



MOLONEYFOX
CONSULTING ENGINEERS

19.1849

**SITE LIGHTING DESIGN REPORT
ROSSHILL, CO. GALWAY
FOR KEGATA LTD.**

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1.0 Executive Summary

This report outlines the design intent and considerations to be taken with regards to bat populations in conjunction with the proposed development, Rosshill, Co. Galway

The report outlines the lighting design as developed by Moloney Fox Consulting The lighting design has been developed with the following principal considerations:

- To minimise the impact of lighting on the bats natural habitat.
- Provide adequate illumination to contribute towards the safe use of the proposed pathways, roads and buildings
- Contain the lighting within the site.
- Minimise light pollution and visual glare to the surrounding neighbourhood
- Provide a visually interesting environment.

The complete external lighting installation will be designed in accordance with the regulations for electrical services as ETCI National Rules for Electrical Installations ET101:2008 as well as consideration of relevant publications including “The Effect of Street Lighting on Bats” (2008) by Matt Emery, and “Bats and Lighting” (2014), Emma Stone - University of Bristol/Bat Conservation Trust.

The predicted performance of the external lighting installations has been assessed in detail using Lighting Simulation software.

Our design intent comprises of column lighting for the pathways and site roads is described in Section 4.0. An indicative example of the type of proposed luminaires (light fittings) have been included, with accompanying images.

An accompanying layout drawing indicates the proposed locations of light fittings and the calculated light levels from the simulation.



2.0 Design Guidelines

A study of artificial light sources and controls was undertaken by Emery (2008) and concluded that shielding and masking of street lights using internal or external louvres, can reduce light spillage by as much as 97%. He recommends that due to their high cost, they are used where the lighting is extremely close to bats. In other areas he recommends that shields can be used which reduce light spill by up to 40%.

Emery considered several lamp types in his analysis, but not however LED sources, which were not as prevalent for external street lights then as they are now.

A comprehensive study by Emma Stone (2014) University of Bristol/Bat Conservation Trust, entitled "Bats and Lighting", considers the optimum means to mitigate the effects of artificial lighting on bats. This study concludes that the type of light fitting with the lowest negative impact on bats are :

- Narrow Spectrum Lights with no UV content
- Low pressure sodium and warm white LED*
- Directional downlights - illuminating below the horizontal plane which avoid light trespass into the environment

The study highlights that warm Low Pressure Sodium and Warm White LED sources have a low relative attractiveness for insects, and therefore least effect on bat prey items.

This study also proposed that lighting control regimes be considered such as dimming lights at certain times, in order to reduce illumination and spill. It is also suggested that lights could be dimmed during periods of low human activity (e.g. 12.30AM to 5.30AM).



3.0 Proposed Site Lighting Design

The proposed scheme comprises primarily of LED luminaires on 6-metre high poles for pathways and roadway areas, located as per drawing 19.1849/E100.

The quantity of luminaires has been calculated to achieve an average illuminance on pathways and roads of 6.3/6.8 Lux with a minimum lux of 1.2.

This complies with Class P3 of IS EN 13201/BS5489 for residential roads and pathways with a S/P ratio of 1.4 (6.0lux average, 1.2 minimum)

The proposed light fitting/scheme has the following features which will help mitigate the effect of the artificial lighting on the bat population:

- Warm White LED light source – less attractive to insects, and a good light source to enable directional luminaires
- Internal Louvres – to reduce light spill and eliminate upward light
- Lowest possible design illuminance levels considering the nature of the site
- Planting will be provided at the perimeter of the car park on the west of the site in order to minimise light spill



Figure 1: Proposed Luminaire

Simulation Results

The results of the simulation calculations are indicated on drawing 19.1849/E100. The results may be summarised as follows:

- Average ground illuminance on road / pathways of 6.3 / 6.8 Lux
- Minimal light spill
- Zero lux light spill
- Zero Lux up light over the entire assessed area of the site
- 0.5 Lux contour line indicated for information



4.0 Conclusion

The proposed lighting scheme has been carefully considered in order to minimise the effect on bat populations.

The Scheme comprises primarily of pole mounted Warm White LED fittings with internal louvres. The Warm White LED light source has the least negative impact on insects and bat prey items as identified in previous studies and is also a compact light source which enables easier control of the light spread.

The internal louvres minimise light spill, particularly to the rear of the fitting, and also completely eliminate any upward light from the fittings. Internal louvres are a recommended strategy for reducing the impact of lighting on bats as identified in previous studies.

The fittings at the will be angled up to 15 degrees to further reduce light spill.

The design light levels (e.g. 6 lux for pathways and roadway areas) have been chosen in order to both comply with Irish Standards for external lighting, while at the same time maintaining light levels as low as practically possible considering the safety of people on site, the locality, and the proximity of bats to the site.

In addition, the site lighting could be dimmed to 50% of its standard brightness during a 5 hour period late at night when human activity on the site will be lower in order to further reduce the impact of the site lighting on bats.