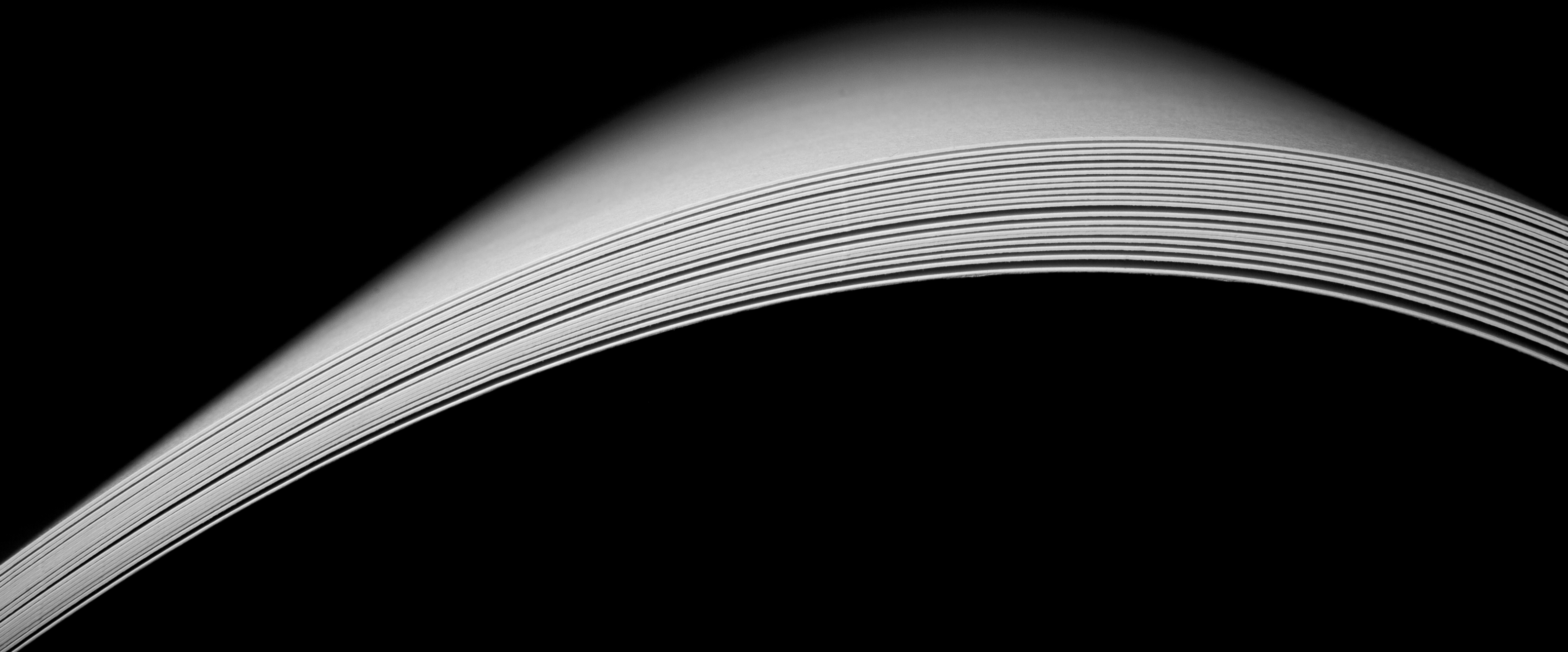




Contents

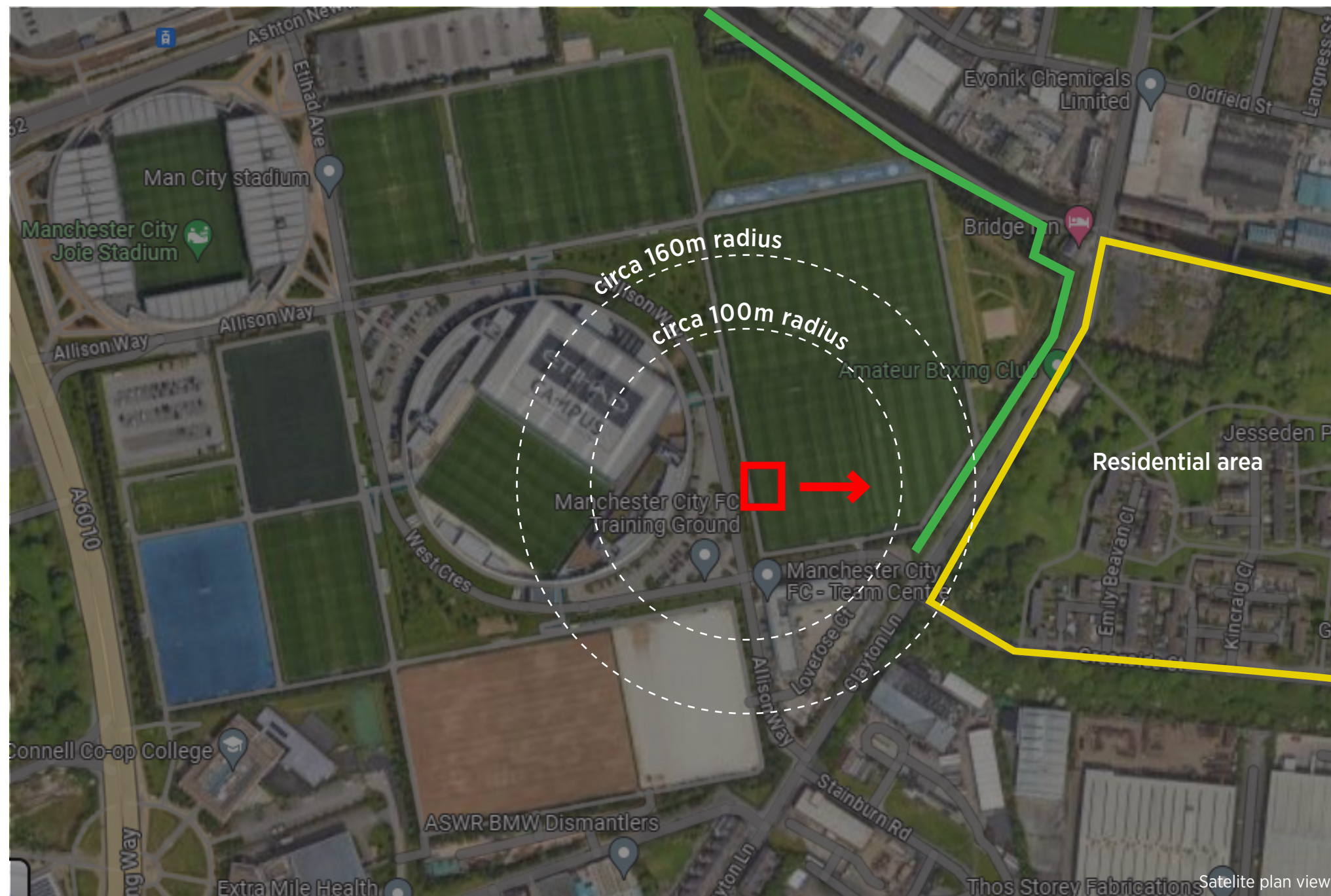
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Brief

Introduction

The purpose of this document is to provide recommendations for the lighting performance of an outdoor digital display in line with ILP guidance and to assess the lighting impact due to the proposed digital display at Manchester City Football Academy.

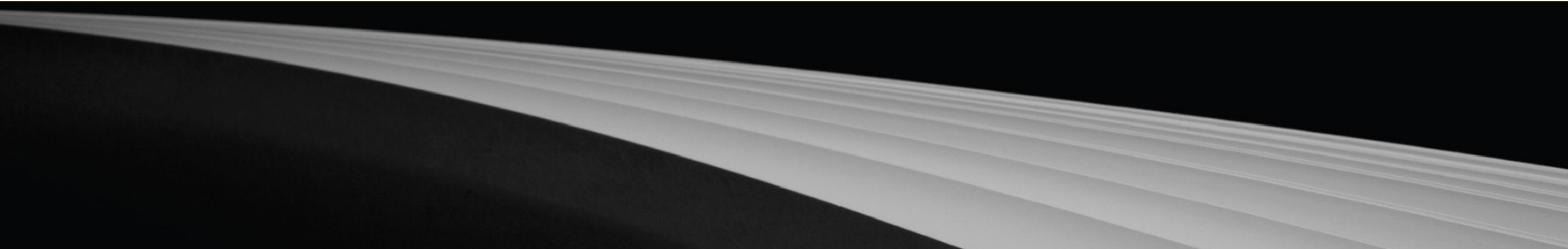


Site

*Manchester City
Football Academy*

A digital display will be installed on the training pitch at the Etihad campus in Manchester. The location of the display is indicated above in red. There is a residential housing opposite of the proposed display location. The distance from the display to the adjacent residential area is approx. 160m and there are hedgerows between them.

The surrounding areas have been identified as E3 zone(Standard- Medium ambient lighting) and E4(Sports activities- High ambient lighting) as per ILP classification of lighting environmental zones.



Digital display

Luminance, simulation set up

Luminaire data:
Luminaire: LED Media Panel
Panel size: 7.2m x 3.9m (28m²)
Mounting height: at 2.5m above ground level

Screen output levels:
Day time operation: 400 - 5000 cd/m²
Night time operation without sports lighting: <200 cd/m²
Night time operation with sports lighting: <300 cd/m²
Post curfew: <100 cd/m²

Recommended maximum permitted values per operation time are shown on the right.

- Notes for simulation:**
- For simulation purposes, no ambient light has been taken into consideration.
 - Day time operation has not been simulated for obtrusive light assessment.

The following luminaire data has been used for simulations:

- Many illuminated advertisement installations are designed to operate during the day and night, so their performance requirements will normally vary during a 24-hour period and will include:
- Daytime operation.
 - Night-time operation.
 - Curfew operation which will require a reduced luminance, or even switch off during defined hours.

Note: Curfew times are not defined within the guidance and are for Local Authorities to agree on a case by case basis if required in the interests of amenity. For media owners it is generally considered to be between 00.00hrs and 05.00hrs.

10.9 During daytime, the background ambient lighting level is generally considerably higher than at night, and therefore the recommended maximum permitted value of sign luminance needs to be increased, as indicated in Table 10.5 below.

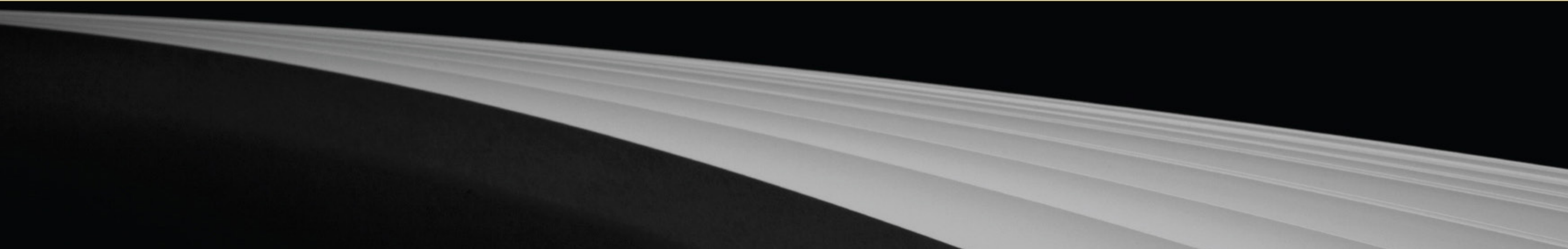
Table 10.5 – Recommended maximum daytime permitted values of sign luminance.

Daylight ambient Illuminance (Eh) [lux]	Sign Luminance [cd/m ²]
Up to 3,500	≤ 400
3,501 to 8,500 (overcast day)	≤ 1,000
8,501 to 15,000 (bright day with cloud cover)	≤ 2,500
15,001 to 25,000 (bright sunny day)	≤ 3,500
25,001 to 42,000 (direct sunlight)	≤ 5,000
42,001 and above	> 5,000

Table 10.4: Recommended maximum night-time permitted values of display luminance

Light Technical Parameter	Maximum sign luminance (L _s) cd/m ²				
	Environmental zones				
Sign surface area	E0	E1	E2	E3	E4
0 to < 5 m ²	0	25	200	300	300
5 to < 20 m ²	0	0	200	300	300
≥ 20 m ²	0	0	100	200	300

- Notes:
- The values in Table 10.4 apply to pre-curfew. The post-curfew levels shall generally be the display being off, unless (in zones E2 to E4 inclusive) the installation is still required to be operational, in which case the performance level shall be 50% of the pre-curfew level.
 - Where a digital display is split into separate areas, or displays are placed adjacent to each other with differing images, the assessment shall be made on the total possible display area.
 - The values indicated are recommended maxima, and in practice these may be required to be lower depending upon the proximity of adjacent / opposite premises with a view of the display. The reason is that for premises within fairly close proximity of the display, i.e. across the road, the vertical illuminance on the premises caused by the display, may exceed the limits advised in Table 10.3. A methodology for assessing the impact of display luminance on vertical surfaces is advised in Appendix 2.
 - The values for signs in Table 10.4 do not apply to signs for traffic control purposes.



Guidance

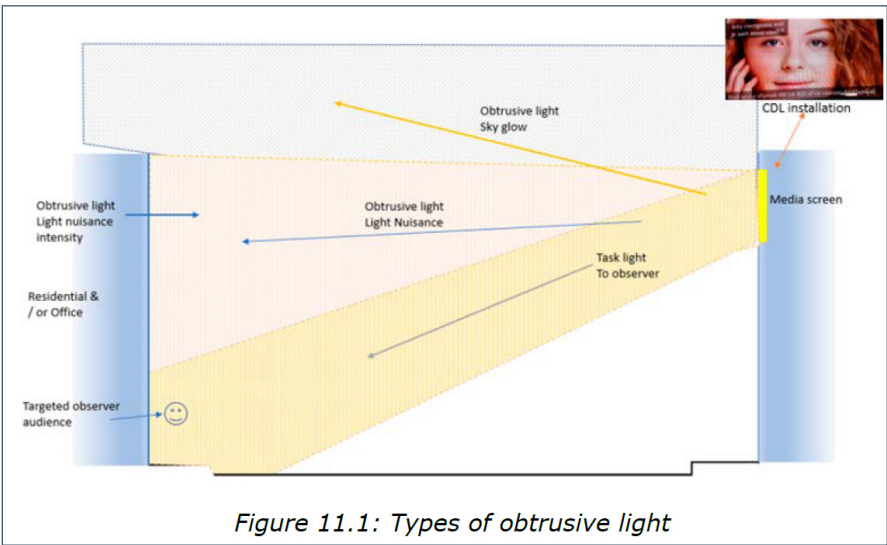
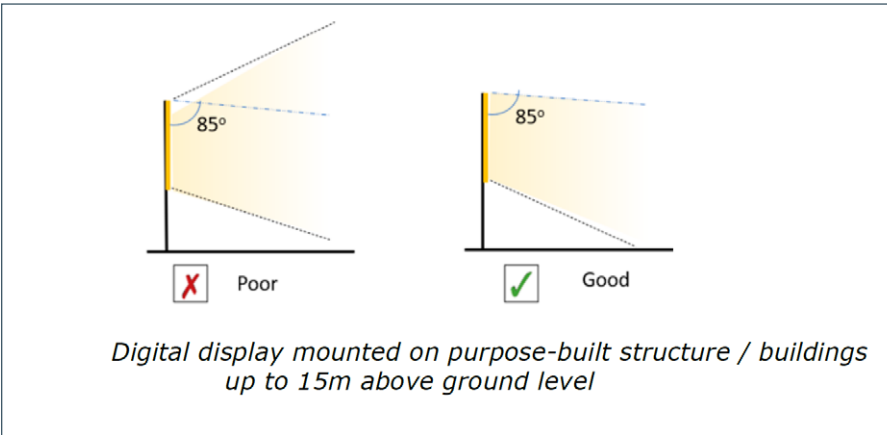
The reduction of obtrusive light

The ILP (Institution of Lighting Professionals) provides guidance notes for the reduction of obtrusive light.

The following documents from the ILP are referenced for the recommendations and assessments provided in this report:

- GN01/21: The Reduction of Obtrusive Light, ILP, 2021
- PLG 05/23: The brightness of illuminated advertisements including digital displays, ILP, 2023

Obtrusive light limitations that will be taken into the assessment as per ILP recommendations are defined by the factors below:



Digital displays are normally mounted vertically, so resolution to mitigate skyglow from the displays should be through optical control, limiting the light emitted at various angles depending upon display location.

Table 3 (CIE 150 table 2): Maximum values of vertical illuminance on premises

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E _v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

* If the installation is for public (road) lighting then this may be up to 1 lx.

Limits apply to nearby dwellings / premises or potential dwellings / premises and specifically windows. The values are the summation of all lighting installations.

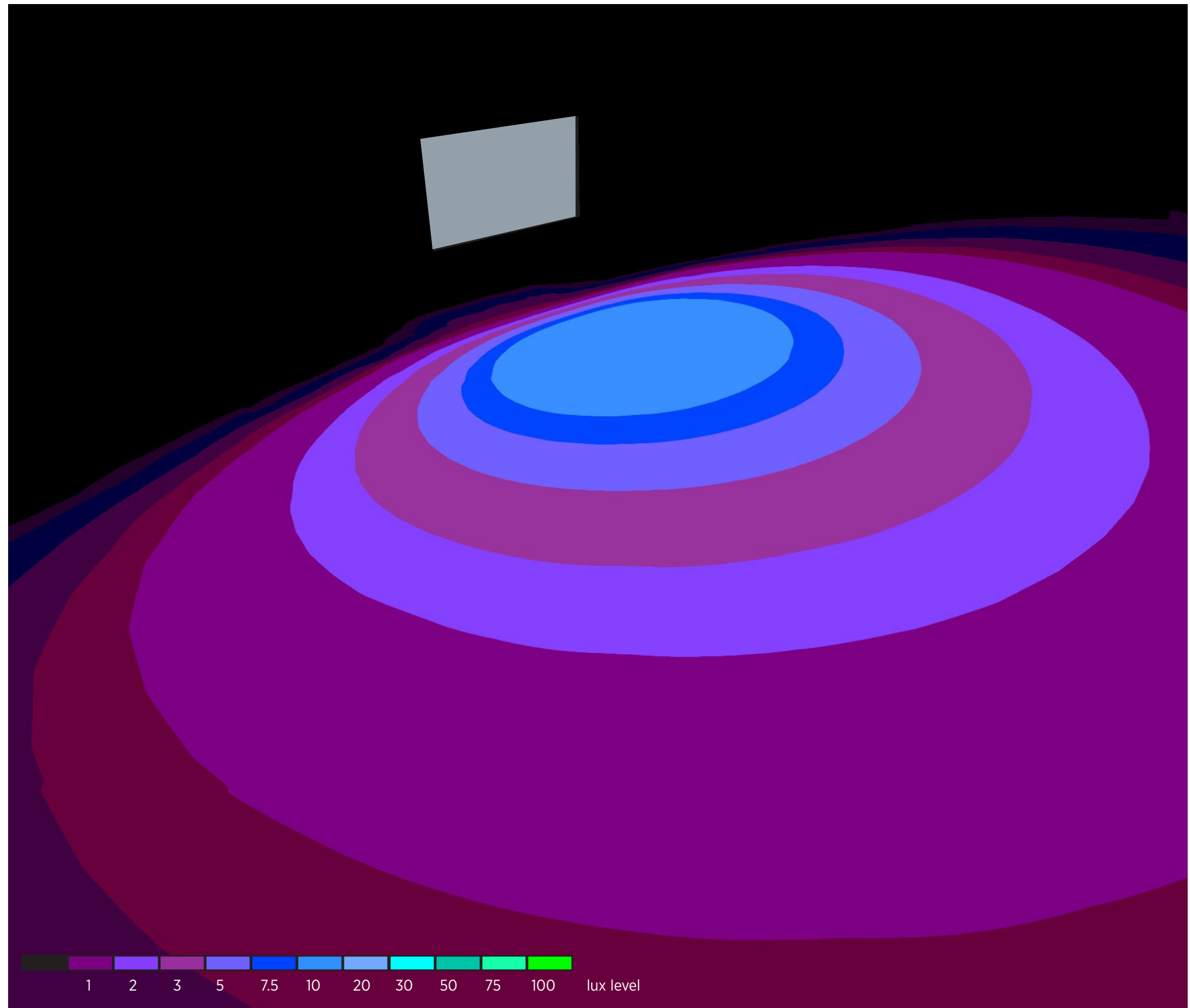
Table 10.7: The effect on the ability to view the night sky at various angles

Angle of light emitted (degrees)	Skyglow effect	Glare effect
100 - 180	Local	Little
95 - 100	Significant	Some
90 - 95	High	High
85 - 90	Significant	High
0 - 85	Minimum	Some

10.17 As can be seen the greatest impact on skyglow is light emitted between 85 and 100 degrees from the downward vertical.

Simulation

Night-time light spill calculation



Light intrusion

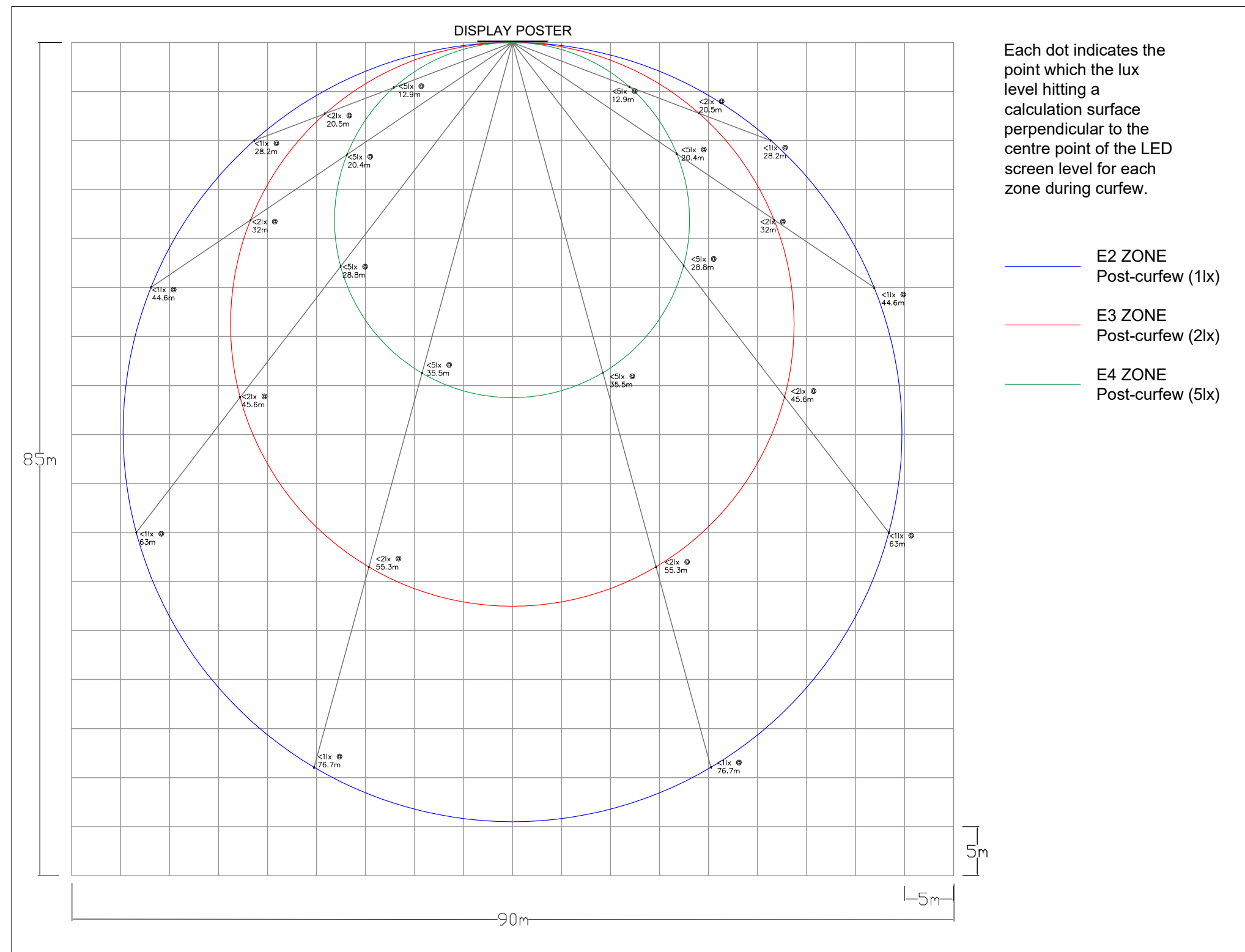
Night-time light spill calculation

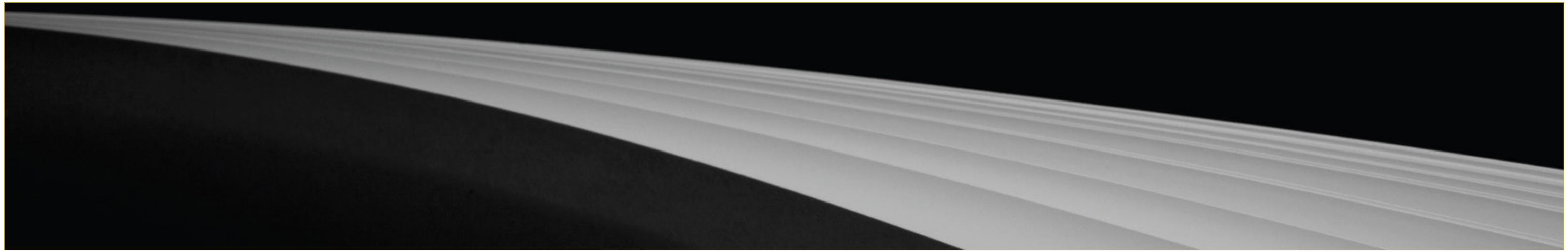
A simulation was produced in order to determine the possible potential effects of light spills on nearby buildings.

The ILP limits light intrusion into windows to a certain lux level, depending on the environmental zone in question. In zone E3, for example, the permissible level is 10 lux pre-curfew and 2 lux post-curfew.

The graph to the right shows vertical illuminance due to the display with 300 cd/m². This demonstrates the worst case scenario. The amount of light intrusion directly in front of the digital display is less than 1 lux at a distance of 85m. This corresponds to the limit for a building in zone E2. The distances decrease to 58m for zone E3 and 36m for zone E4.

These results are based on a building directly facing the display panel - if buildings are at varying offsets to the panel, then the distances become shorter, as shown.





Summary

Conclusions and notes

Conclusions

- The luminance from the digital display is on the basis of all-white content, which provides the worst case scenario. In general, once content is displayed through the panel, Luminance values drop.
- The level of light intrusion can be adjusted using the dimming levels, to satisfy various limits and distances to nearby buildings.
- The distance from the proposed display location and residential area is more than 100m. With 300 cd/m² output (the worst case scenario), the amount of intrusive light is less than 1 lx at the 85m distance directly in front of the display panel. Due to the distance and vegetation (evergreen plants & trees) at the boundary, there would not be any obtrusive light impact from the display on the adjacent residential area.

Notes

- Sports lighting within the training field and any other ambient lighting are not taken into consideration.
- As a future action, the ILP recommendations for limiting sky glow should also be investigated. With the current display optics, the new ILP recommendations for sky glow are not achievable. Integration of louvre or any optical controls is encouraged to block any upward light above 85 degrees from the vertical.

Thank you.

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