

A lighting solution

minimizing the night-time disturbance of bats



Urban populations are rapidly growing, and so are urban spaces. One of the consequences of increasing urbanization is that more light is needed. LED, due to its clear advantages such as high efficiency, the possibility to have connected lighting, and the reduced maintenance needed, is becoming the preferred lighting source. However, while providing safety and visibility, the night-time emissions of poor-quality LED lighting can disturb the activities of nocturnal creatures such as bats.

The importance and protection of bats

Bats are highly beneficial mammals that have a significant impact on controlling insect populations. In agricultural areas for example, bats are highly effective at controlling agricultural pests, leading to economic benefits for farmers.

Moreover, bat populations have the potential to be robust natural indicators of the health of our environment. This is because they are very sensitive to pressures such as climate change, agricultural intensification, pesticides, and land-use changes. They can also complement other taxonomic indicators by providing information on the night-time environment.¹

It is therefore no surprise that official bodies and communities are putting more efforts into the conservation of these mammals. The Habitats Directive published by the European Union covers all bat species living in the area of the EU. Its overall objective is to maintain and restore the natural habitats and species of wild fauna and flora that are of community interest. The Directive requires all Member States to undertake positive measures to ensure their populations reach a favorable conservation status.

Lighting is certainly one of the key areas of consideration when it comes to creating ideal conservation situations for bats. Poor-quality artificial lighting negatively influences the night-time behavior of certain bat species in various ways:

- (In)direct effects on maternity colonies, hibernation sites and roosts.
- Affecting commuting routes, e.g. by creating a barrier over lit roads.
- Interfering with feeding activity, including prey distribution and intra-bat species competition.
- Higher risk of predation at illuminated roost sites.

Recent research from 2017 shows that white light LEDs have made slower flying species stop drinking water at cattle troughs and reduce the drinking behavior of faster flying species. To learn more about the research, go to www.bats.org.uk

Current solutions to mitigate the effects of poor-quality lighting include limiting the use of artificial light or even turning it off completely. But these measures can potentially lead to safety issues for humans. Recognizing this conflict of interest, Signify initiated the research and development of a dedicated light recipe to ensure that bats' night-time activities are not disturbed while providing sufficient light for human activities.

A light recipe limiting the night-time disturbance of bats

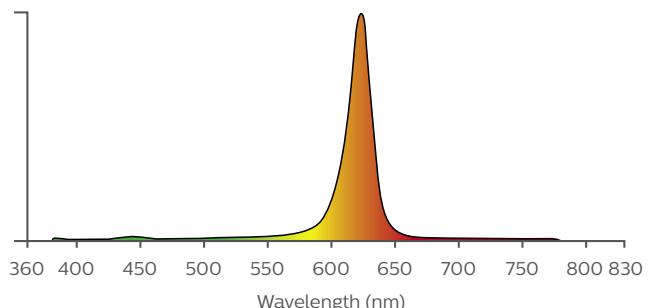
We developed a special light recipe to limit the night-time disturbance of bats. The recipe was the result of extensive research conducted at eight different sites in the Netherlands over seven years.

The study tested the response of three species of bat to three different experimental light spectra in an otherwise dark and undisturbed natural habitat. [If you would like to read the full research report, please contact us.](#)

The research was conducted in cooperation with leading universities such as the University of Wageningen and various environmental and non-profit organizations. The result is a new light spectrum designed for animals that are distracted by short wavelength light, while at the same time offering sufficient comfort and safety for people. It has no impact on the activity of bats, while people have enough light to operate or drive safely.

This new light recipe that has no impact on bat activity fulfils the following specifications:

- RA=60*
- T(K) = 1000K
- Luminaire efficacy 88-91 Lumen/Watt for DigiStreet, 71-83 Lumen/Watt for LumiStreet/UniStreet
- Between 85% and 95% of the spectral power (W) is between 590 nm and 780 nm.



*When dimming, the Ra will go below 60; but will still remain above 50

The light recipe is already available with two Philips LED luminaires designed for road and street applications. Both feature flat glass and are available with a range of optics to ensure the best possible lighting depending on the requirements of the application.

The light sources are available with the following lumen packages:

1. 2500 lumen (LED25)
2. 3300 lumen (LED33)
3. 5400 lumen (LED54)
4. 10000 lumen (LED100)

The standard available optics cover the most common application geometries from narrow to very wide road widths.

Available optics

DN10 | DM11 | DW10 | DX51



¹ Stone, Emma & Harris, Stephen & Jones, Gareth. (2015). Impacts of artificial lighting on bats: A review of challenges and solutions. Mammalian Biology - Zeitschrift für Säugetierkunde. 80. 10.1016/j.mambio.2015.02.004.

Case study

Nieuwkoop in the Netherlands

To ensure that its population of rare bats is not disturbed by its new housing program and associated artificial lighting, the municipality of Nieuwkoop in the Netherlands installed Philips streetlights with the specially designed color and wavelength in the Zuidhoek area.

The lights have no impact on the normal nocturnal behavior of bats, while ensuring good visibility for residents. To encourage citizens to embrace the concept of wildlife protection, the municipality distributed light bulbs incorporating the same light recipe to residents, that they could place in their gardens.

To further optimize light levels, the municipality installed our Interact City remote light management system to ensure that light is only on when it's needed. They can now also enjoy functionalities like light scheduling and set up an annual dimming calendar.

“The key aspect of the project was to create a natural landscaping concept in which the housing program does not impact local wildlife.”

Robert Jan Vos, Independent Lighting Designer



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