Lendlease

One Sydney Harbour

Reflectivity Report Update

Amending DA - Building R4B, Barangaroo - SSD 8892218

Rev B | 11 November 2020

Job number 239304-00

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1 Amending DA Introduction

1.1 Introduction

This report supports a State Significant Development (SSD) Development Application (DA) submitted to the Department of Planning, Infrastructure and Environment (DPIE) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The 'amending' SSD DA seeks approval for eight additional storeys and 5,650sqm of gross floor area (GFA), amongst other items, to Residential Building R4B approved under SSD 6965. This SSD DA proposes to amend the 60-storey Residential Building R4B development approved under SSD 6965, which in turn necessitates the inclusion of condition(s) of consent to this SSD DA that require the modification of SSD 6965.

1.2 Site Description

Barangaroo is located on the north western edge of the Sydney Central Business District (CBD), bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east; and bounded to the south by a range of new development containing large CBD commercial tenants.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – the Headland Park, Barangaroo Central and Barangaroo South. The Residential Building R4B site is located within Barangaroo South. The site of this proposed DA is located on land generally known and identified in the approved Concept Plan (as modified) as Block 4A, as shown in **Figure 1** below.

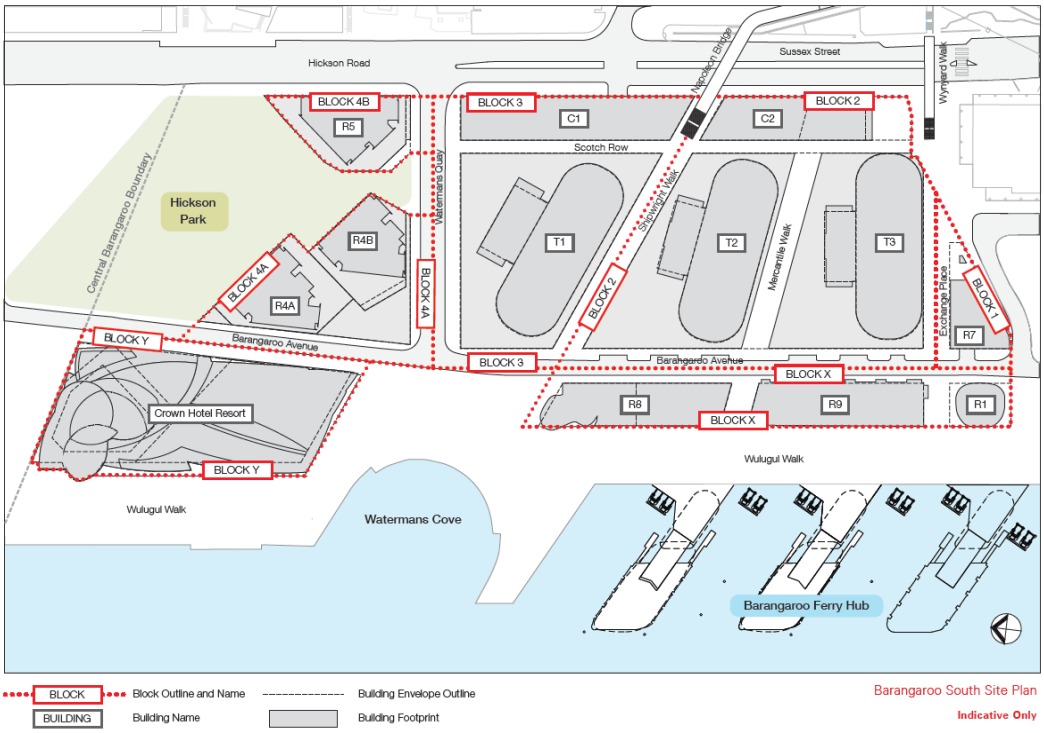

Figure 1: Block 4A in relation to Barangaroo South

1.3 Background

1.3.1 Barangaroo South Concept Plan (as modified)

The approved Barangaroo South Concept Plan (MP06_0162) (as modified), includes approval for the following:

- A mixed use development involving a maximum of 602,354 sqm gross floor area (GFA), comprised of:
  - a maximum of 191,031 sqm of residential GFA of which a maximum of 162,031 sqm will be in Barangaroo South;
  - a maximum of 76,000 sqm of GFA for tourist uses of which a maximum of 59,000 sqm will be in Barangaroo South;
  - a maximum of 34,000sqm of GFA for retail uses of which a maximum of 30,000 sqm will be in Barangaroo South;
  - a maximum of 5,000 sqm of GFA for active uses in the Public Recreation zone of which 3,500 will be in Barangaroo South; and
  - a minimum of 12,000sqm GFA for community uses.
- Approximately 11 hectares of new public open space/public domain, with a range of formal and informal open spaces serving separate recreational functions and including an approximate 2.2km public foreshore promenade.
- Built form design principles, maximum building heights and GFA for each development block within the mixed use zone.

- Public domain landscape concept, including parks, streets and pedestrian connections.
- Alteration of the existing seawalls and creation of a partial new shoreline to the harbour.
- Construction, operation and maintenance of a concrete batching plant to supply concrete for construction of future development under this Concept Plan at Barangaroo South.
- No approval is granted or implied for the future use of a heliport and/or a helipad.

This 'amending' SSD DA seeks to achieve the maximum permissible GFA and height for Residential Building R4B that was approved as part of the latest modification to the Concept Plan (modification 10). Any consent that is granted to this SSD DA will be generally consistent with the terms of approval of the Concept Plan (as modified).

1.3.2 Residential Building R4B - Development consent SSD 6965

Development consent SSD 6965 was granted by the NSW Minister for Planning on 7 September 2017 for Residential Building R4B, comprising of a 60-storey mixed use building, with 297 residential units and retail floor space at ground level. This included a total gross floor area (GFA) of 38,896sqm, 38,602sqm of which was approved for residential floor space, and the remaining 294sqm was approved for retail floorspace.

Consent was also provided for associated building public domain works, fit-out and use of the basement, a link bridge connecting to Building R4A and associated building identification signage.

On 7 February, 2020, development consent SSD 6965 was amended to account for a range of design changes, including an increase in total GFA from 38,896sqm to 38,911sqm, comprised of an increase in retail GFA from 294sqm to 309sqm, and a reduction in the number of apartments to 283.

A second application to modify development consent SSD 6965 has been submitted to the DPIE. The amendments contained within the modification application broadly relate to the following changes:

- increase the number of apartments from 283 to 290;
- revised dwelling mix and internal layout changes;
- changes to the landscaped podium layout; and
- changes to the number of car spaces from 320 to 324.

It is anticipated that this modification application to development consent SSD 6965 will be determined prior to the determination of this SSD DA. As such, this SSD DA is made with the above changes in mind.

1.4 Overview of Proposed Development

This ‘amending’ SSD DA seeks consent for eight additional storeys with 5,650sqm of GFA and containing 32 additional apartments, and an allocation of 7 additional car parking spaces to Residential Building R4B. More specifically, this SSD DA proposes to amend Residential Building R4B, through:

- an increase to the overall building height from RL208.23 up to RL235 (an additional 8 levels)
- increase the overall number of apartments from to 290 to 322
- revise the dwelling mix and apartment relocations within the building envelope; and
- change to the number of car spaces from 324 to 331.

2 Reflectivity Assessment

2.1 Aim

This report extends on the Reflectivity Study report for this project submitted with the now approved SSD DA 6965. Its purpose is to comment on the impact of the alterations to the proposal made by the Amending SSD DA on the findings of the original Reflectivity Study.

It should be read in conjunction with the original Reflectivity Study report prepared by Arup:

- SSD DA 6965 Appendix L: *One Sydney Harbour – Reflectivity Report – Residential Building R4B,* Rev. F dated 29 July 2016

2.2 Summary of relevant changes

The Amending SSD DA proposes a vertical extension, adding 8 storeys to the overall height of the building. This increases the upwards extent of the glazed curtain wall facades potentially reflecting the sun.

Orientation of façade planes determining direction of reflections, detail character of the façades, and intent for façade material reflectivity are not changed in the Amending SSD DA proposal.

2.3 Assessment Criteria, Methodology and Assumptions

Due to the change of façades being limited to their vertical extent, this report argues that findings from the original Reflectivity Study analysis can be used to characterise reflections likely to be received from the extended facade area. This is done for the observer approach directions from the original study in section **2.4** below.

Analysis in the original Reflectivity Study, and the commentary in this report, are using the assessment approach documented by D.N.H. Hassall (1991).

This report is a desktop review based on the original Study geometric modelling results and the relative position of the extended façade area in the field of view of observers, drawing on Arup's experience with reflectivity studies based on the Hassall methodology. As per the original study, facades are assumed to have a maximum specular reflectivity of 28%.

2.4 Assessment results

2.4.1 Road traffic

In general, little change is expected to the reflected glare potential of the proposed building towards road traffic. For view directions typically level with the ground as can be assumed for drivers, and due to facades being vertical, reflections closer to the base of the building are most likely to show the highest equivalent veiling luminance due to their relative proximity to the direction of view.

Reflections from the top extension levels are normally well above level view, except at long distances when the building itself occupies only a smaller angle within the field of vision. Example views from the original Reflectivity Study of locations for which tower reflections were discussed (A, B, C, D, and I per original study numbering) are marked up below to illustrate the relative position of the upper extension levels to the origins of strongest reflections.

A. Traveling north on Barangaroo Avenue

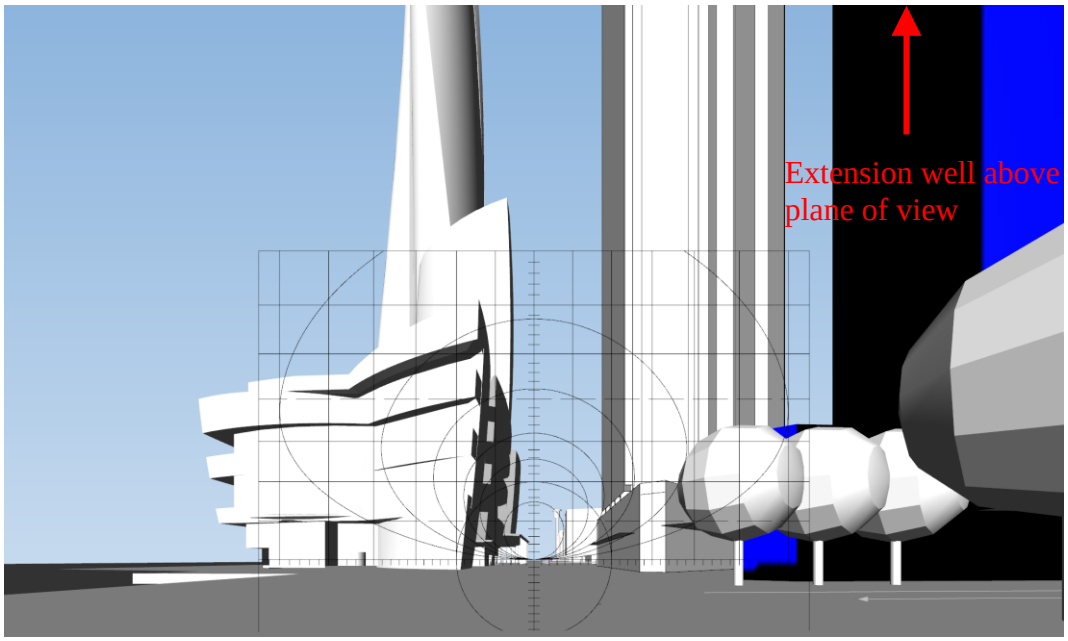

Figure 2: Perspective view from Barangaroo Avenue heading north

Viewed from locations along this stretch of road, the proposed vertical extension remains well above the plane of view. Any visible reflections would be an intensity smaller than those from the lower levels, which in turn have been found in the original Reflectivity Study to remain below the acceptable threshold of 500Cd/m² per Hassall.

Thus, the vertical extension is not expected to cause glare in this location.

B. Traveling south on Barangaroo Avenue

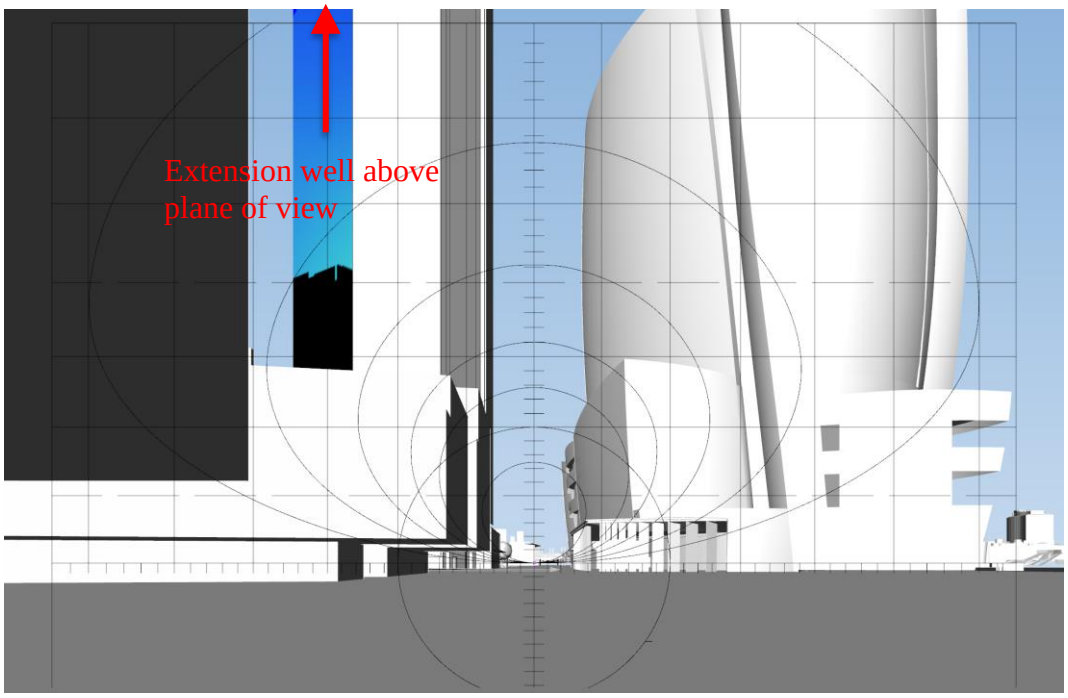

Figure 3: Perspective view from Barangaroo Avenue – north east façade

Viewed from locations along this stretch of road, the proposed vertical extension remains well above the plane of view. Any visible reflections would be an intensity smaller than those from the lower levels, which in turn have been found in the original Reflectivity Study to remain below the acceptable threshold of 500Cd/m² per Hassall.

Thus, the vertical extension is not expected to cause glare in this location.

C. Traveling south on Hickson Road

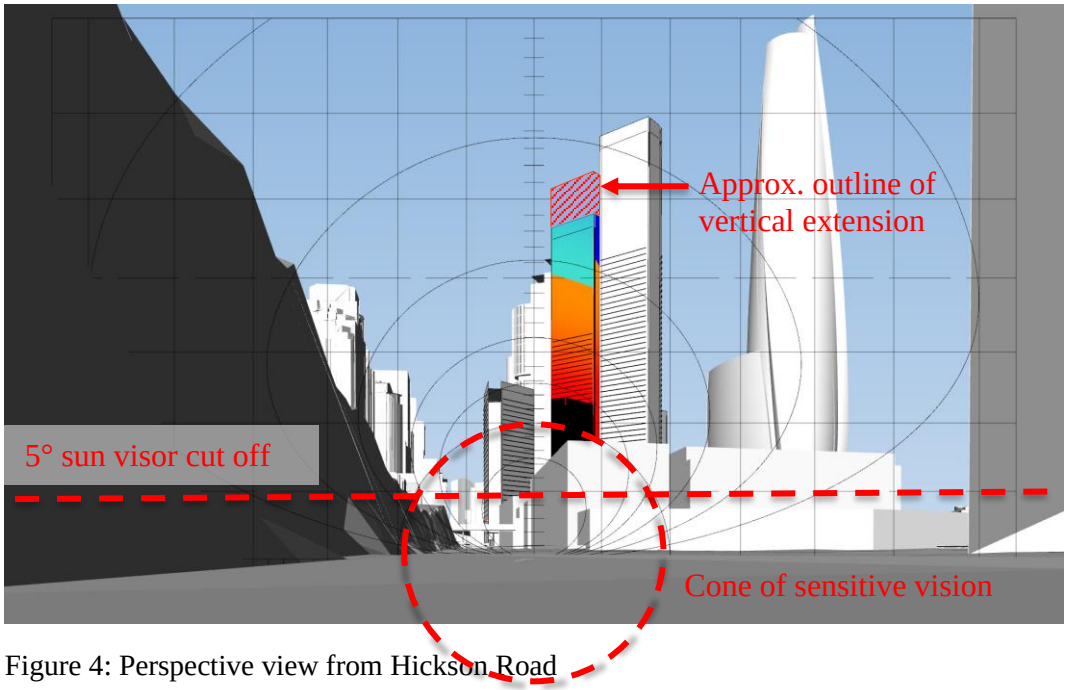

Figure 4: Perspective view from Hickson Road

Viewed from locations along this stretch of road, the proposed vertical extension is generally above the zone where the strongest reflections are expected.

In addition, it remains outside the cone of sensitive vision and above the 5° sun visor cut off angle, and drivers can lower their sun visors to mitigate reflections from the extension in the same way as noted for the lower tower façade in the original Reflectivity Study.

Thus, the vertical extension is not expected to cause glare in this location.

D. Traveling south on Kent St

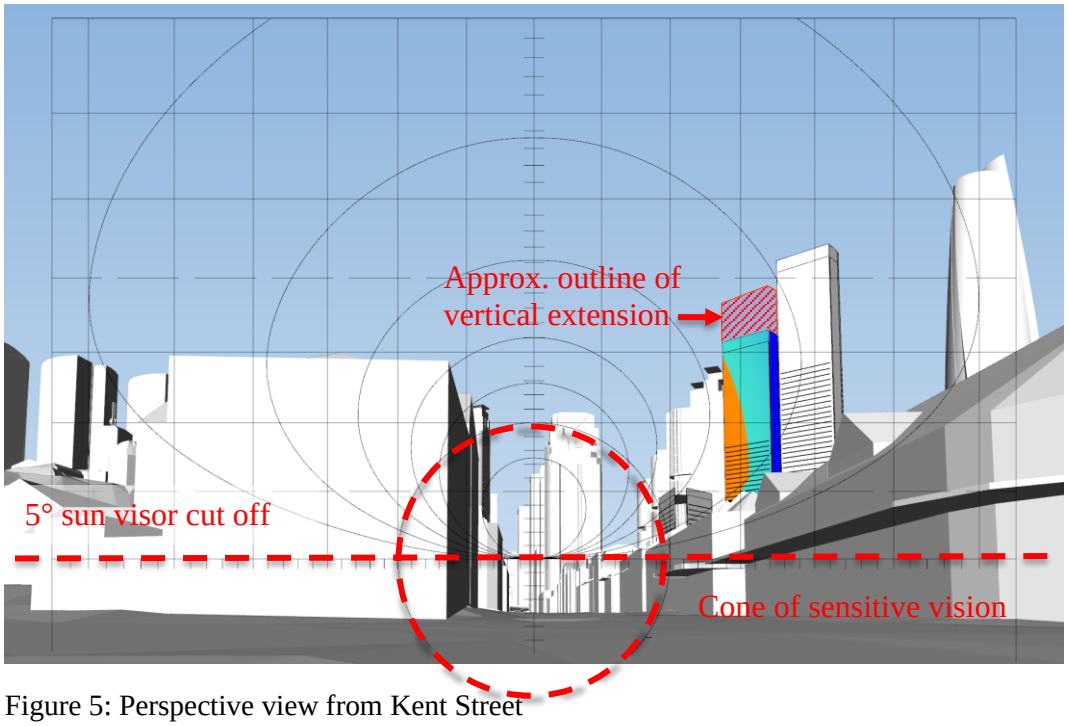

Figure 5: Perspective view from Kent Street

Viewed from locations along this stretch of road, the proposed vertical extension is generally above the zone where the strongest reflections are expected.

In addition, it remains outside the cone of sensitive vision and above the 5° sun visor cut off angle, and drivers can lower their sun visors to mitigate reflections from the extension in the same way as noted for the lower tower façade in the original Reflectivity Study.

Thus, the vertical extension is not expected to cause glare in this location.

I. Traveling West on Waterman's Quay

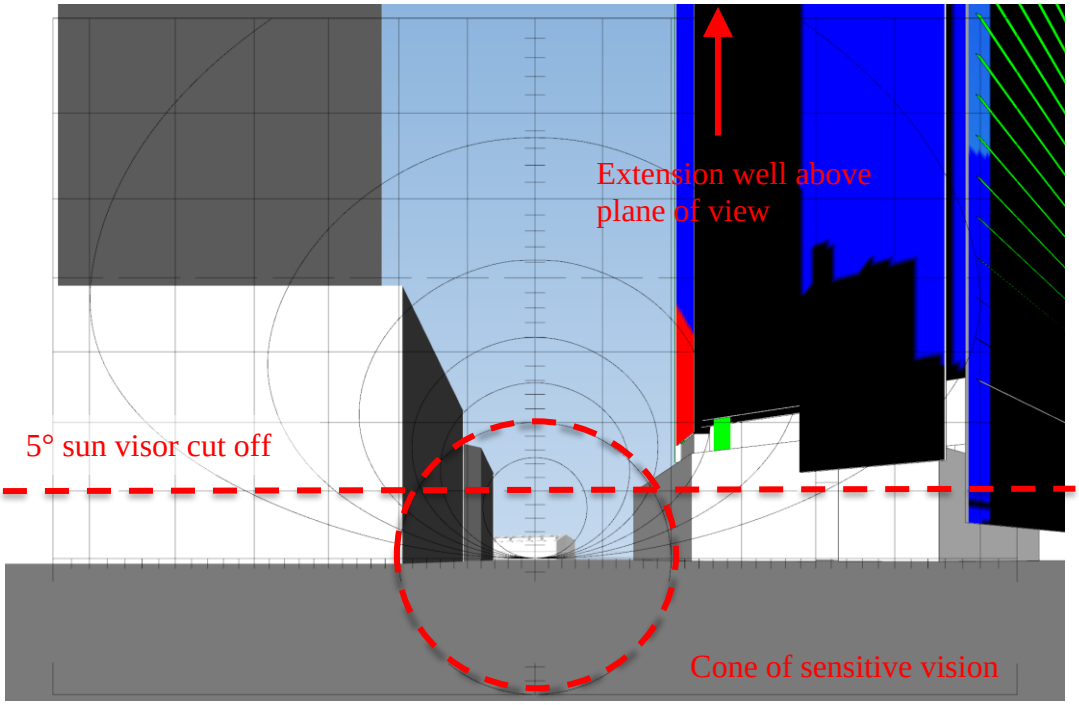

Figure 6: Perspective view from Waterman's Quay

Viewed from locations along this stretch of road, the proposed vertical extension remains well above the plane of view. Any visible reflections would be an intensity smaller than those from the lower levels, which in turn have been found in the original Reflectivity Study to remain below the acceptable threshold of 500Cd/m² per Hassall.

Thus, the vertical extension is not expected to cause glare in this location.

2.4.2 Impact on Traffic in Other Locations

While the vertical extension may add to the areas further afield where parts of the building can be seen from road level, similar considerations as noted in the original Reflectivity Study apply, i.e. unacceptable glare is not expected due to only smaller parts of the sun disk being reflected and scattering effects over long distances reducing intensity of reflections.

2.4.3 Impact on Pedestrians

As noted in the original study, the incidence of reflections from the building that affects pedestrians is generally similar to that at the examined road traffic locations. Thus, added impact due to the height increase is expected to be minimal and within acceptable bounds, as noted above for road traffic.

2.4.4 Impact on Air and Water Traffic

This report focuses on the impact of reflections on pedestrians and drivers. The effect of reflections on air and water has not been included in the assessment of this report.

The proposed amendments do not alter the general comments made in the original Reflectivity Study report.

3 Conclusion

This report finds that the increased upward extent of facades is unlikely to create unacceptable reflected glare.

In summary, based on the original SSD DA Reflectivity Study and the review of proposed changes to the design in the Amending SSD DA, the overall performance of the building in terms of reflectivity is expected to be as per the original Reflectivity Study:

The proposed Building R4B performs well in terms of solar reflectivity, and glare affecting drivers on surroundings streets is not expected to exceed the constraints of acceptability according to the Hassall methodology, as long as the external normal specular reflectance of glazing and cladding is kept within **28%**.

Pedestrian observers are easily able to adjust their view and thus reduce the glare impact of reflections. They move at a rate significantly slower than that of a vehicle. For this reason, it can be concluded that it will be safe for pedestrians to divert their vision in order to avoid glare.