



# Complete inventory of light pollution in the municipality of Putte (Belgium)

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## Introduction

Putte (Belgium, Flanders Region) is a small municipality of 15,395 inhabitants and 3,495 ha (8,636 acres) near Maline (Mechelen). It has four towns: Beerzel, Grasheide, Peulis and Putte. To get an idea of the amount of light pollution, the municipality asked us to make a full inventory of public lighting (= street lighting), lighting of public buildings and offences of the limited laws concerning light pollution.

## Methods and material

### 1. Street lighting

We made an on site visit of every street during night and measured the pole distance and took pictures of every type of street lighting. These pictures were taken with a Canon EOS 300D camera who took RAW images. The RAW images were processed with the RAWTOLUM-software by Jan Hollan. This software calculates the luminance for each pixel. It divides the image in to a grate of 48 x 36 cells and calculates the mean luminance for each cell in the grate. This allows us by examining the processed images to get an idea of the luminance on the road surface and elsewhere.

We got access to the data from the energy provider concerning the types of luminaires, pole height and the time they are switch on. This data and the data from the processed images is combined to give list of good and bad street lighting.

### 2. Lighting of public buildings

All public buildings ( 4 churches and the town hall) were visited during night. The kind of lighting of these buildings was noted and pictures were taken. The pictures were processed in the same way as the pictures of the street lighting. For each building the report stated the good and bad elements of the lighting.

### 3. Offences of the limited laws concerning light pollution

In Flanders there are only two laws concerning light pollution. The first law is an Regional environmental law which has 4 articles about light pollution. The first article states "everyone should take the necessary actions to prevent light pollution". The second article states "the use of outdoor lighting is limited to what is necessary for the activity and safety of persons" and "lighting should be made to limit non-functional light trespassing to the surroundings". The third article states "lighting to get attention should be limited to the object to be lit". The last article states "advertising lighting can't be brighter than the street lighting".

The second one is the Federal traffic law which bans lighting that can cause glare on roads.

We made visits during night of the whole municipality to note all industrial areas, sports centers, houses, gardens and advertising lighting and noted all offences of these articles.

### 4. Maps

We made two maps. One map shows the location of each type of offence per offender (e.g. municipality, sport clubs, companies, civilians) and per type of lighting (parking lighting, garden lighting, sportfield lighting, area lighting, advertising lighting and attention lighting) (see below). The second map shows the location of good and bad luminaires for street lighting per type of luminaire.

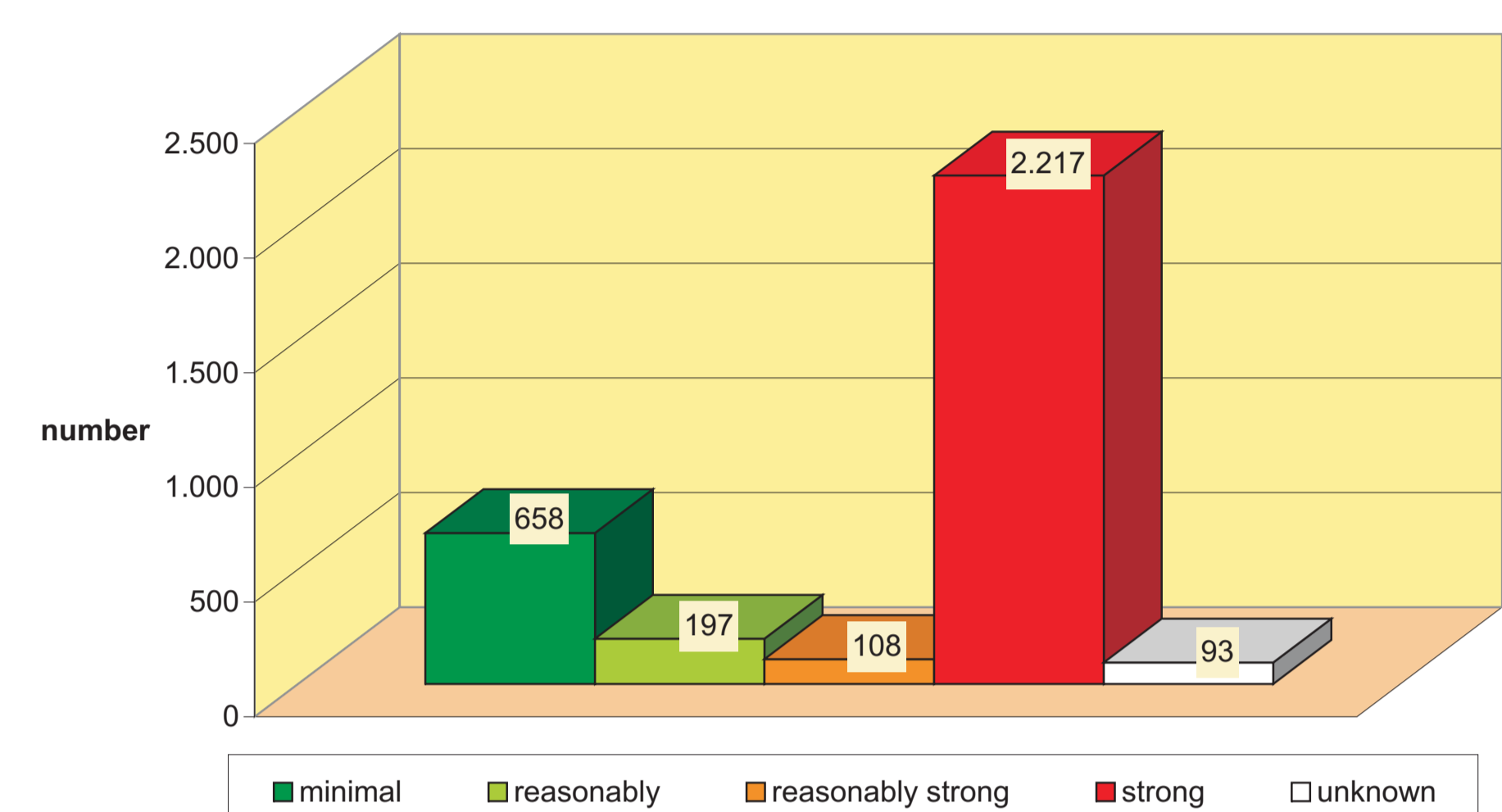


## Results

### 1. Street Lighting

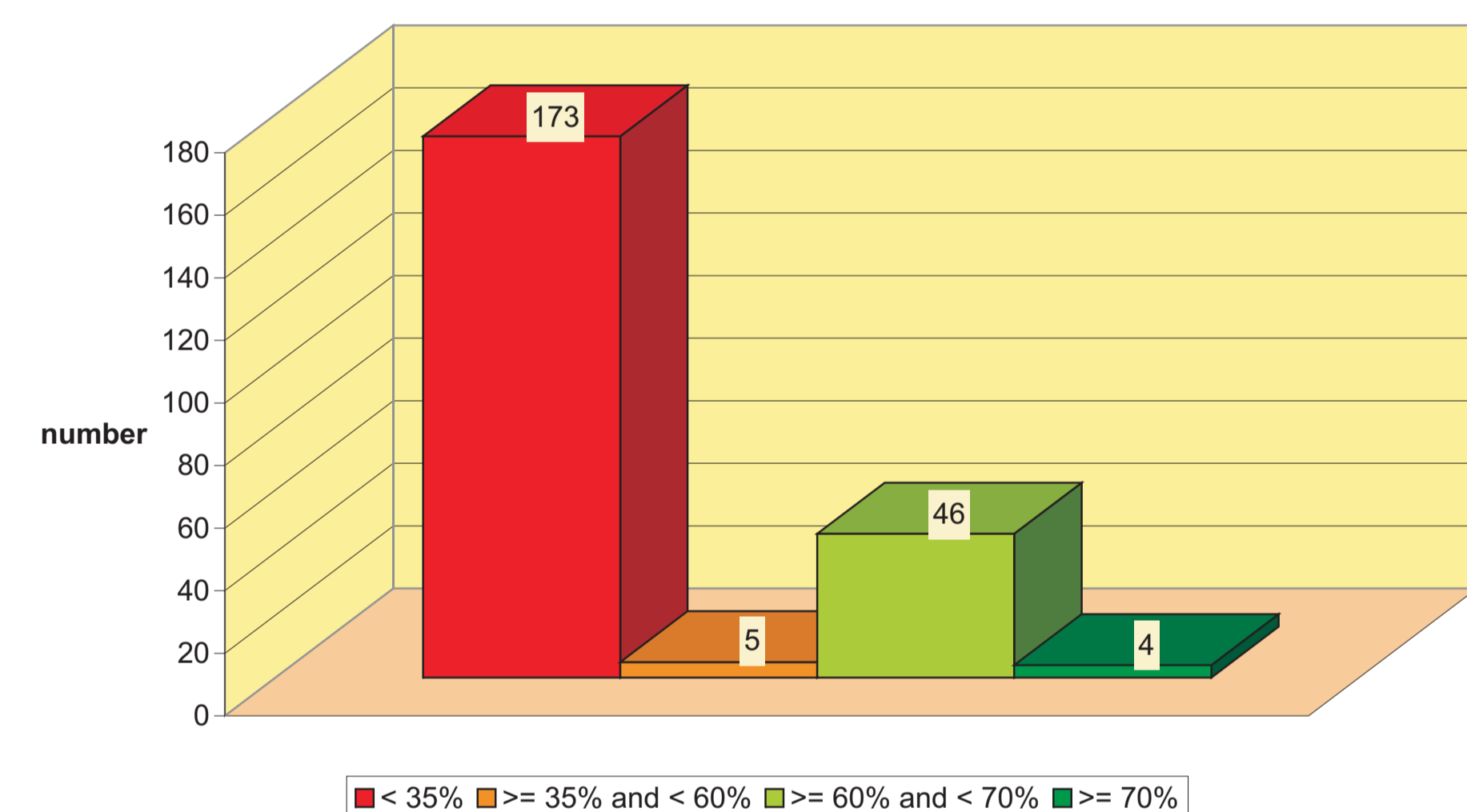
There are 3,273 luminaires. 20% give minimal light pollution, 6% provide reasonable light pollution, 3% are reasonable strong light polluters and 68% is strongly light polluting. 3% of the luminaires are unknown. Surprisingly in several streets (84 = 40%) more than one type of luminaire is used randomly giving no uniform lighting. Figure 1 gives an idea of the kind of light pollution for the different luminaires.

Figure 1: Luminaires per category of light pollution



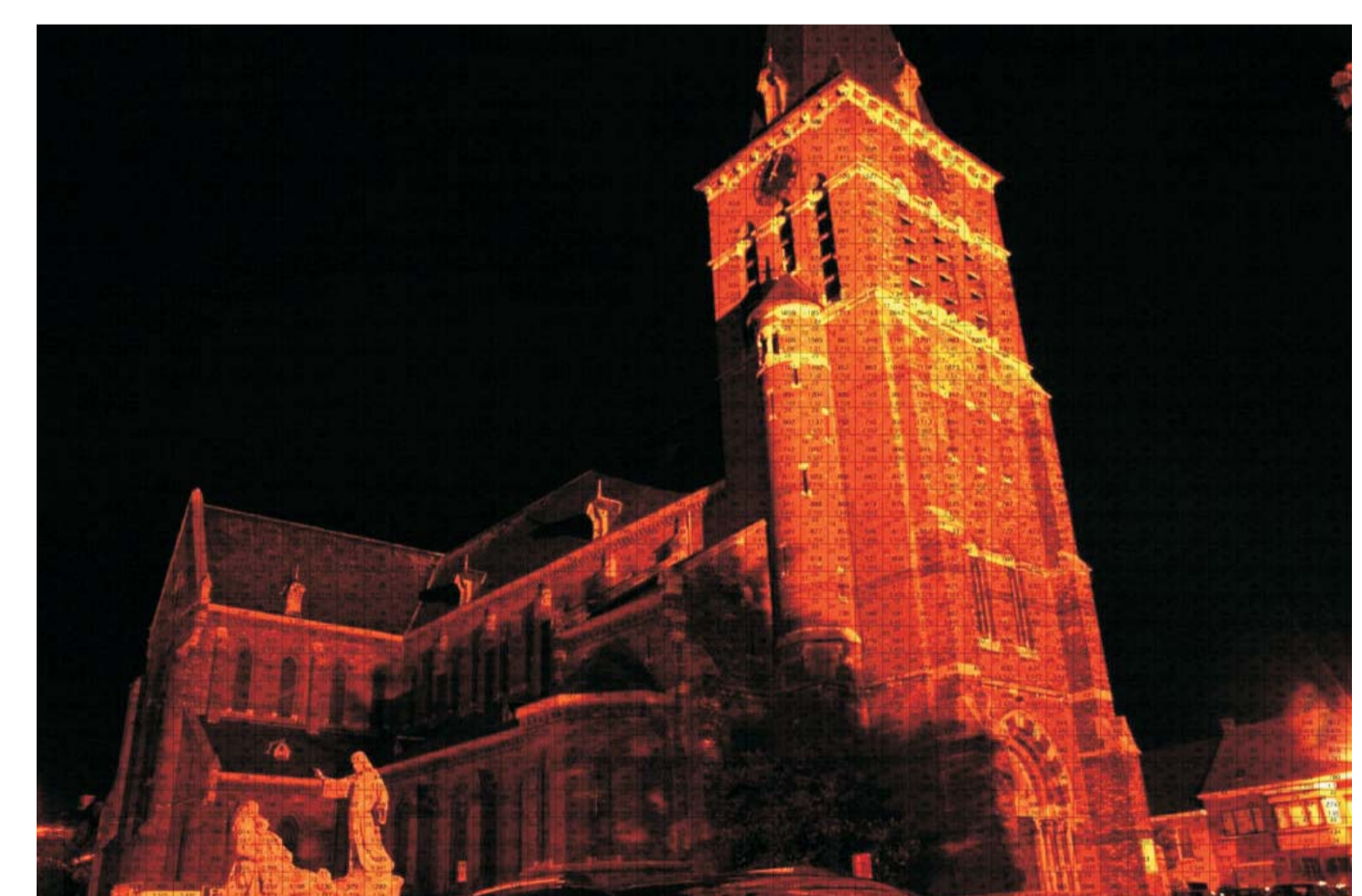
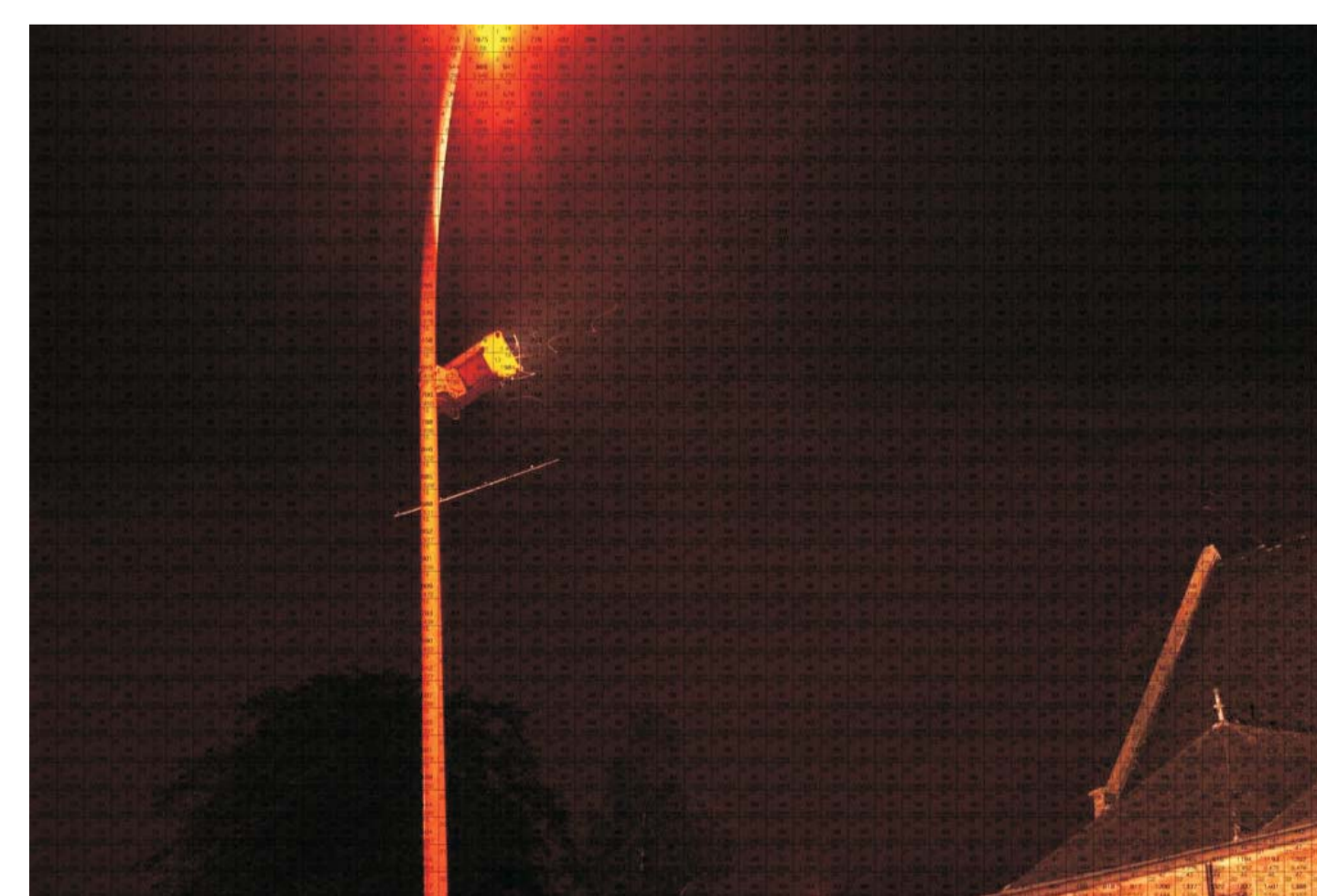
The uniformity of the road lighting was measured by comparing the highest measured luminance on the road surface with the lowest. Most photos (out of 228) have a uniformity of less than 70% which is not good for safety driving. Figure 2 gives the uniformity per category.

Figure 2: Uniformity of street lighting per category



### 2. Lighting of public buildings

The 4 churches and the city hall are lit by projectors mounted upwards on poles of the street lighting. This causes strong light pollution. The pictures below show the problem.



### 3. Offences of the limited laws concerning light pollution

Figure 3 shows the number of offences per type of offender and type of lighting.

Figure 3: Number of offences per type of offender

