



UoM Dalton Ellis Roadway lighting

Nocturnal wildlife-friendly lighting design

Job number:	EA0039	Number of Pages:	13
Prepared by	K Munnich and Jason Reynolds MSc MCIEEM	Date:	01/07/25
Reviewed (signature)		Revision	03



CONTENTS

PAGE

1.0	Introduction	1
2.0	Personnel.....	3
3.0	Surveys	4
4.0	Existing lighting.....	6
5.0	Lighting design evolution.....	7
6.0	Conclusions and recommendations	11
7.0	Comparison schedule	12

1.0 Introduction

- 1.1.1 In January 2025, Troup Bywaters + Anders and Simply Ecology Limited were commissioned by The University of Manchester to integrate a nocturnal wildlife-friendly design of lighting into proposals for new lights to pedestrian access and vehicle parking areas needed for students and visitors at Ellis Halls of Residence, University of Manchester. See Plan 1 for Site Location.
- 1.1.2 This note has been prepared to detail the measures that have been undertaken in developing the external lighting to consider ecological implications upon nocturnal wildlife, specifically bats and their habitats.
- 1.1.3 The Dalton Ellis Campus development has various lighting requirements in the external environment including;
- Illumination at the entrance to the rear service yard and car park
 - Lighting to pedestrian footpaths, particularly through the service yard that pose greater risk to the public at night.



Plan 1: Bird's-eye view of the sinuous site access road to be illuminated (Ellis Halls in scaffolding).

- 1.1.4 In carrying out the design, the lighting engineer and the ecologist have worked together using a number of documents, including;
- i. BS 8300; *Design of an accessible and inclusive built environment*; Part 1: *External environment* – Code of practice
 - ii. BS 8300; *Design of an accessible and inclusive built environment*; Part 2: *Buildings* – Code of practice.
 - iii. Institute of Lighting Professionals: Guidance Note 01/21, *the reduction of obtrusive light*
 - iv. The Society of Light and Lighting; Lighting Guide 6: *The exterior environment*
 - v. BS EN 12464; *Lighting of work places*; Part 2 *Outdoor work places*
 - vi. BS EN 13201:2015; *Road lighting*; Part 2: *Performance requirements*
 - vii. BS 5489-1:2020; *Design of road lighting - Lighting of roads and public amenity areas*. Code of practice
 - viii. Bat Conservation Trust / Institute of Lighting Professionals; Guidance Note 08/23, *Bats and artificial lighting at Night* (Bats and the Built Environment series).

2.0 Personnel

- 2.1.1 Kevin Munnich has carried out the design of the external lighting for the service road/parking areas within the Dalton Ellis Campus. Kevin has worked for Troup Bywaters + Anders since 2007 and has carried out design work for the University of Manchester since 2018. Kevin is an experienced electrical design engineer employed within building services since 1977 (48 years' experience) and has worked on numerous lighting designs for both internal and external environments. His on designs take into account the ecological, arboreal environments and also in reducing upward light, working towards the dark skies initiative plan.
- 2.1.2 Jason Reynolds MSc MCIEEM carried out all bat surveys and provided the ecological expertise to co-author this document. Jason started Simply Ecology Limited in 2007. Jason is an experienced ecologist who has been continuously employed in the field of nature conservation since 1995 (30 years' experience) and has a wealth of experience in both the statutory nature conservation agencies and private consultancy. During his career has worked in Conservation Officer roles for the Joint Nature Conservation Committee, English Nature, Environment Agency, Cumbria Wildlife Trust and Durham Wildlife Trust prior to setting up Simply Ecology ecological consultancy in 2007, where he is the Lead Ecologist. He has an MSc from The University of Aberdeen and his thesis investigated the relationship between habitat type and complexity and the foraging behaviour of *Pipistrelle* bats. Jason holds protected species survey licences for all British bats.

3.0 Surveys

- 3.1.1 Bat surveys undertaken by Simply Ecology of Ellis Halls of Residence in 2022 identified the presence of bats roosting in the south facing gable end of the Halls (see Plate 1). To summarise, the level of bats activity at the site was low, with all bats flying away from the roost and away from Anson Road. This was unsurprising given the very high levels of illumination and lack of greenspace the dense urban nature of the wider environment to the East, which the Ecologist judged had very little habitat suitability for bats. Bats flew away from the roost via the parts of the site with grassland and mature trees, to the West of the Halls. In the experience of the ecologist, overall levels of bat suitability and activity were in line with their findings elsewhere in NW England and expectations for such an urban site.
- 3.1.2 The refurbishment of Ellis in 2023 required the presence of an Ecological Clerk of Works to ensure that no bats were disturbed or the bat roosts damaged during replacement of the roofing material. This was completed like-for-like in Spring 2023, the time of year when bats were least likely to be present.

The gap bats use to access the top of the wall plate was retained and reinstated after the works were complete via a stand-off between the brickwork and the soffit (see Plate 2).

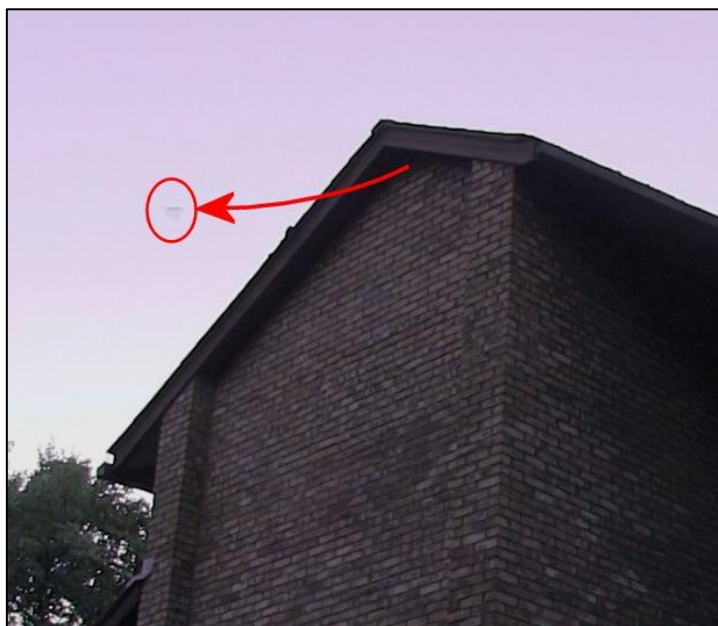


Plate 1: A small bat roost for up to 3x common pipistrelle is present on the south facing gable of Ellis halls.



Plate 2: The renewed soffit maintained the roost access for bat via a stand-off from the brickwork.

4.0 Existing lighting

- 4.1.1 The existing flood lighting consists of area floodlights with a colour range of between 4000 Kelvin and 6500 Kelvin, the exact details are not known so the above colour range has been assumed for the purpose of this design note.
- 4.1.2 The current lumieres have not prioritised downward illuminance, and light spills out above the horizontal plane into the wider environment.
- 4.1.3 Currently the existing external lighting is timeclock and photocell controlled to avoid operation in daylight hours. This is controlled by a common central system installed on the garage wall. The lighting is operational during the hours of darkness. The luminaires are controlled based on: -
 - a) Luminaires activated based on a set, timeclock schedule
 - b) Luminaires switched on/off when the external illumination level reaches a set level.

5.0 Lighting design evolution

- 5.1.1 Please refer to TB+A drawings EA0039-E-63-SP-003 and EA0039-E-63-SP-004 that provides details of the lighting design and lighting levels.
- 5.1.2 An initial design for lighting was produced which would provide a modern solution, but which only took into account the needs of pedestrians and vehicles using the site. This was the Starbeam Eco, the details of which are listed in Table 1.
- 5.1.3 Following discussions between the lighting engineer and the ecologist, two further designs were considered, the Acorn and the Starbeam Eco with 2700k lumieres.
- 5.1.4 The design process incorporated key elements from ILP/BCT Guidance Note 08/23 with the objective of including all of the following features:
 - i. All luminaires are LED that do not emit UV light (metal-halide and fluorescent sources are not used).
 - ii. LED luminaires have been selected as they provide a sharp cut-off, low intensity, good colour rendition and dimming capability.
 - iii. A warm white spectrum (2700Kelvin) has been adopted as it is suitable for wildlife (to reduce the blue component from the light spectrum).
 - iv. LED peak wavelengths higher than 550nm (component of light most disturbing to bats).
 - v. Column heights have been kept to a minimum to minimise light spill.
 - vi. The Luminaires selected have no upward light component
 - vii. Any external lighting on motion-sensors will be set on short timers.
- 5.1.5 We have endeavoured to find a balance between lighting level appropriate to the ecological nature, of the site, and the lighting requirements for users.
- 5.1.6 In comparison with the baseline existing lighting, the new external lighting design incorporates LED luminaires with a colour range of 2700 Kelvin. These have been put forward to accommodate the presence of bats.
- 5.1.7 The lighting has been designed to address the requirements identified in the brief by the UoM, providing adequate illuminance for safety and security whilst minimising light pollution. Lighting has been designed to a minimum, safe limit throughout, with consideration to lighting codes.
- 5.1.8 The proposed luminaires would be provided with integral PIR's (presence detection) and photocell sensor, these will be use alongside time scheduling to control the operation of the luminaires. The

photocell will, when the external illumination level drops to a set level will bring the luminaires on at a minimum illumination level, this will be maintained until the integral PIR senses movement within the area and brings the luminaires up to their full intensity which will be maintained for a set period of time. Once the PIR sensors do not detect movement for a set period (time duration to be agreed) will then reduce the luminaire output back down to its minimum illumination level.

- 5.1.9 Luminaires throughout have been chosen to utilise low column lighting (5m due to the location of adjacent residential buildings and the possibility of vans and lorries being present in the service yard) with a vertical downward illuminance. Columns have been chosen in lieu of bollard luminaires, to provide greater durability and lower risk of damage.
- 5.1.10 Please refer to TB+A drawings EA0039-E-63-SP-001 that provides details of the lighting design.
- 5.1.11 As noted above the lighting controls will be provided with photocell, timeclock and presence detection. The controls will therefore allow the adjustment of timeclock setting and lighting levels to respond to ecologist advise such as dusk/dawn requirements, seasonal control or according to human activity.
- 5.1.12 Finally, the lighting controls will be adjusted at the commissioning stages with ecologist input and review, to provide the optimal control solution.
- 5.1.13 A summary of the calculated lighting levels is given in the Tables 1-3 below so that these can be compared: -
- 5.1.14 Table 1: Was the Initial Option No 1 – Starbeam Eco 31W 4000K which was produced to meet the design specification for users but did not take into account nocturnal wildlife. It has been shelved, but details of the scheme are provided here to demonstrate the evolution of the design and how wildlife friendly design features have subsequently been integrated.
- 5.1.15 Table 2: Option No 2 – Acorn 27W 2700K. This is a far more suitable design than the Starbeam, but overall was not considered to be as strong as candidate as the Starbeam with 2700K lumieres.
- 5.1.16 Table 3: Option No 3 – Starbeam Eco 31W 2700K. A comparison of the overall LUX levels makes this the final and preferred option for use at the site.

Table 1 - Starbeam Eco 31W 4000K: Summary of Option No 1 Scheme calculated Lux levels, to external areas.

Location	Calculated illuminance (Lux)			
	Avg	Max	Min	Min/Avg
(01) Parking	5.65	9.26	2.40	0.42
(02) Parking	14.0	22.5	7.79	0.56
(03) Parking	24.3	48.0	14.7	0.60
(04) Bin Storage	30.1	49.2	15.3	0.51
(05) Parking	16.5	24.6	13.1	0.79
(06) Parking	15.9	18.7	13.6	0.86
(07) Parking	14.7	20.8	9.35	0.64
(08) Crossing	22.5	35.6	16.6	0.74
(09) Pedestrian Walkway	38.5	52.1	18.0	0.47
(10) Roadway	17.0	38.3	5.91	0.35

Table 2 - Acorn 27W 2700K: Summary of Option No 2 calculated Lux levels, to external areas (EA0039-E-63-SP-003).

Location	Calculated illuminance (Lux)			
	Avg	Max	Min	Min/Avg
(01) Parking	8.38	16.4	3.86	0.46
(02) Parking	25.4	33.1	19.0	0.75
(03) Parking	21.3	37.3	16.4	0.77
(04) Bin Storage	32.3	37.3	23.3	0.72
(05) Parking	24.7	31.6	16.8	0.68
(06) Parking	19.1	27.6	12.9	0.67
(07) Parking	17.1	25.2	11.5	0.67
(08) Crossing	32.2	41.4	22.2	0.70
(09) Pedestrian Walkway	32.7	42.5	11.9	0.36
(10) Roadway	18.5	28.0	6.37	0.34
(11) Roadway	16.3	30.1	7.54	0.46

Table 3 - Starbeam Eco 31W 2700K: Summary of Option No 3 calculated Lux levels, to external areas (EA0039-E-63-SP-004). Preferred Design

Location	Calculated illuminance (Lux)			
	Avg	Max	Min	Min/Avg
(01) Parking	8.94	12.1	5.41	0.61
(02) Parking	17.8	27.7	12.7	0.71
(03) Parking	13.4	21.7	10.4	0.48
(04) Bin Storage	20.7	24.4	17.1	0.70
(05) Parking	15.3	22.0	11.2	0.73
(06) Parking	10.7	14.2	6.08	0.57
(07) Parking	10.5	16.8	5.14	0.49
(08) Crossing	24.5	28.9	20.2	0.82
(09) Pedestrian Walkway	16.5	29.2	5.37	0.33
(10) Roadway	15.0	22.4	4.5	0.30
(11) Roadway	12.4	24.8	4.94	0.40

6.o Conclusions and recommendations

- 6.1.1 In January 2025, Troup Bywaters + Anders and Simply Ecology were commissioned by The University of Manchester to integrate a nocturnal wildlife-friendly design of lighting into proposals for new lights to pedestrian access and vehicle parking areas needed for students and visitors at Ellis Halls of Residence, University of Manchester.
- 6.1.2 It is recognised that the existing site is subject to high levels of light, from the existing dated lighting and also from sources beyond the control of the project such as the Anson Road public realm lighting. A lighting design suitable for pedestrian and vehicular access which is strongly focussed on nocturnal wildlife also present at the Halls of Residence has been achieved through collaboration between the lighting engineer and ecologist. Several iterations were assessed, and the overall summary of these is provided in Section 7.o. The final selection of Option 3 includes key elements in relation to lighting and nocturnal wildlife to provide a tailored design for the site which reflects current guidelines.
- 6.1.3 As part of the design, other options to potentially benefit bats, such as hedgerow or tree habitat screening, which would provide dark area for bats were considered. Unfortunately, the layout of the site buildings and hardstanding does not lend itself to incorporation these soft landscaping mitigation features. Nonetheless a robust lighting scheme is proposed which incorporates key features from ILP/BCT 2023 and which compares very favourably to the existing lighting at the site.
- 6.1.4 *It is recommended that the local planning authority accept the proposed lighting scheme Starbeam Eco 31W 2700K Option No 3 as it will deliver an improvement in terms of night time illumination of the Ewings site.*

7.0 COMPARISON SCHEDULE

The schedule below is a basic comparison of all existing external lighting and the options assessed for the Dalton Ellis access road and service yard.

System	No of Columns	Heads per Column	Column Height	Lamp Wattage	Lumin Output	Colour Rendering	Upward Light Output	PIR	Time Clock + Photocell	Lux Levels
External Council Lighting	5	1	10m	Unknown	Unknown	2000K Assumed	20-30% Upward	No	Yes	Not known
Existing Site Lighting	8	2	4m	30w Assumed	3000 lumens Assumed	6500K Assumed	No Control	No	Yes	
Option 1 Initial Proposed Lighting	14	1	5m	31w	4225 Lumens	4000K	0%	No	Yes	Refer to schedule in section 6
Option 2 Proposed Lighting	14	1	5m	27w	4775 Lumens	2700K	0%	Yes	Yes	Refer to schedule in section 6
Option 3 Proposed Lighting	14	1	5m	27w	4775 Lumens	2700K	0%	Yes	Yes	Refer to schedule in section 6