LIGHTING STRATEGY

PROJECT: Barnsley Road, Denby Dale S38

PREPARED FOR: Yorkshire County Properties

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1. Introduction

1.1 General

1.1.1 The lighting strategy proposes good practice and outlines a suitable approach to apply to the installation of the lighting required to support the S38 Application. The aim of the strategy is to outline a minimally obtrusive approach to lighting, which is functional as well as ensuring sensitivity to the environment and sensitive ecology.

1.1.2 Lighting associated with the Proposed Development will comply with GN01:2020 - Guidance Notes for the Reduction of Obtrusive Light outlined by the Institution of Lighting Professionals (ILP).

1.1.3 The lighting strategy has been developed in line with recommendations outlined in industry standard guidance for sensitive ecology receptors. This seeks to ensure the lighting associated with the Proposed Development is minimally obtrusive.

2. Standards and Policies

2.1 Guidance

Guidance Notes for the Reduction of Obtrusive Light (GN01:2020)

2.1.1 The lighting strategy shall be informed by industry guidance notes which aim to reduce the potential for obtrusive light to occur, caused by poorly designed and installed exterior artificial lighting. The lighting strategy is informed by the most relevant sections of GN01/20 (published in January 2020) to reduce the potential for obtrusive light from a wide range of exterior lighting applications. Notably, the updated guidance has been specifically aimed at systems of flood lighting, as such some sections relating to luminaire source intensity are not applicable to this lighting strategy.

2.1.2 The environmental zone criteria detailed within **Tables 1** and **2** will form the basis for the lighting strategy.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5 +)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty etc
E2	Rural	Low district brightness (SQM ~ 15 to 20)	Sparsely inhabited rural areas, Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, Small town centres or suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

Table 1 Environmental Zone Descriptions

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

6. Astronomical observable dark skies will offer clearer views of the Milky Way and of other objects such as the Andromeda galaxy and the Orion Nebula.
7. Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their own relative intrinsic value in the UK.

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

Table 2 Obtrusive light criteria relating to each Environmental Zone

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

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

2.1.3 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)."

"Dark buffers, illuminance limits and zonation dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. Buffer zones rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in- to zones of increasing illuminance limits radiating away from the feature" (see **Figure 2**).

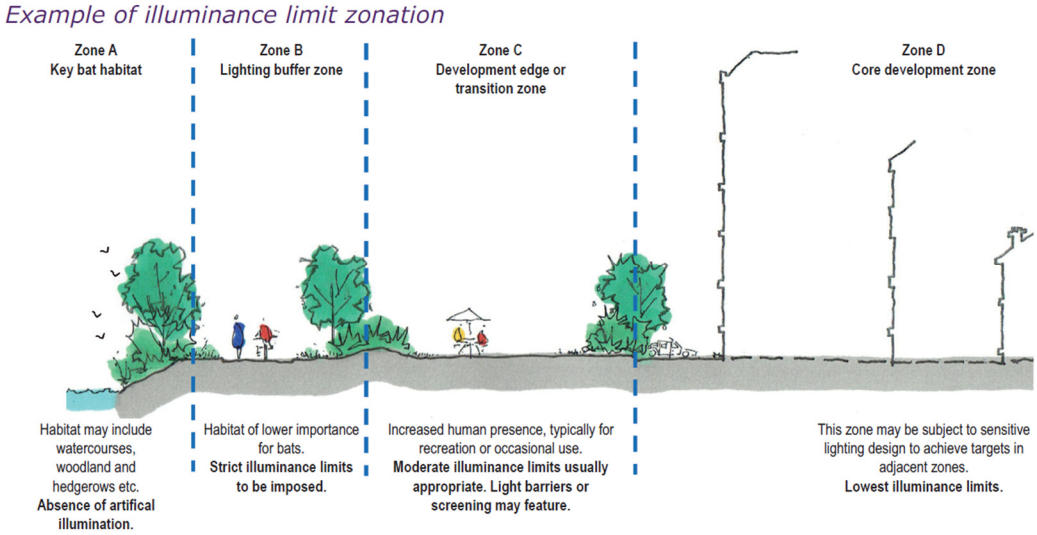


Figure 1 Example of lighting zonation near sensitive boundaries and known ecological habitats

2.1.4 The following must apply when choosing luminaires unless otherwise specified within the lighting performance criteria within this lighting strategy*:*

- *All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used.*
- *LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.*
- *Where possible a warm white spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component.*
- *Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).*
- *Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill. (See figure overleaf.)*
- *The use of specialist bollard or low-level downward directional luminaires to retain darkness above can be considered.*
- *However, this often comes at a cost of unacceptable glare, poor illumination efficiency, a high upward light component and poor facial recognition, and*
- *their use should only be as directed by the lighting professional.*
- *Column heights should be carefully considered to minimise light spill.*
- *Only luminaires with an upward light ratio of 0% and with good optical control should be used –See ILP Guidance for the Reduction of Obtrusive Light.*
- *Luminaires should always be mounted on the horizontal, i.e. no upward tilt.*
- *Any external security lighting should be set on motion-sensors and short (1min) timers.*
- *As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed."*

2.2 Relevant British Standards

2.2.1 Lighting design criteria outlined within *BS 5489-1:2020 – Code of Practice for the Design of Road Lighting – Lighting of Roads and Public Amenity Areas* is applicable to the proposed development.

3. Lighting Strategy

3.1 Brief

3.1.1 The lighting strategy has been developed in conjunction with the guidance outlined in ILP GN08/18 – Bats and Artificial Lighting in the UK, which outlines the considerations required for species that are significantly affected by lighting. Therefore, the lighting strategy is sensitive to ecology through the technical parameters such as colour temperature, which has a correlation with spectral power distribution. With this is mind, it is important that these factors are duly considered when evaluating light spill, as the technical properties of the light spill have also been designed to have less ecological impacts through the wavelengths of light contained within it.

3.1.2 The development will require lighting for safety, amenity and security during the hours of darkness. This section outlines the requirements and performance criteria to be applied to the lighting design, ensuring that it is fit for purpose and environmentally sensitive. This will be achieved through compliance with British Standards and lighting industry guidance as outlined in **Section 2**.

3.2 Environmental Zone

3.2.1 The Application Site is situated within the Kirklees Metropolitan Council district. In reference to **Table 1**, the Application Site is located within a '*Well- inhabited urban settlement'* where background ambient light levels are expected to be of *'medium district brightness.'*

3.3 Key Areas Requiring Lighting

3.3.1 Lighting will be required in the following areas of the Development:

- Adoptable Carriageway
- Adoptable Footway

3.4 Illustrative Lighting Zones

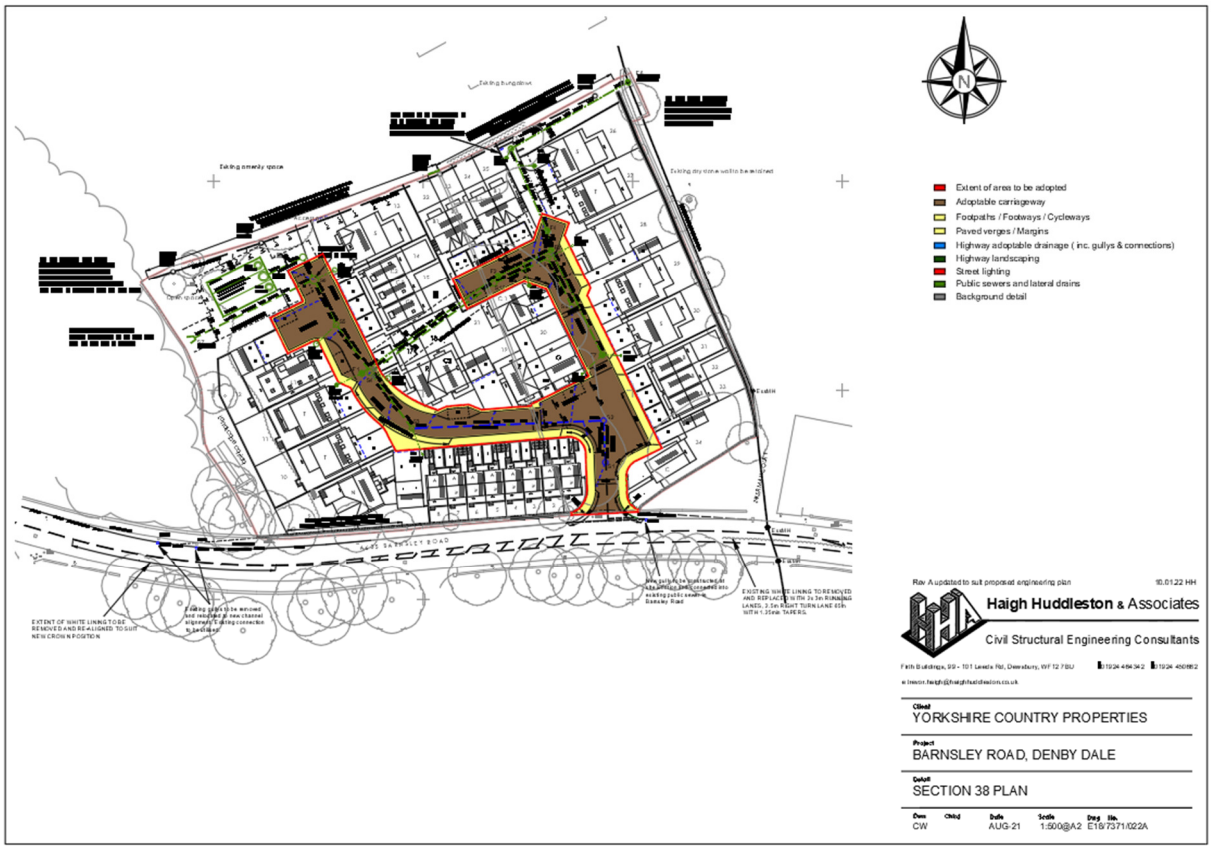


Figure 2 Illustrative Lighting Zone Plan (N.T.S.)

3.5 Barnsley Road, Denby Dale

3.5.1 Lighting will be required on Barnsley Road, Denby Dale for the safety and amenity of pedestrians, cyclists and vehicular traffic.

3.5.2 Lighting of Barnsley Road, Denby Dale will be compliant with the British Standards and Obtrusive Light Guidance outlined in **Section 2**.

3.5.3 Suitable lighting levels for Barnsley Road, Denby Dale are deduced from British Standard BS 5489-1:2020 (Table A.5 Lighting Classes for subsidiary roads with a typical speed of main user *v* ≤30 mph.

3.5.4 Lighting for Barnsley Road, Denby Dale will be designed to ensure safety during peak traffic flow in the winter months. As such, the lighting levels selected for the road reflect this. For energy efficiency purposes, it is possible for lighting levels to be dimmed in accordance with curfew hours.

3.5.5 Traffic flow at peak hours is determined as '*normal'*. The area is assessed as having a moderate level of ambient luminance, so a P5 lighting class is deemed appropriate. Further details on the lighting performance parameters are provided in **Table 2**.

3.5.6 Barnsley Road, Denby Dale will be illuminated using column mounted luminaires not exceeding 6.0 metres in height above ground level (AGL).

3.5.7 At 22:00pm, in line with lighting curfew hours noted in ILP GN01 – Guidance Notes for the Reduction of Obtrusive Light, lighting levels on Barnsley Road, Denby Dale will be reduced.

3.5.8 Luminaire correlated colour temperature (CCT) will not exceed 4000 Kelvin, which is considered neutral white and appropriate for the location of this development.

3.5.9 Luminaire performance parameters for Barnsley Road, Denby Dale lighting is outlined in **Table 3.**

Equipment Specification	Description
Location	Barnsley Road, Denby Dale
Correlated Colour Temperature (K)	4000K (maximum)
Luminaire Manufacturer	OrangeTek
Luminaire Model	Ignis Mini
Luminaire Style	Column Mounted
Light Source	LED [Light Emitting Diode]
Height	6.0 metres (maximum) (AGL)
Luminaire Tilt	0° (5° positive tilt for lamps N1 & N2)
Design Guidance	
Luminous Intensity Class	G2
Lighting Class	**BS 5489-1: 2020** - *Code of practice for the design of road lighting* P5 (*Ē* Average: 3.0 – 4.5 Lux / *E* Min: 0.6 Lux) (*BS5489 -1 :2020 Table A.5)*
Mounting Arrangement	Post Top (Column Mounted)
Control	Luminaires to be controlled by 20/20 lux photocell to ensure switch on at dusk and switch off at dawn. Luminaires to be dimmed between 22:00pm and 05:00am as per the following pre-programmed regime: 100% Dusk to 22:00 75% 22:00 to 00:00 50% 00:00 to 05:00 100% 05:00 to Dawn

Table 3 Barnsley Road, Denby Dale - Luminaire Performance Requirements.

3.5.10 Lighting for the proposed development will be controlled by photocells which will switch lighting on when daylight has fallen to below 20 lux. This generally occurs during the civil twilight phase (30 minutes after sunset). So lighting during the months between April and September will only be in use during the later period of the evening.

3.5.11 Luminaires on lamp columns N1 & N2 will installed at a 5 degree positive tilt. This is necessary to appropriately illuminate the wide section of road near the site entrance without resorting to the use of higher output luminaires, which would have the adverse effect of raising the average illuminance levels for the site.

4. Conclusion

4.1.1 The lighting strategy outlines the criteria for the lighting design of the Proposed Development to ensure that the lighting is fit for purpose, whilst maintaining sensitivity towards the environment through compliance with relevant British Standards and Guidance.

4.1.2 To ensure that the potential for obtrusive light is minimised, it is necessary to restrict the mounting heights of the luminaires, tilt angle, colour temperature and lumen output of exterior light sources to those specified in **Section 3**.

4.1.3 The exterior lighting outlined in the lighting strategy shall comply with the requirements for an E3 Environmental Zone as per **Table 1**.

4.1.4 Compliance with the lighting strategy will allow a safe and sensitive level of light for way finding and guidance at night, whilst limiting obtrusive light to a negligible level and in compliance with ILP GN01:2020 and GN08/18, which seeks to reduce light spill onto sensitive boundaries.

4.1.5 The lighting strategy has been developed in conjunction with the guidance outlined in ILP GN08/18 – Bats and Artificial Lighting in the UK, which outlines the considerations required for species that are significantly affected by lighting. Therefore, the lighting strategy is sensitive to ecology through the technical parameters such as colour temperature, which has a correlation with spectral power distribution. With this is mind, it is important that these factors are duly considered when evaluating light spill, as the technical properties of the light spill have also been designed to have less ecological impacts through the wavelengths of light contained within it.

Appendix 1 – Proposed Site Plan

Quantity	Symbol	Type of Lighting Unit
2		Proposed 6 metre Steel column with Spigot Mounted LED5 OrongeTek IGNIS mini 20 MPH 4.0_70_203_2168_2 (13w) 2.17klm lantern c/w 5 degree tilt
6		Proposed 6 metre Steel column with Spigot Mounted LED5 OrongeTek IGNIS mini 20 MPH 4.0_70_203_2168_2 (13w) 2.17klm lantern

Grid 1
Results – Horizontal Illuminance (lux)
Eav= 4.16
Emin= 0.60
Emax= 9.75
Emin/Emax= 0.06
Emin/Eav= 0.14
Emax/Eav= 2.34

Luminaire Data
Luminaire B IGNIS mini – 20 LEDs, MPH, 4000K, 0203mA, Opt2 Lamp OSRAM SQUARE CRI70 SPR1.57 4000K N7 MF 0.76

Key
- Luminaire B Column
- Beam Aiming Target
- Photometric Centre

All Dimensions in metres



NOTE

Lighting column erections should only be called off once the adoptable back edge (pin kerb) has been installed on site and there are levels to work to.

The footway wearing course should not be laid until the lighting column/s have been erected and serviced.

Ducting Requirements for connections to street lights in-fans required

Please refer to the ENATS 12-23 & 24 regulations for specific ducting requirements. Ducting must be installed at correct depths as per NJUG 7 requirements.

Summary of Ducting Requirements

Please note that it is now mandatory for all electrical service ducting & road crossings to have 2.5mm thick Warning Tile Tape installed above them to offer warning of the presence of the electrical cable below. Marker tape is no longer adequate.

The tile tape must be 150mm wide, cleanly cut and square with no sharp edges. The tile should be terminated with suitable identification complying with ENATS standard 12-23 and meet impact requirements of BS3416. It should be installed 100mm above mains electric duct and 75mm above services ducting duct

The Tile Tape can be purchased from a number of manufactures & building supply companies including Jewsons. The Ironage Code for Northern is EXCONT 08.
The Tile tape MUST be embossed with the Northern Powergrid logo or it will be unsuitable.

Ducts shall be installed as straight as possible in one earthworks run and in one trench. Please ensure that service duct is at 90o to any road crossings. Please ensure the road crossing is free for 10ft's clear. You will need to install one duct per service. Please ensure that draw cords are installed in the ducts and that the services duct meets the back of the footpath.

Electric service ducts UNDER FOOTPATHS

Must be black 38mm diameter, at a depth of 450mm below the final surface level. Duct must be of rigid type UPVC or HDPE, smooth walled with a smooth inner surface. They must be indelibly and clearly marked with the legend "ELECTRIC CABLE DUCT".

Electric service ducts UNDER ROADS

Must be black 125mm diameter, at a depth of 900mm below the final surface level. Duct must be of rigid type UPVC or HDPE, with corrugated outer and smooth inner surface, and must be indelibly and clearly marked with the legend "ELECTRIC CABLE DUCT".

UNDER NO CIRCUMSTANCES MUST THE DUCT & TILE TAPE BE ENCASED IN CONCRETE!

Please read electricity Acts which considers to prevent the ingress of water service. Each one on as may cause delays and extra costs. If you are in any doubt as to the requirements regarding ducting please contact your Northern Powergrid Representative.

Materials

You must provide your own electricity service duct, road crossing duct, warning tile tape and cabinets. The costs of these items have been included in the price of your quotation. Service and Mains cable are provided and installed by Northern Powergrid.

- *Please note that in the event of a Site Manager changeover, this document MUST be passed on to the new Site Manager as their he/she is made aware of all the Developer's responsibilities.*
- *Should the new Site Manager wish to discuss these responsibilities, please contact your Northern Powergrid Representative to arrange a meeting*

REF.	DATE	REVISIONS

Kirklees COUNCIL

Directorate of Place
Civic Centre 3, Market Street
Huddersfield, HD1 2TG

SECTION: Street lighting		
DRAWN: JRD	CHECKED: YA	
SCALE: 1:500	PROJECT NO.: S38	DATE: Feb 2022

PROJECT
Barnsley Road dev
Denby Dale
Yorkshire County Properties

TITLE
Proposed lighting
BS5489–1:2020
Lighting class P5

DRAWING No. 6713

CAD No.

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Appendix 2 – Indicative Light Spill Diagram – Full lighting levels (dusk – 10:00pm)

