FARINGDON TENNIS CLUB

PROPOSED FLOODLIGHTING

PROPOSAL TO HAVE FLOODLIGHTS ON TWO COURTS - USING LED LUMINAIRES

February 2012

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BACKGROUND

Floodlighting of tennis courts has improved enormously over the past twenty years, typically now using metal halide luminaires (superseding yellow sodium) with highly sophisticated asymmetric reflectors that can light up the courts with low aiming angles . These therefore provide good quality white uniform light that can be focused onto the courts with minimal spill and glare. There are two common layouts for lighting a pair of courts to LTA minimum recommended levels:

- Layout A: nine columns (with 12 luminaires) approx 7m high; or
- Layout B: six columns (with 8 luminaires) that are 10m high.

Layout A will require approx 14KW with both courts lit; and B slightly less at 9KW. To minimize glare and to maximize uniformity then layout B arrangement with less columns is better – but is not always appropriate if houses are in close proximity to the courts.

In spite of the huge improvements, metal halide luminaires still have obvious drawbacks. The two most obvious disadvantages are they cannot be dimmed, and that they require careful warm-down periods. This means that when they are being used they are left on all evening - and at full power.

LED floodlighting technology changes all this. Compared to the very best metal halide luminaires (usually considered to be the Philips MVP507) , LED floodlighting technology (when implemented well offers) even better spill and glare control than metal halide with asymmetric reflectors; even better uniformity; and total flexibility. LEDs can be dimmed and can also be instantly switched on/off without coming to any harm. Energy consumption overall will typically be reduced by *at least* 70% . Less glare, less spill, less energy.

For this reason, Faringdon Tennis Club is proposing to adopt the LED luminaires from AAA-LUX in Eindhoven (Netherlands) . See www.aaa-LUX.nl .

Attachment A: Flyer AAA-LUX2011-11-08EngA5.pdf

PROPOSED COLUMN LAYOUTS AND FITTINGS

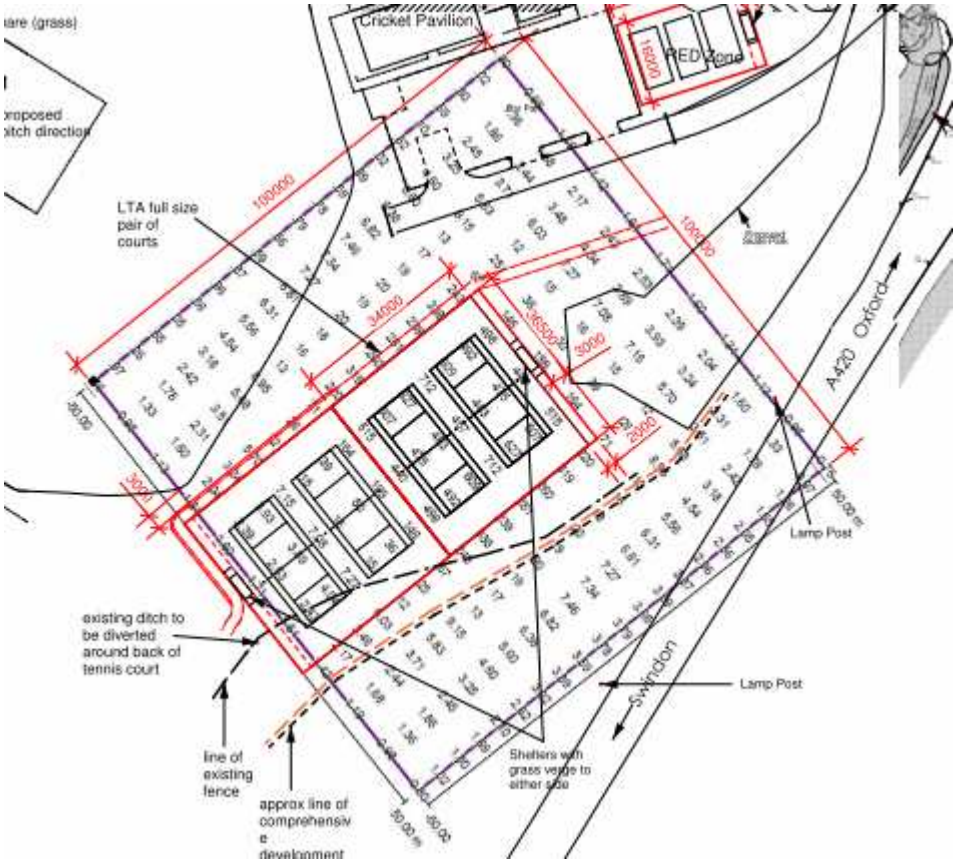
The nearest houses are approximately 200m away (Nursery View) from the courts, and the proposed location of the tennis courts means that they will largely be tucked away from direct line of sight. A substantial buffer of shrubs and taller trees, as well as the embankment further down, acts as a screen between the courts and the road (A420) . This is a partial screen in winter, and a much fuller screen in summer when the leaves are out.

Particularly in winter, passing road users will be able to see that the floodlights are on when they are being used, and therefore it is important to know exactly what the maximum spill and glare will be - as experienced by road users. Higher columns *reduces the aiming angle* of the luminaires, and hence also *reduces both the glare and the spill*.

For this reason, Layout B (with six columns that are 10m high) is the most appropriate, and will not be more noticeable to the houses 200m away.

SPILL

Attachment B (Attachment B 819 SK17 Lighting area around courts.pdf) shows a 100x100m square with the two floodlit courts at the centre – **and with all eight luminaires full on**. The numbers in the plot indicate the calculated number of LUX as if measured by a light meter placed on the ground at that point:



It should be pointed out that **all eight luminaires full on** would indeed be typical with metal halide luminaires; but less so with LED . LEDs can be dimmed, and also switched on/off selectively.

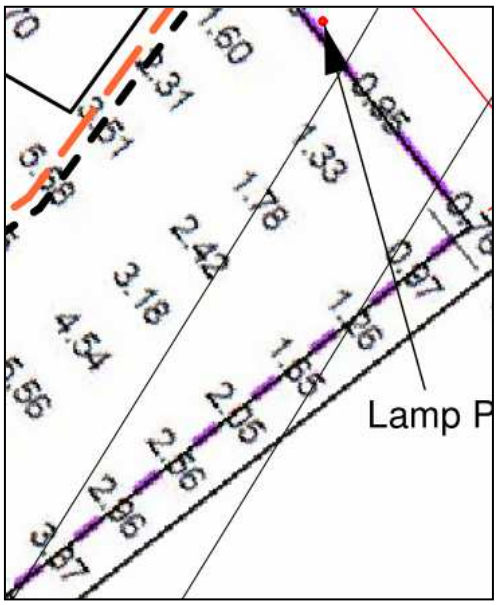
Any light falling outside the boundaries of the court perimeter fence is regarded as "spill" (= wasted light!) and should be kept to a minimum.

This is achieved by choice of column layout and height; type & design of luminaire; and aiming angles of luminaires. Carefully designed asymmetric reflectors have over the past twenty years been refined to such a point that spill from modern tennis court floodlighting has been reduced significantly.

The LED luminaires from AAA-LUX take this a step further - as the photograph above shows.

Each of the eight luminaires consists of eight separate sub-luminaires that are each angled separately and individually.

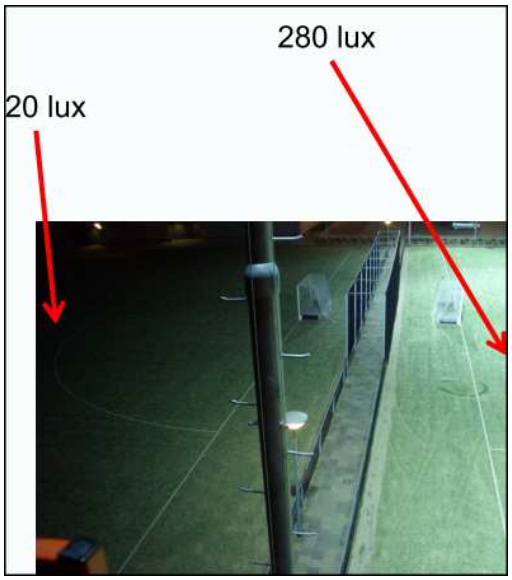
In this way, both the spill and the glare are further reduced.



We see from **attachment B** that the spill on the A420 is between one and four LUX (whereas on the court itself the maintained average must be 500 LUX) . This does not take into account any screening by the substantial buffer of trees and shrubs that will reduce the spill still further– particularly when the leaves are out.

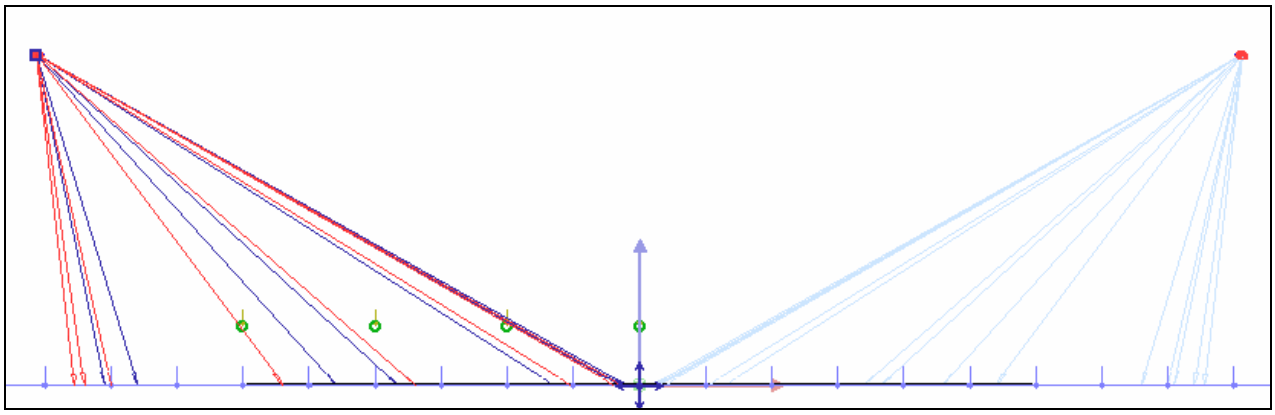
There are also 10-metre high lamp posts lighting up the A420 as it approaches the roundabout at the top of the A417. These lamps account for between 10 and 20 LUX at ground level. In this context, the one to four LUX due to the floodlights would not be considered significant. (A full moon overhead on a clear light accounts for approximately one LUX).

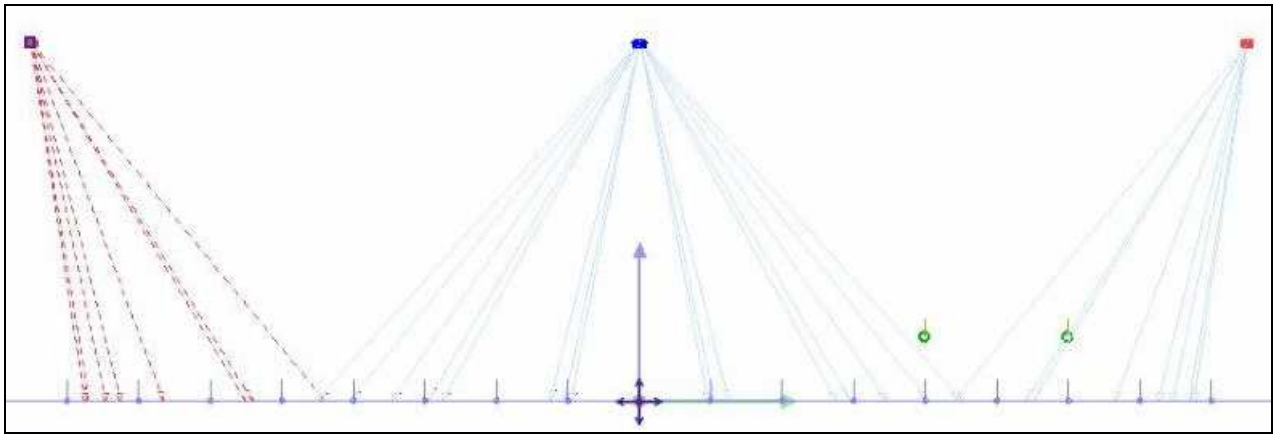
The photo below shows the boundary of an LED-lit hockey pitch and illustrates the minimal light spill that can be achieved with LED floodlighting:



GLARE

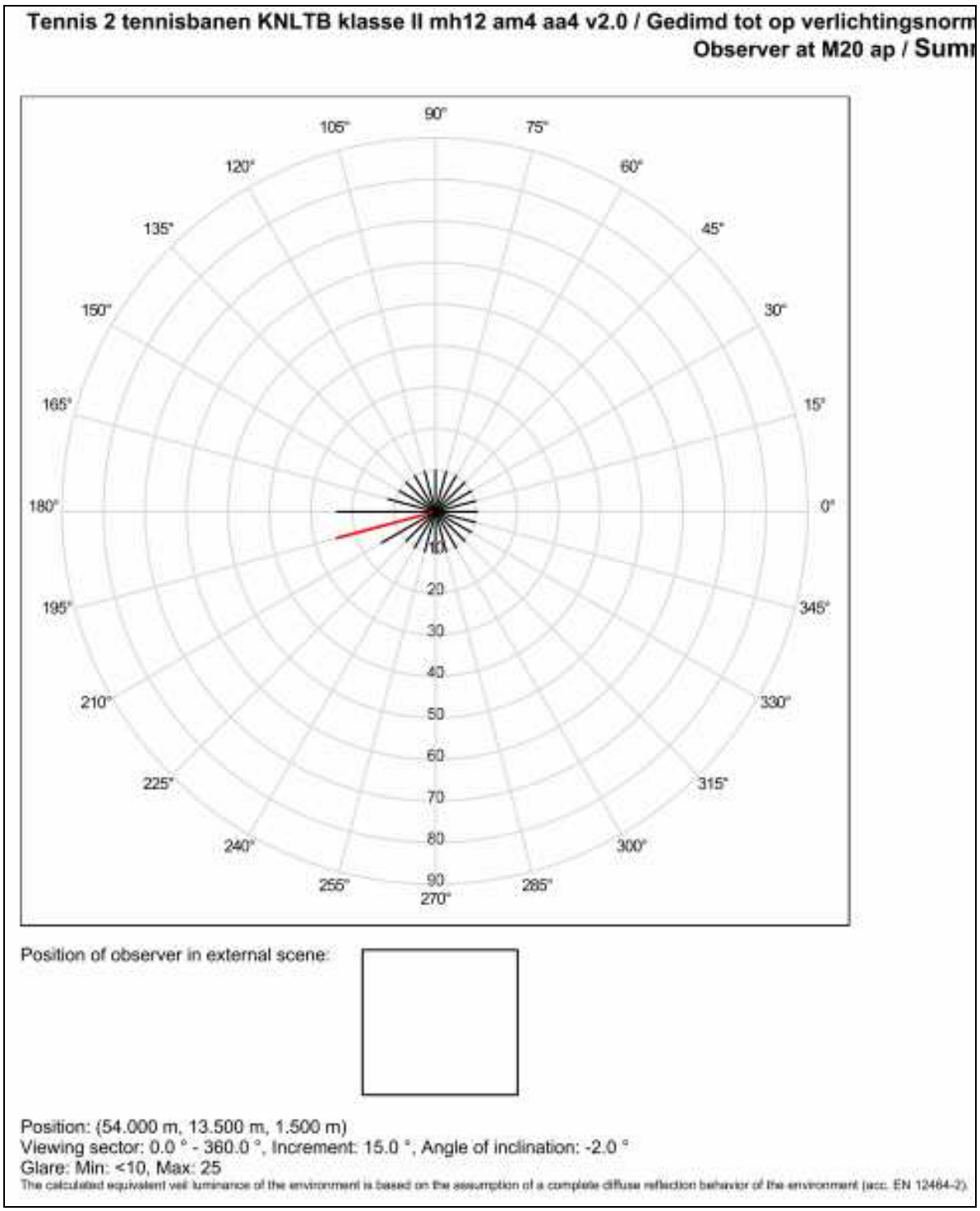
The eight sub-luminaires that make up each of the eight luminaires are each angled separately to achieve maximum uniformity with minimum spill and glare. There are in total sixty four separately angled sub-luminaires each consisting of super-bright LEDs that in themselves have exceptionally precise directional characteristics. The illustrations below show two courts lit using 10m masts side-on and length-on :



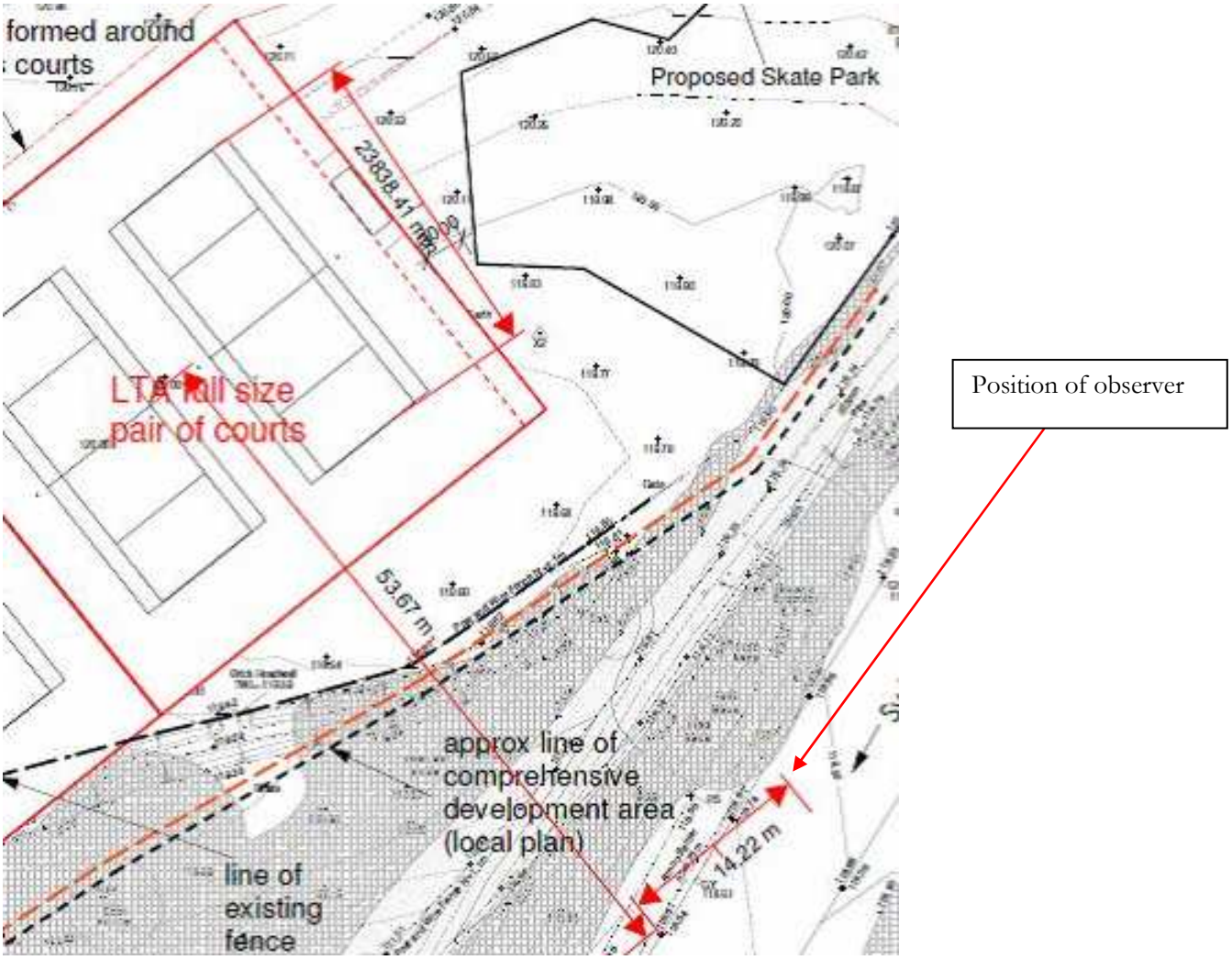


(human observer indicated by green dot)

The illustration below shows the GR (Glare Rating) for an observer on the A420:

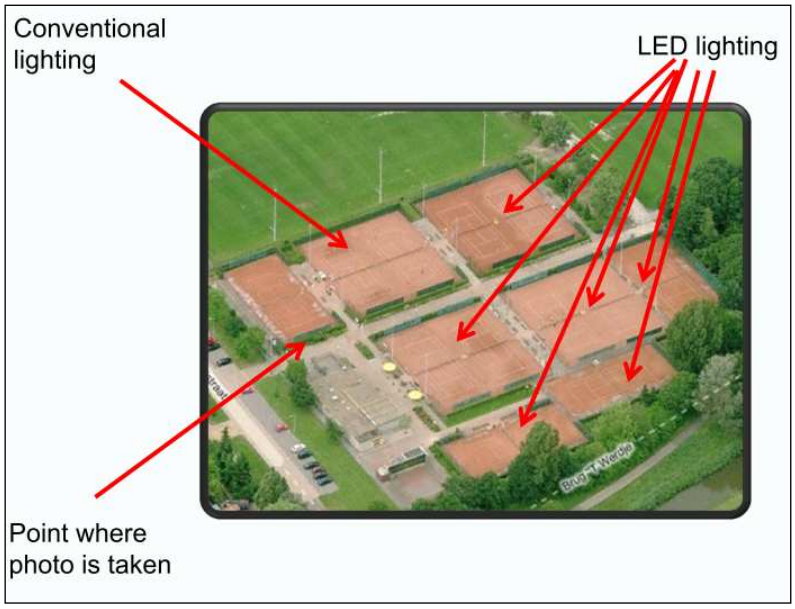


The position of the observer (assuming driving height of 1.5m) in the previous illustration is shown below:



This is the position where the GR will be at its highest. From the previous page we see that the maximum GR is 25, which is described as "hardly noticeable" according to the CIE publication 112 *(CIE 112-1994 : Glare Evaluation System for Use Within Outdoor Sports and Area Lighting (E))*. See also **attachment C** (LabNot10.pdf), showing a similar GR scale. This "hardly noticeable" glare rating is experienced by the observer on the A420 if they look directly in the direction of the lights (shown as 195 degrees on the previous page) . Looking along the road, (in either direction) a driver or other road user will experience a GR of less than ten, which is graded by CIE pub. 112 as "not noticeable" .

Shown opposite is an aerial photograph of twelve courts in Eindhoven – where one pair is conventionally lit (metal halide – Philips MVP507) but ten are now LED lit (one is unlit). The position of the photographer that that took the photo in the 2nd illustration is also shown.



Below is the photograph taken at night – showing clearly that the LED luminaires cause significantly less glare – even when compared with the best metal halide luminaires:

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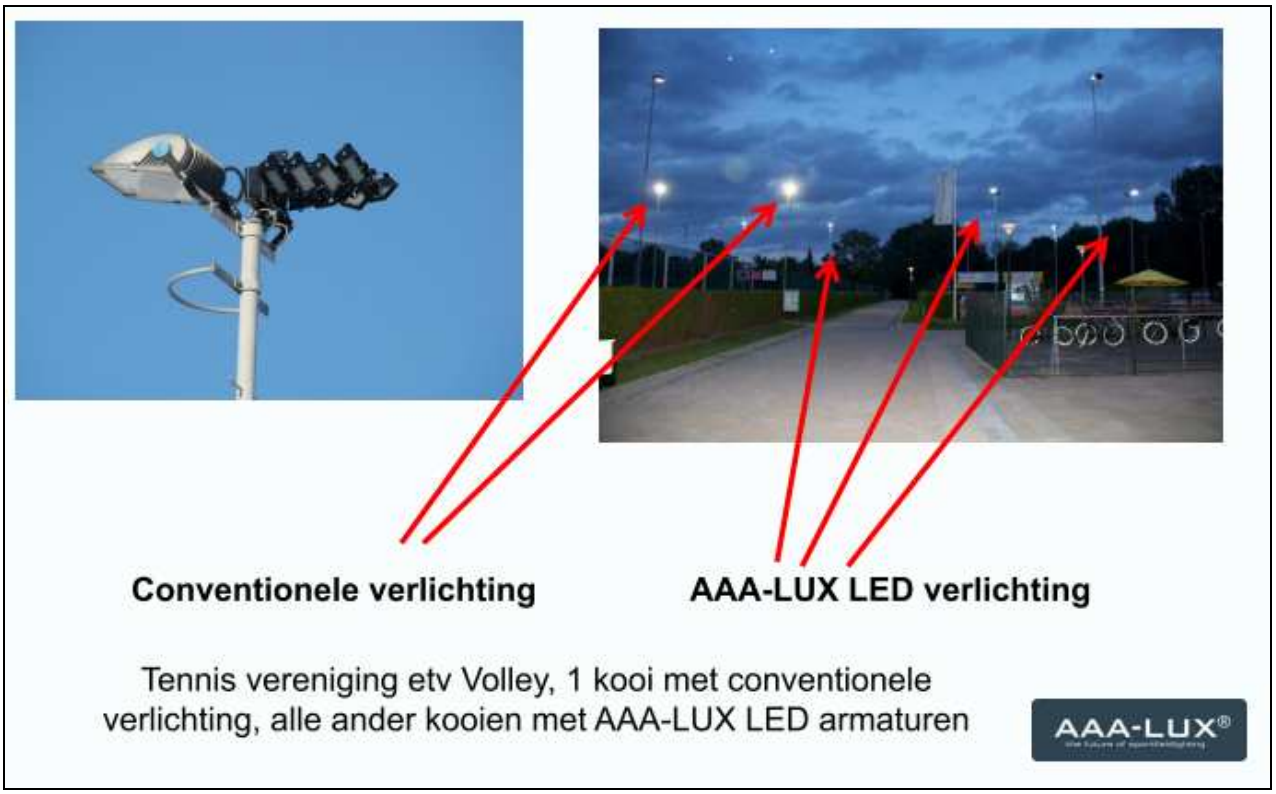

The highest glare is of course experienced by the tennis players themselves – should they choose to look into the lights. Interviews conducted (in dutch) with members and visitors to the Tennispark Eindhoven are unanimously in support of the new LED luminaires. The glare is perceived as significantly less for the same light intensity.