and act accordingly to investigate any complaint regarding artificial lighting of statutory nuisance. Once statutory nuisance may occur, local authorities must issue an abatement notice requiring that the nuisance cease or be abated within a set timescale.

2.2 National Planning Policy

The National Planning Policy Framework (NPPF) 2023 states that:

- » 180: Planning policies and decisions should also ensure that new development is appropriate for its location taking in 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:
- » Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

The Planning Policy Guidance (PPG) states that: "Artificial light provides valuable benefits to society, including through extending opportunities for sport and recreation, and can be essential to a new development. Equally, artificial light is not always necessary, has the potential to become what is termed 'light pollution' or 'obtrusive light' and not all modern lighting is suitable in all locations. It can be a source of annoyance to people, harmful to wildlife, undermine enjoyment of the countryside or detract from enjoyment of the night sky. 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.

2.3 Local Planning Policy

2.3.1 Eastleigh Borough Local Plan 2016-2036

The local plan for the Eastleigh Borough sets out the policies and plans to guide future development to 2036. Modifications have been made that address the concerns raised by the Inspector following the previous examination hearings. The following policies are of relevance to external lighting and will be material considerations in determining the planning application:

2.3.1.1 Policy 24.NC Protected Species

Development will not be permitted where it would adversely affect species or habitats which are protected by legislation, unless appropriate measures are proposed which would acceptably mitigate the impact on those species.

2.3.1.2 Policy 25.NC Biodiversity

Development will not be permitted if it is likely (either individually or in combination with other developments) to have a direct or indirect adverse effect on priority habitats, protected or priority species, or on the local ecological network unless it can be demonstrated that:

- » there are no alternative solutions;
- » the adverse effects are unavoidable;

- » measures are taken to mitigate or, as a last resort, compensate for the adverse effects;
- » there is an overall biodiversity net gain; and
- » if there are any residual adverse effects, the benefits of the development clearly outweigh the adverse effects on priority habitats, priority and protected species, and the local ecological network.

2.3.1.3 Policy 26.NC Protection of Wildlife Network

Development will not be permitted unless it can be demonstrated that:

- » there have been thorough habitat and species surveys;
- » the great crested newt strategic survey and strategy have been considered in all developments within 500m of a great crested newt pond; and
- » the strategic bat trapping survey has been considered in all developments within the locality of a woodland or connected habitat networks.

2.3.1.4 Policy 36.ES Lighting

Permission will be refused for proposals which do not incorporate well designed lighting, where lighting is necessary. Lighting should be concentrated in those areas where it is required and spillage, either horizontally or vertically, should be minimised. The size and design of the lighting columns should not detract from the character of the locality.

2.3.1.5 Policy DM8 Pollution

Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through light intrusion, both generally and with respect to the South Downs National Park's status as an International Dark Night Skies reserve.

2.3.1.6 Policy DM14 Parking

New residential development will be required to provide off-highway parking which is adequate in terms of highway safety. Proposals to provide new car parks will be permitted if the lighting provision addresses impacts on residential amenity.

2.3.2 Eastleigh Borough Council Biodiversity SPD

Whilst not referencing lighting specifically, the Biodiversity SPD provides additional guidance on conserving biodiversity for the region.

3. Site Application Overview

3.1 Introduction

The plan for the One Horton Heath internal distributor roads will incorporate a P3 road located on the east side of the site, providing transport from the north west to central east to south east.

The internal distributor roads will be surrounded by green infrastructures, new residential areas, as well as SuDS drainage features, foot paths and cycle paths in certain areas. It is anticipated that the road will be lit with street column luminaires. The internal distributor roads do not cross or have contact with the south or north green infrastructure, however it does cross a small area of the central green infrastructure.

Steps must be taken to meet ecological and environmental criteria with the main concerns being the green infrastructure and new residential area surrounding the road, as well as the crossing at the central green infrastructure. Light spill from the road can disturb the surrounding ecology, so steps such as ecological and environmental beneficial installation designs implemented to street lights must occur, to minimise the impact and comply with regulations and policies regarding to lighting and biodiversity.

Regarding the planning of development, the construction of the 1.4km internal distributor road pursuant to planning application O/20/89498 for the construction of major mixed-use development at One Horton Heath.

3.2 Assessment

Assessing current site conditions consists of a desk top survey of the site, identifying and commenting on the existing lighting profile across the entire site and immediately adjacent areas. This is completed through:

- » An assessment of the site, adjacent areas and sensitive receptors;
- » Establishing the site and surrounding area Environmental Zone ratings as per current Institute of Lighting Professionals (ILP) and Bat Conservation Trust guidance.

The review has been undertaken in accordance with ILP Professional Lighting Guide 04: Guidance on Undertaking Environmental Lighting Impact Assessments, current Institute of Lighting Professionals (ILP) and Bat Conservation Trust guidance.

The review and report aim to clarify the known light pollution issues and will enable a review of the results against the criteria identified by the various lighting and environmental bodies, national and local policy and standards.

3.3 Desk Study

Guidance Notes for the Reduction of Obstructive Light GN01:2021 (ILP, 2021) classifies environmental zones into five categories, shown in Table 2. The lighting limitations for each environmental zone are described in Table 1, extracted from the same document. Limits are set in terms of:

- » Permissible maximum upward light %;
- » Illuminance into windows;
- » Source intensity; and
- » 'Building luminance', which sets upper values for decorative lighting of any structure, statue etc.

These limits should then be applied to any new lighting in the area. However, it should be noted that the standard primarily pertains to built environments.

Following the review, the site has been classified as Environmental Zone E2 bordering E3 along the eastern edge of the site.

Where possible, any new lighting proposed by the development should be outside the GI application boundary and conform to the limitations provided in Table 2.

3.4 Sensitive Receptors

The sensitive receptors of the site have been identified as the following:

- » Proposed residential dwellings outside the GI boundary;
- » Existing light sensitive species within the application boundary.

The site is also located approximately 1.5km from the River Itchen Special Area of Conservation (SAC) though it is anticipated that artificial lighting will not impact the area due to the distance from the location.

The impact on these receptors shall be discussed in detail in section 5.

3.4.1 Ecological Appraisal

An ecological appraisal of the site has been undertaken by Johns Associates. The following guidance has been given in relation to lighting.

Lighting designs for the development should aim to maintain low lux levels across the site to maintain dark corridors and unlit habitats that are important for the nocturnal and crepuscular species present.

Bats are considered to be the species most likely to be negatively affected by an increase in artificial lighting from the development, in particular the species that are known to be light adverse, such as brown long-eared bats. Otter, barn owl, dormice and great crested newts could also potentially be affected by any artificial lighting of high value habitats given the current absence of artificial lighting on these habitats. This is particularly relevant to the lighting of any road severance locations.

The lighting approach for new development should be in accordance with current best practice guidance on designing lighting with reference to bats (Bat Conservation Trust and Institution of Lighting Professionals, 2018).

Artificial light, specifically light with high blue light content, can severely disrupt life's natural rhythms. The local wildlife such as insects, birds, and bats are primarily affected with consequences including impairment of reproductive and foraging activities, and even the death of animals in the vicinity of artificial light sources. The use of artificial lights (with high blue content) at night-time has been proposed as a factor of insect decline.

The graph below (Figure 2) shows the perceived colour spectrum of insects and LED-spectres in comparison. Insect respond to the lower end of the visible spectrum

including the blue light wavelength. The use of warm light colours is therefore recommended due to the reduced blue light content. The warmer the colour, the lower the blue light content emitted. Amber light (similar to 1800K) has significantly reduced blue light and therefore is a highly recommended solution (More on amber light at section 4.1.1.1). Warmer colour temperatures of light (with less blue wavelengths) have also been proven to have a lower impact to bats.

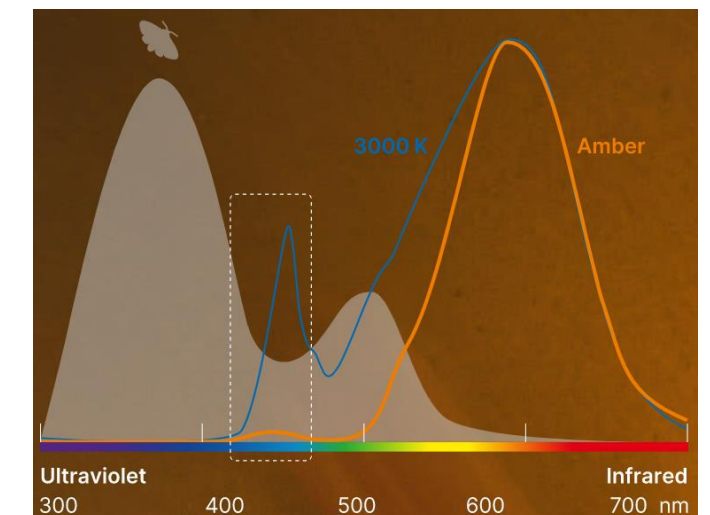


Figure 2: Perceived visible spectrum of insects & LED-spectres

As an overarching principle, dark corridors must be maintained around roosts, foraging areas and commuting corridors with no net increase in light levels as a result of the development in areas used by bats. It should be noted that enhancements over the existing baseline must also be built into scheme design wherever possible; i.e., development schemes that actively reduce any existing elevated lux levels associated with bat habitat features.

Important bat habitat zones and sensitive habitats should be maintained in 'completely dark' conditions, defined as less than 0.2 lux on the horizontal plane and less than 0.4 lux on the vertical plane (measured at 1.5m and 4m) (Bat Conservation Trust and Institution of Lighting Professionals, 2018).

A discrete buffer-zone oriented parallel to each retained ecological feature of importance to the nocturnal/ crepuscular species, present on site, should be created. Table 3 shows the ecological buffer

specification detailing the steps required to meet the ecological appraisal.

3.5 Current Site Conclusion

This information will now be used to assess the indicative masterplan proposals and its residual effects on the surrounding areas and sensitive receptors.

Table 1: Environmental Lighting Categories (GN01:2021, ILP 2021)

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO Starlight Reserves,
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks
E2	Rural	Low District Brightness (SQM ~ 15 to 20)	Sparsely inhabited rural areas, village
E3	Suburban	Medium District Brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High District Brightness	Town/city centres with high levels of night-time activity

Table 2: Obtrusive Light Limitations for Exterior Lighting Installations - General Observers (GN01:2021, ILP 2021)

(ULR = Upward Light Ratio of the installation; Ev = Vertical illuminance in lux; I = Light intensity in candelas; L = Luminance in candelas per square meter. *permitted only from public road lighting installations.)

Zone	Sky Glow ULR (Max %)	Light Intrusion (into windows) Ev (Lux)		Luminaire Intensity I (candelas)		Building Luminance L (Pre-curfew)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average L (cd/m2)
E0	0	0	0	0	0	0
E1	0	2	0 (1*)	2500	0	0
E2	2.5	5	1	7500	500	5
E3	5	10	2	10000	1000	10
E4	15	25	5	25000	2500	25

Table 3: Ecological Buffer Specification (J00556, Johns Associates)

Feature	Importance	Minimum Buffer: - No excavation (except SuDS, respecting RPAs) - No construction related activities of activities likely to have negative effect on habitat - Biodiversity Enhancement permitted - No additional lighting > 0.5lux	Measurement From:
Ancient Woodland	SINC	15m	Tree stems on outer edge of woodland
Other Woodland (including tree belts)	Non SINC	15m	Tree stems on outer edge of woodland
Hedgerows with mature trees at regular intervals	SINC or Non SINC	15m	Tree stems on outer edge of woodland
Hedgerows without mature trees or only occasional trees	SINC or Non SINC	5m (plus RPA around any mature trees to be retained)	Centre line of linear habitat
Watercourses	SINC or Non SINC	10m (except for SuDS connections and ecological improvements)	Bank edge of water limit when watercourse is full
Ponds	SINC or Non SINC	10m (except for existing structures/infrastructure, SuDS connections and ecological improvements)	Bank edge of water limit when pond is full
Wetland and large areas of Grassland Habitats Identified for retention	SINC or Non SINC	10m	To be defined based on nearest obvious boundary feature, e.g., hedge, fence, track etc.

Legend

SINC = Site of Importance for Nature Conservation

4. Indicative External Lighting Strategy

4.1 Design Guidance

The following documents should be consulted and adhered to when designing the external lighting strategy for the scheme:

- » ILP Guidance Notes for the Reduction of Obtrusive Light GN01:2021;
- » ILP Guidance Note 08: Bats and Artificial Lighting in the UK;
- » ILP PLG04: Guidance on Undertaking Environmental Lighting Impact Assessments;
- » CIBSE Lighting Guide 6 (LG6) – Outdoor Environment;
- » CIBSE SLL Code for Lighting 2022;
- » BS 5489-1:2020 – Code of Practice for Design of Road Lighting;
- » CEN/TR 13201-1: Road Lighting – Part 1: Selection of Lighting Classes;
- » CIE – Guidelines for Minimising Sky Glow;
- » Royal Commission on Environmental Pollution – Artificial Light in the Environment.

The ILP Guide for the Reduction of Obtrusive Lights is the primary document used by most local councils and planning departments to categorise the provision of external lighting. Where possible, the external lighting should be compliant to Dark Sky requirements and to Lighting Environmental Zone CIE E2.

4.1.1 Street Lighting

To meet ecological policies and legislation, no luminaires are provided on the green infrastructure (including footpaths and cycle paths). Street lights will be implemented only on the internal distributor roads, the housing estate roadways, and the link road which are located outside the green infrastructure. However, some of these roads are around some of the green infrastructure, therefore methods of mitigation to the external lighting installation are suggested in order to minimise the lighting impact to surrounding ecology. Methods listed in section 4.3 are all

highly recommended and should be put into effect.

Required road lighting levels and uniformity must comply with the assessment tables provided in BS EN 13201-1: Road Lighting – Part 1: Selection of Lighting Classes as well as BS 5489-1:2020

In addition, the requirements stated in the Hampshire County Council Document TG13 - Street Lighting shall be provided.

The following assumptions have been made in order to classify the road types:

- » The typical speed of the motor vehicles will be up to 25mph (secondary and tertiary streets), up to 30mph (Link Road and internal distributor roads)
- » No geometric measures have been put in place for traffic calming;
- » The area does not have a higher-than-normal crime risk;
- » Facial recognition is unnecessary in the area;
- » The difficulty of navigational tasks are normal; and
- » There is a normal flow of pedestrian traffic.

Table 4 describes the classifications for the road types proposed. The M lighting class recommends illuminance levels for roads where the predominant users are motorised vehicles and the speed of the user is moderate to fast. The P lighting classes recommend illuminance levels for minor roads, where traffic speed and density are lower, and the predominant users are pedestrians, slow moving vehicles, or cyclists, for example in residential areas. The C lighting class is used for conflict areas such as shopping streets, road intersections of some complexity and roundabouts.

4.1.1.1 Proposed Street Lighting

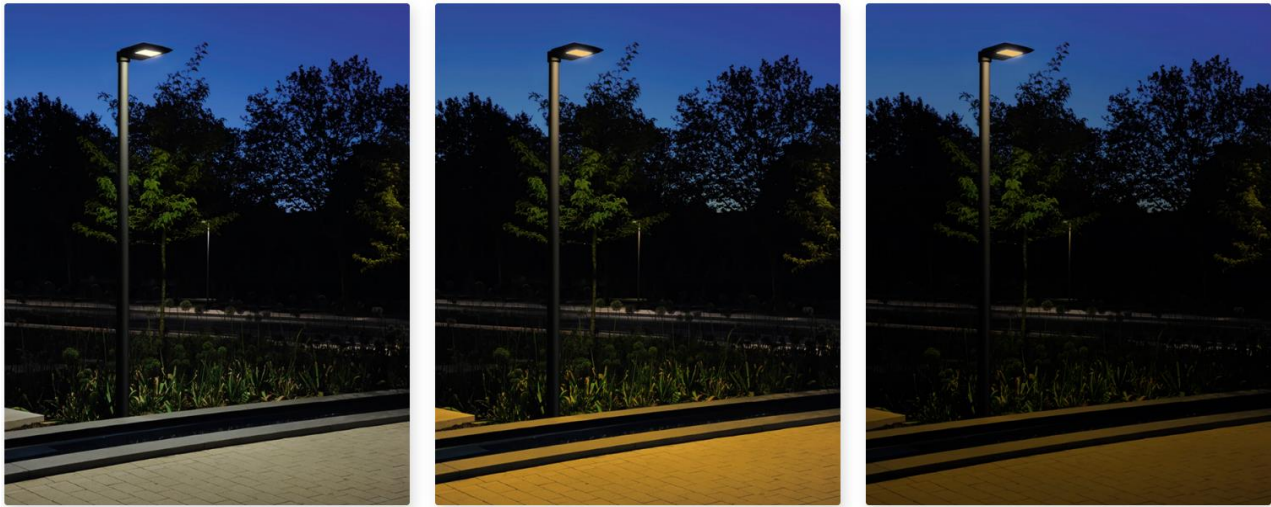
To ensure the external lighting scheme is as unobtrusive as possible, it is proposed that the site is modelled using low height, directional column luminaires to provide sufficient illuminance on roads whilst also being mindful of the sensitive receptors on site. To integrate the site into the nearby

Table 4: Road types and classifications - P classes

Road type	Classification	Average Illumination Ea	Minimum Illumination Emin
Secondary and Tertiary Streets	P3	7.5 [lx]	1.5 [lx]
	P4	5.00 [lx]	1.00 [lx]
	P5	3.00 [lx]	0.6 [lx]

Table 5: Road types and classifications - M classes

Class	Luminance of the road surface of the carriageway for the dry and wet road surface condition				Disability Glare	Lighting of Surroundings
	Dry Conditions			Wet	Dry Conditions	Dry Conditions
	Illuminance [cd/m2]	Uniformity Uo	Longitudinal Uniformity UI	Uniformity Uow	Threshold Increment fTI	Edge of Illuminance Ratio REI
M4	0.75	0.4	0.6	0.15	15	0.30



3000 Kelvin Amber (similar to 1800 Kelvin) Amber (similar to 1800 Kelvin) with simultaneous output reduction

Figure 3: DALI Dimmable Street Lights visual comparison

residential areas and green infrastructure, amber LEDs which has a similar colour temperature to 1800K are preferred to mitigate impact to local ecology. A possible option is to utilise DALI Dimmable Street Lights (Figure 3) where the colour temperature and light output can be reduced during night-time hours, ensuring minimal impact on the local ecology while maintaining safety for people walking by. A similar and more preferred option compared to the DALI system above, is to utilise the

Mayflower CMS (controls and dimming system) due to its intuitive design.

Where roads cross existing areas used by bats to migrate through the site, stretches of road can be left unlit to provide corridors of < 0.5 lux for bats to commute to different areas.

Where lighting is deemed required due to safety concerns, innovative solutions could also be applied such as red LED street lighting to create bat friendly corridors such as in the Netherlands and Worcestershire.



Figure 4: Bat friendly red street lighting.

Where possible, residents should be educated about the flora and fauna in their local area and encouraged to install low lumen security lighting to reduce the lux levels falling onto sensitive receptors.

For all highways adopted by Hampshire County Council (HCC), a dimming profile in line with HCC lighting specification requirements will be applied: typically, luminaires are either dimmed or every second luminaire is switched off past a designated curfew time to reduce the overall light pollution of the development.

The Link Road

The Link Road has been classified as M4 and should be lit in accordance with standards shown in Table 5. Column luminaires are typically used to provide the higher illumination levels and spread across conflict areas to provide high visibility for motorists and cyclists.

The Internal Distributer Roads

The internal distributor roads have been classified as P3 and should be lit in accordance with standards shown in Table 4. Directional column luminaires are typically used to provide sufficient illuminance on roads whilst also being aware of the sensitive receptors on site.

4.1.1.2 Conflict Areas

Existing Residential Area

An existing residential area located east from the site may be affected by the internal distributor roads. The street lights on this road can produce light spill which can disturb the existing residence. Ecological and environmental beneficial installation designs

must be implemented to street lights to minimise the impact and comply with regulations and policies regarding to lighting and biodiversity.

Green Infrastructure & New Residential Area

The internal distributor roads are surrounded by green infrastructure and new residential area. The internal distributor roads do not cross or have contact with the green infrastructure, apart from a small area of the central green infrastructure where the internal distributor road does cross through. The street lights on these roads can produce light spill which can disturb the new residence and surrounding ecology. Ecological and environmental beneficial installation designs must be implemented to street lights to minimise the impact and comply with regulations and policies regarding to lighting and biodiversity.

4.2 Sensitive Receptors

4.2.1 Existing Areas Utilised by Bats

The ecology report has identified that the site is useful for a number of bat species. Where possible, any areas identified as being useful for existing bat populations should be lit to a maximum level of 0.2 lux on the horizontal plane and 0.4 on the vertical plane (measured at heights of 1.5m and 4m).

4.3 Recommendations for All Artificial Lighting Proposals

The following principals should be adopted when designing external lighting proposals for the One Horton Heath:

- » The use of directional, LED lamps is recommended to both save energy and ensure that light is only directed to the required areas;
- » The use of amber LEDs which has a similar colour temperature to 1800K. Warmer colour temperatures of light (with less blue wavelengths) have been proven to have a lower impact to bats.
- » Cowls, shields or hoods could be fitted to luminaires to limit light spill into unwanted areas.

- » Proposed luminaires can use specially designed optics/construction to prevent excessive back spill and upward bleed (minimise sky glow). Luminaires should have a 0° tilt and be designed to have a ULR of <5%.
- » Dimming controls can be provided to automatically dim luminaires during curfew hours.
- » Some fittings could be provided with PIR sensors to provide automatic switching when not in use. This however should only be used for private fittings.
- » All street adoptable lighting will be to Hampshire CC Specification and should utilise the Mayflower CMS (controls and dimming system).

Table 6: General performance requirements for exterior spaces (BS EN 12464-2)

Type of area, task or activity	Em [lux]	Ra [min]	Uo [min]	GRL [max]
General circulation areas				
Walkways exclusively for pedestrians	5	20	0.25	50
Traffic areas for slowly moving vehicles (max 10km/h, e.g., bicycles)	10	20	0.40	50
Regular vehicle traffic (max 40km/h)	20	20	0.40	45
Pedestrian passages, vehicle turning, loading and unloading points	50	20	0.40	50
Parking areas				
Light traffic e.g., parking areas near schools	5	20	0.25	55
Medium traffic e.g., parking areas of colleges or universities, office buildings, sports and multipurpose building complexes	10	20	0.25	50
Heavy traffic e.g., parking areas of major conference venues, major sports and multi-purpose building complexes.	20	20	0.25	50

5. Lighting Impact Assessment

It is recommended that all areas are assessed using lighting modelling software at Detailed Design stages to understand predicted light levels of the new development and any required mitigation methods if negative effects are deemed possible.

5.1 Internal Distributer Roads

The internal distributer roads located on the east side of the site, provides transport from the north west to central east to south east areas. It is anticipated that it will be lit with street columns luminaires to the P3 lighting classification. The street lights on the road can produce light spill which can disturb sensitive receptors around the surrounding ecology.

5.1.1 Existing Residential Area

The central east internal distributer roads are nearby the existing residential area located east from the site.

The sensitive receptors include the existing residence in this area. The distance between the internal distributer roads and the existing residential area is small, hence impact here may be classed as minor adverse without mitigation, though likely neutral with suitable mitigation methods in place.

5.1.2 Green Infrastructure & New Residential Area

Along certain stretches of the road, the internal distributer roads are surrounded by green infrastructures and new residential areas.

The sensitive receptors include ecologically sensitive areas along certain areas of the green infrastructure, and the new residence in the new residential area. For most of the road, the distance between the internal distributer roads and the green infrastructure / new residential area is small, however it does cross a small area of the central green infrastructure, hence impact here may be classed as minor adverse without mitigation, though likely neutral with suitable mitigation methods in place.

5.2 Conclusion

The internal distributer roads have been evaluated to assess the residual effects that the site will have due to the proposed lighting proposals. Table 7 below summarises the residual effects of the site development.

As luminaires will be installed on the internal distributer roads, with no mitigation there will be negative lighting impact with minor adverse effects. However, if the luminaires are carefully considered to mitigate spill into the green infrastructure boundary and ecological buffer zones, and mitigation measures we discussed were applied, effects would be neutral. Measures such as:

- » Warmer Colour temperature LEDs
- » Dimming controls
- » Cowls, Shield or Hoods installed onto the luminaires
- » Applying Buffer Zones

However, this will require confirmation from the modelling assessments at the Detailed Design stages.

Table 7: Summary of residual effects

Area	Predicted Effect with No Mitigation	Predicted Residual Effect with Mitigation
internal distributer roads	Negative (Minor adverse effects)	Neutral

The methods of lighting and control provided within this report are proven methods for reducing light spill over the site boundary onto neighbouring areas and also to reduce sky glow from upward light distribution.

The purpose of the lighting scheme is ultimately to provide a safe and secure environment for the residents and also to minimise or eliminate any negative impact on the existing environment and ensure that the new development blends into the surrounding area.

This lighting assessment achieves the criteria in the Eastleigh Borough Council 'Local list for validation of planning applications', with the

exception to providing light calculations. Further lighting calculations will be required prior to construction to demonstrate mitigation of lighting impact. Due to the stage of development, it is not possible to provide layout plans indicating light spill.

The proposed scheme will be developed in conjunction with the One Horton Heath project team, Eastleigh Borough Council and recommendations from the planning committee.

Table 8: Residual effects table - ILP Professional Lighting Guide 4

Nature	Ref.	Level	Descriptions	Remedial needs
Positive	1	Major/substantial beneficial effects	Significant improvement in night environment and/or reductions in glare, spill light and sky glow etc.	
	2	Moderate beneficial effects	Noticeable improvement in night environment and/or reductions in glare, spill light and sky glow etc.	
	3	Minor beneficial effects	Slight improvement in night environment and/or reductions in glare, spill light and sky glow etc.	
Neutral	4	None/negligible	No significant effect or overall effects balancing out	None
Negative	5	Minor adverse effects	Slight increase in visibility of site, glare, sky glow etc.	Develop appropriate levels and type of mitigation
	6	Moderate adverse effects	Noticeable increase in visibility of site, glare, sky glow etc.	
	7	Major adverse effects	Significant increase in visibility of site, glare, sky glow etc.	

Appendix A: Glossary of Terms

Atmospheric Conditions

The amount of particle pollution and presence of moisture and other gases in the atmosphere. Light is scattered by the particles and that coming back to an observer below causes the veiling impact of Sky Glow.

Aura

Localised halo of light above a lit area, caused by direct upward light or reflections from the ground and other surfaces. More obvious where light units are grouped relatively close together and / or of high power.

Ballast

Ballast is located internally within a luminaire and forms part of the lighting control gear. The ballast regulates the light output of the luminaire.

Curfew

The time after which stricter requirements (for the control of obtrusive light) will apply. Often a condition of use of lighting applied by the local planning authority.

Colour Rendering Index (CRI)

Ability of a light source to match colours in comparison with a full spectrum light source such as daylight or a tungsten lamp. On a scale of 0 – no colour matching, to 100 – full colour matching.

Environmental Zone (E0 – E4)

A classification method developed by the ILP to match appropriate lighting controls to the local environment:

- » An E0 Zone is UNESCO Starlight Reserve, IDA Dark Sky Parks etc.;
- » E1 Zone is an intrinsically dark landscape;
- » E2 Zone as low district brightness;
- » E3 Zone is medium district brightness; and
- » E4 Zone is a City Centre location.

LED

Light emitting diode.

Lighting Illuminance

The illuminance or light level is the amount of light energy reaching a given point on a defined surface area, namely the luminous flux (i.e. lumens) per square meter. Illuminance is measured in lux.

Lux

The lux is the unit of illuminance and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square meter. In photometry, this is used as a measure of the intensity, as perceived by the human eye, of light that hits or passes through a surface.

Sky Glow

Wide area of night sky scattering direct and indirect upward light back to an observer. Depends on atmospheric conditions and the amount of upward light. Very typical above urban areas.

SON

High-pressure sodium discharge lamp. Typically, golden orange light or whiter light, but more modern versions available in a 'whiter' output. Very poor CRI of approximately 25.

SOX

Low pressure sodium discharge lamp. Orange light, essentially monochromatic, identifying only yellow colour with all others rendered as shades of grey. CRI 0.

ULOR

Upward light ratio output.

Uniformity (UO)

The uniformity of illumination is the lowest calculated illuminance and the average illuminance of the working plane. Uniformity is calculated to ensure the lighting design provides a uniform illuminance in line with the required standards.