

Prestwich Travel Hub

Glare & Source Intensity Assessment

Worst Case Residential Receptors

A glare and luminous intensity assessment has been carried out using Relux software across the two worst case receptor locations: No. 1 Highfield Place and No. 6 Highfield Road. These properties represent the closest and most directly exposed residential first floor windows to the rooftop lighting installation, modelled from the perspective of a resident looking toward the Travel Hub from their first floor window. Measurement points are positioned at 4.5 m above external ground level at first floor window height, with viewing directions oriented toward the Travel Hub rooftop lighting.

The assessment has been conducted in accordance with the Institute of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light (GN01/21), with the site classified as Environmental Zone E3, applicable to this suburban town centre location in Prestwich. All results presented represent the pre-curfew scenario with the lighting operating at full output, representing the worst case for assessment purposes.

The relevant metrics for this assessment are luminaire source intensity (measured in candelas) and vertical illuminance at the receptor (measured in lux), as defined by ILP GN01 for E3 environments. A vertical illuminance study has been issued in a previous report.



Locations of worst case receptors used in this assessment

Luminous Intensity – Source Intensity Results

The luminous intensity of the rooftop luminaires has been calculated at each worst case receptor location, measuring the intensity of light emitted directly toward the residential windows. The results have been assessed against the Institute of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light (GN01/21). As set out in Table 4 of the ILP GN01 guidance 'Limits for the luminous intensity of bright luminaires', the maximum luminous intensity emitted by a luminaire for Environmental Zone E3 pre-curfew is 10,000 candelas.

Table 4 (CIE 150 table 3): Limits for the luminous intensity of bright luminaires⁴

Light technical parameter	Application conditions	Luminaire group (projected area A_p in m^2)					
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$	$A_p > 0.5$
Maximum luminous intensity emitted by luminaire (I in cd) ⁵	E0						
	Pre-curfew	0	0	0	0	0	0
	Post-curfew	0	0	0	0	0	0
	E1						
	Pre-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500
	Post-curfew	0	0	0	0	0	0
	E2						
	Pre-curfew	0.57 d	1.3 d	2.5 d	5.0 d	10 d	7,500
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	500
	E3						
	Pre-curfew	0.86 d	1.9 d	3.8 d	7.5 d	15 d	10,000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	1,000
	E4						
	Pre-curfew	1.4 d	3.1 d	6.3 d	13 d	26 d	25,000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500

Institute of Lighting Professionals – The Reduction of Obtrusive Light – Guidance Note 01/21 (GN01/21)

Table 4 – Limits for the luminous intensity of bright luminaires

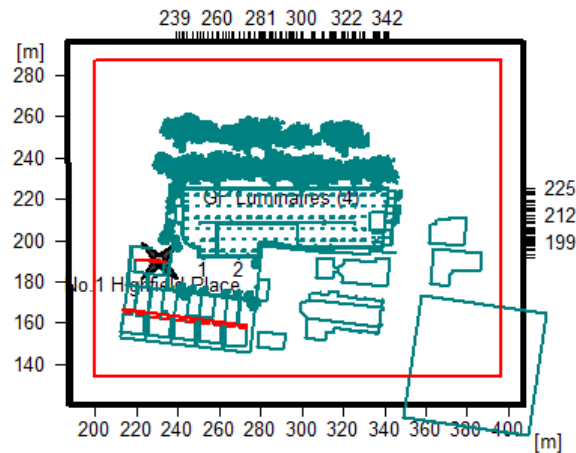
The Relux lighting model for the Prestwich Travel Hub external and rooftop lighting scheme has been used to calculate the luminous intensity at the worst case receptors at no.1 Highfield Place and no.6 Highfield Road. The calculation results are included on the next page for information. The results list all luminaires that produce luminous intensity at the receptor location, along with their luminous intensity value. The higher values on the list are from the closer luminaires, reducing in intensity down the list.

The worst case luminous intensity results at each receptor location are as follows:

- No. 1 Highfield Place: 141 candelas (0.141 kcd), equivalent to 1.4% of the 10,000 cd pre-curfew limit
- No. 6 Highfield Road: 2,371 candelas (2.371 kcd), equivalent to 23.7% of the 10,000 cd pre-curfew limit

Both receptor locations return results that are comfortably within the ILP GN01 Table 4 E3 pre-curfew limit of 10,000 cd. The result at Highfield Road, whilst higher than Highfield Place due to the more direct orientation of these properties toward the car parks external luminaires, remains at less than a quarter of the permitted threshold, demonstrating a compliant outcome at the most exposed receptor location in the assessment.

No.1 Highfield Place – Luminous Intensity



Measuring point for luminous intensity: No.1 Highfield Place

Position : x = 231.20 m, y = 190.37 m, z = 4.50 m

No.	Luminaire	Position			Lumin. intensity I[kcd]
		x[m]	y[m]	z[m]	
1	MISTRAL MIDI - AREA OPTIC, MIMH44KA	258.49	192.98	10.60	0.141
2	KOLO IP65 HOOD, K6H44KHB	242.38	203.69	1.80	0.042
3	KOLO IP65 HOOD, K6H44KHB	240.85	208.75	1.80	0.041
4	KOLO IP65 HOOD, K6H44KHB	238.96	209.47	1.80	0.033
5	MISTRAL MIDI - AREA OPTIC, MIMH44KA	252.36	191.93	5.95	0.021
6	MISTRAL MIDI - AREA OPTIC, MIMH44KA	269.53	191.93	5.95	0.008

No.6 Highfield Road – Luminous Intensity



Measuring point for luminous intensity: No.6 Highfield Road

Position : x = 258.19 m, y = 160.15 m, z = 4.50 m

No.	Luminaire	Position			Lumin. intensity I[kcd]
		x[m]	y[m]	z[m]	
1	MISTRAL MIDI - AREA OPTIC, MIMH44KA	280.75	208.56	10.61	2.371
2	MISTRAL MIDI - AREA OPTIC, MIMH44KA	295.75	208.56	10.71	2.141
3	MISTRAL MIDI - AREA OPTIC, MIMH44KA	265.75	208.57	10.61	1.644
4	KOLO IP65 HOOD, K6H44KHB	240.85	208.75	1.80	0.049
5	MISTRAL MIDI - AREA OPTIC, MIMH44KA	295.75	209.44	10.61	0.011
6	MISTRAL MIDI - AREA OPTIC, MIMH44KA	280.75	209.44	10.61	0.011
7	MISTRAL MIDI - AREA OPTIC, MIMH44KA	265.75	209.45	10.61	0.010
8	MISTRAL MIDI - AREA OPTIC, MIMH44KA	269.53	191.93	5.95	0.009
9	MISTRAL MIDI - AREA OPTIC, MIMH44KA	252.36	191.93	5.95	0.006
10	KOLO IP65 HOOD, K6H44KHB	242.38	203.69	1.80	0.001

Glare Rating

In addition to the source intensity assessment, external glare rating calculations have been carried out using Relux software across viewpoints at the two worst-case receptor locations. It is important to note that glare rating is not a metric defined within ILP GN01 for the assessment of external nuisance lighting at residential receptors. The technically recognised metric for this purpose is luminous intensity (source intensity in candelas), which has been assessed against the ILP GN01 Table 4 limits detailed above and demonstrated to be compliant at all receptor locations.

It is worth noting that Unified Glare Rating (UGR) applies specifically to indoor workplace comfort and is not the appropriate metric for assessing external nuisance glare affecting neighbouring residential windows. Instead a maximum glare rating ($R_{G,MAX}$) has been calculated which represents the highest numerical glare rating computed at an observer receptor. It qualifies the worst-case discomfort glare experienced by an observer.

The glare rating calculations are provided here as supplementary information only, to give the planning authority additional visual context and reassurance regarding the potential for glare nuisance at neighbouring properties, recognising that there is no official published threshold for what constitutes an acceptable external glare rating from a residential nuisance perspective. The calculation results are included on the next page for information. The results show the glare rating at the receptor locations described.

Whilst no official guidance exists prescribing a maximum acceptable external glare rating for residential nuisance purposes, a glare rating of 50 is widely referenced within the lighting industry as a general benchmark above which glare begins to become a source of visual discomfort.

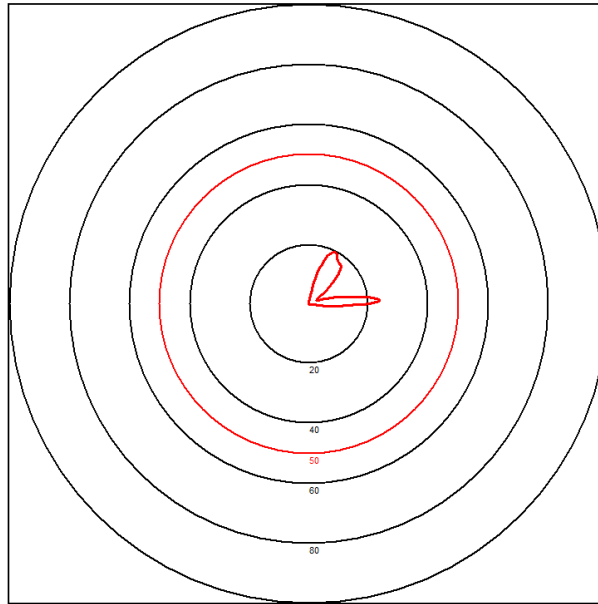
The glare rating results across the assessed viewpoints are as follows:

- No. 1 Highfield Place: $R_{G,MAX} = 23.5$
- No. 6 Highfield Road: $R_{G,MAX} = 40.8$

Both assessed viewpoints return results below the indicative benchmark. The result at Highfield Road, whilst higher than Highfield Place due to the more direct orientation of these properties toward the car parks external luminaires, remains less than the 50 $R_{G,MAX}$ suggested threshold, demonstrating a compliant outcome at the most exposed receptor location in the assessment.

These supplementary glare calculations, considered alongside the source intensity results which confirm compliance with ILP GN01 Table 4, provide a comprehensive picture of the visual impact of the rooftop lighting on neighbouring residents.

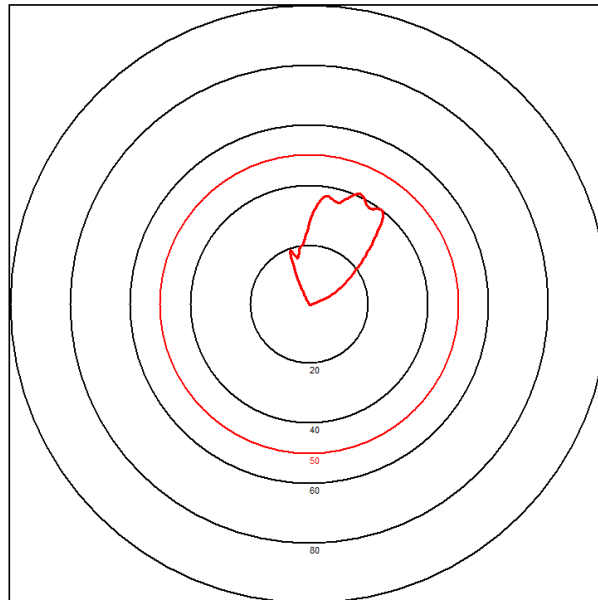
No.1 Highfield Place – Glare Rating



$L_{ve} = 0.05 \text{ cd/m}^2$, $\bar{E}_i = 29 \text{ lx}$, $p = 15 \%$

No.	Description	Position	$R_{G,max}$	Direction
1	No.1 Highfield Place	231 m/190 m/4.5 m	23.5	86° (0°)

No.6 Highfield Road – Glare Rating



$L_{ve} = 0.05 \text{ cd/m}^2$, $\bar{E}_i = 29 \text{ lx}$, $p = 15 \%$

No.	Description	Position	$R_{G,max}$	Direction
2	No.6 Highfield Road	258 m/160 m/4.5 m	40.8	25° (0°)

Findings

Taken together, the luminous source intensity and glare assessment results confirm that the rooftop lighting installation does not produce unacceptable source intensity or visual glare at any of the assessed receptor locations. The worst-case luminous source intensity at Highfield Road, the most exposed receptor, remains at less than a quarter of the pre-curfew ILP E3 permitted limit, and both glare rating assessments pass the 50 $R_{G,MAX}$ benchmark. The design can be considered compliant across the full range of worst-case receptor positions assessed, consistent with ILP GN01 installation guidance.

