

Planning Considerations for Reflected Sunlight Glare

Planning Practice Note 96

December 2022

This practice note provides guidance about the planning considerations for reflected sunlight glare in the built environment. It addresses:

- **reflected glare in the planning scheme**
- **how different types of reflected glare are characterised**
- **locations, design approaches and materials that may cause reflected glare**
- **how to prepare a reflected glare assessment**
- **suggested planning permit conditions to address reflected glare.**

Addressing reflected glare in the planning scheme

Clause 15.01-2S (Building design) of the Victoria Planning Provisions outlines a strategy of minimising detrimental impacts of development on neighbouring properties, the public realm and the natural environment. Reflected glare is also the subject of application requirements and decision guidelines in a variety of zones, overlays and particular provisions in Victorian planning schemes.

What is reflected glare

Reflected glare can occur when sunlight is reflected from a building surface into the view of surrounding observers causing annoyance and/or loss of vision, which may then cause safety risks and/or amenity impacts. The risk of reflected glare is generally greater for developments above four storeys in height.

There are two forms of reflected glare to consider when planning and designing new development:

- **Discomfort glare** is a temporary vision sensation caused by high brightness that produces discomfort for an observer, but generally does not present health and safety risks.
- **Disability glare** affects contrast in vision to reduce overall visibility, which can present health and safety risks when the observer is impacted.

Some of the key terms used when discussing reflected glare are as follows:

- **Specular light reflectance** means the proportion or percentage of light that reaches a surface and is reflected off that surface in a mirror-like way.
- **Normal incidence** means light that reaches a surface from a direction that is perpendicular (at a 90 degree angle) to the surface.
- **Linished (satin finish) stainless steel** is a stainless-steel finish with fine parallel polishing lines, commonly used for work surfaces, handrails and similar.



Reflected glare risk factors

Locations of sensitivity

Reflected glare risk is greater for developments in dense urban environments with residential and/or commercial developments, or for developments viewed from key receptors such as rail corridors, main roads, airports or parks. Exposed buildings in other non-urban settings may also result in reflected glare.

Design factors

A range of key design factors can also increase the extent and type of reflected glare risk. These factors may include building height and exposure, geometry/design of the building, and orientation or concavity of the façade. The following images provide examples of these factors.

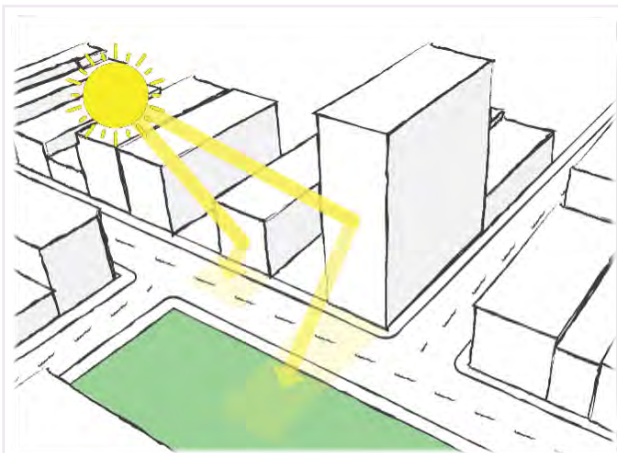


Figure 1 – Building height

Reflected glare risk is greater for developments above four storeys and is typically associated with mid-rise and high-rise developments.

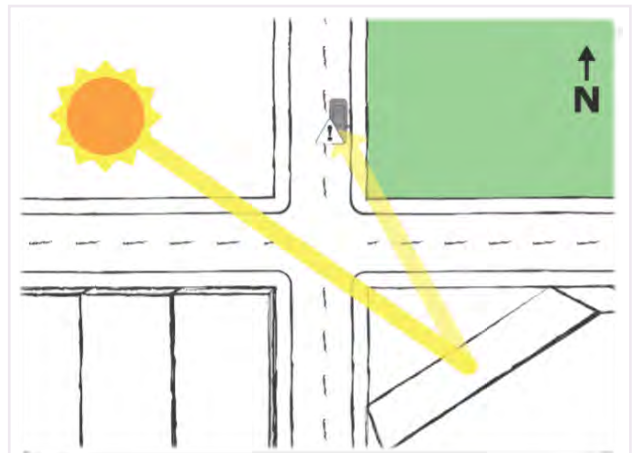


Figure 2 – Building orientation

Reflected glare risk is greater for elevations rotated from cardinal (north/south/east/west) directions.

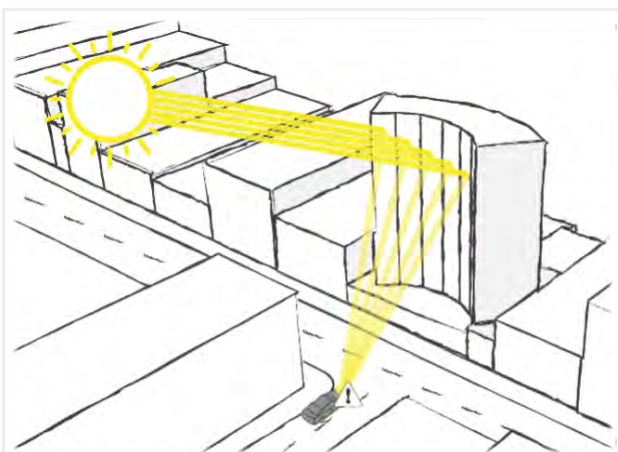


Figure 3 – Concave façades

Reflected glare risk is greater for concave curvature or faceting on façades.

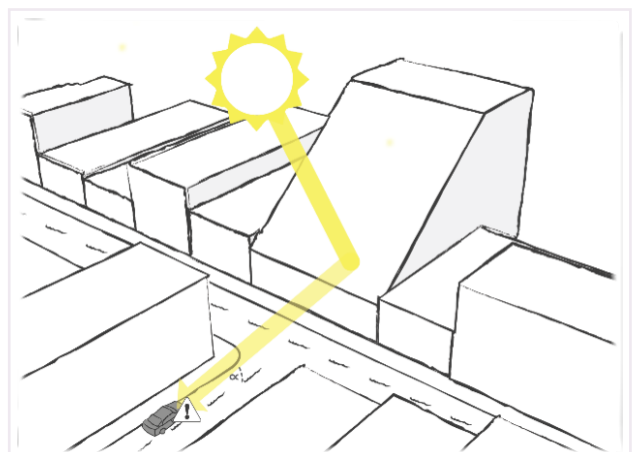


Figure 4 – Tilted façades

Reflected glare risk is greater for glass that is tilted.



Building materials

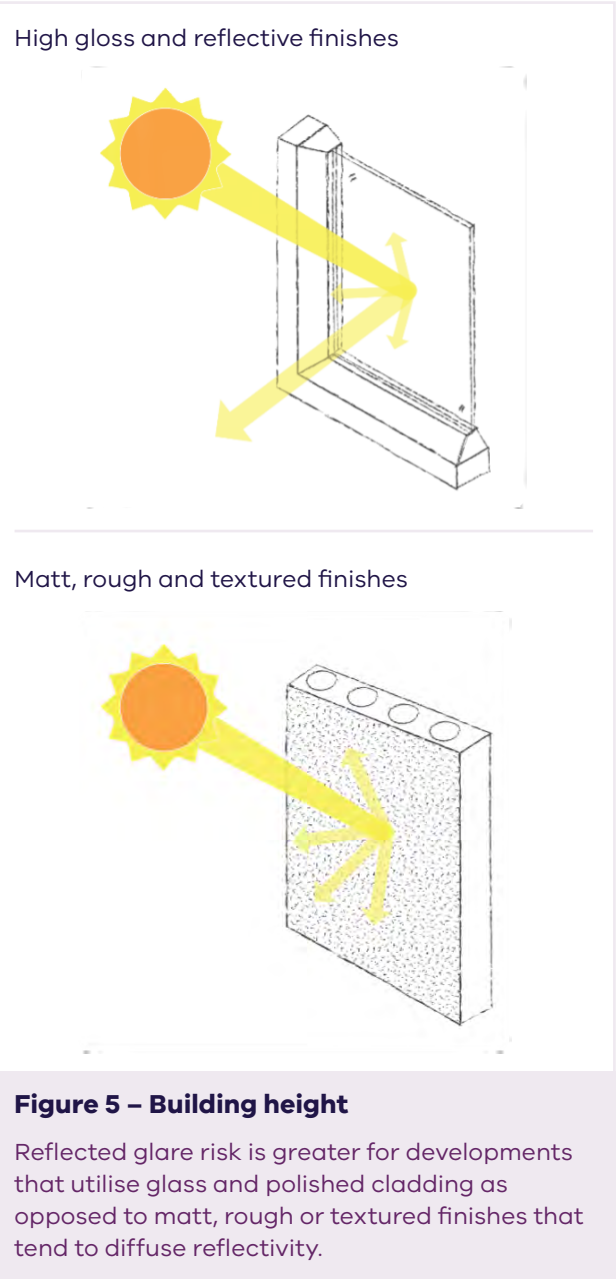
Glass and polished cladding are widely used in construction and if excessively applied (coupled with locational and design factors) are more likely to cause reflected glare than other materials in the built environment.

Glass is a key source of reflected glare which can be particularly intense and visible from varying locations and directions throughout the day and year. Intensity can be highest when sunlight reaches glass from an angle. Reflected glare can still be an issue with glass that has been treated to reduce reflected glare.

Polished cladding can behave like glass in creating particularly intense reflected glare.

Other cladding finishes can also have complex reflected glare characteristics and can create risks. An example is linished (satin-finish) stainless steel, which can create highly intense sunlight reflections.

Reflected glare risks can also arise when cladding, painted walls or concrete have matt or smooth finishes, although reflection is generally less intense than from glass or polished cladding.





Assessing reflected glare

What is a reflected glare assessment?

A reflected glare assessment is a technical report that identifies the likelihood and extent of reflected glare impacts occurring as a result of development and provides recommendations for mitigating those impacts. The assessment can be completed by lighting, building façade or sustainability specialists and will require input from the project architect and complementary disciplines to gather the requisite information.

A reflected glare assessment should include the following information:

- Description of the proposed development.
- The applied method used for the reflected glare assessment.
- Any assessment assumptions.
- Identification of potential observers receiving glare.
- Review of materials, finishes and reflectors.
- Assessment of the proposed development's disability and discomfort glare.
- Mitigation measures for reflected glare.

When is a reflected glare assessment required?

Some discomfort glare is unavoidable in development, as distinct from disability glare which must be avoided. The aim of the assessment should be to identify potential impacts associated with prolonged discomfort glare and to also consider the potential for disability glare and determine any possible mitigation measures.

A reflected glare assessment should be initiated by a proponent early in the design and development phase of a project if the type of development proposed is likely to result in reflected glare. Proponents are encouraged to make their own assessment based upon site characteristics, features and context and proposed building design and materiality. In general terms, a reflected glare assessment is recommended where:

- Development is located in a dense urban area or viewed from rail corridors or main roads and is four storeys or higher.
- Glossy surface finishes, including linished stainless steel or glass, with more than 15 per cent specular light reflectance at normal incidence are proposed.

- Tilted (facing upwards) surfaces with glass and/or reflective façade finishes are proposed.
- Glass and/or reflective façade finishes with concave curvature or faceting are proposed.
- Other similar circumstances where reflected glare risks may arise from the proposed building siting and design.

Carrying out and implementing the recommendations of a reflected glare assessment early in the design phase can help avoid or minimise reflected glare through responsive architectural design and thereby reduce the risk of issues arising later during the assessment of the planning application or even after construction is completed.

A responsible authority may request a reflected glare assessment where it considers that the proposed development may result in the potential risk of unacceptable reflected glare, and may require a further assessment if the design is modified during the application process. The responsible authority may also choose to direct changes to the building through permit conditions to mitigate the impact of reflected glare.

Preparing a reflected glare assessment

A reflected glare assessment must consider the risk of disability glare and discomfort glare and include an analysis of the likely glare risk factors and provide recommendations for potential mitigation measures that can be used to reduce the impact of reflected glare to an acceptable level.

For example, a site that is relatively exposed and is located close to a sensitive land use or transport corridor will require a building design and façade treatment strategy that utilises building height, shape and form, materials, finishes, colours and textures to its advantage to minimise the likelihood of reflected glare.

The key matters and steps to consider in completing a reflected glare assessment are set out below.

Site analysis

- Identify observers at risk from glare derived from the proposed building, defining:
 - their directions of view
 - whether they are fixed or transient observers (e.g. pedestrians/passengers/drivers that may traverse the subject site, adjoining streets, rail corridor or flight path)



- if transient, their paths of travel
- view directions for safety-critical tasks such as driving.
- Identify and characterise the proposed building façade’s glare-reflecting material finishes (areas of glazing, external cladding, smooth or finished surfaces).
- Identify when and where discomfort or disability glare reflections may be experienced from higher risk elements of the building form or shape (e.g. concave or tilted design features).
- Consider and document the site’s surrounding context and identify potentially sensitive locations and routes, affected buildings and open spaces, including factors that may compound glare.

Assessment

- To ascertain the risk of disability or prolonged discomfort from glare reflection, perform an assessment of glare risk to determine:
 - when and where the reflections are problematic
 - the type and intensity of glare reflections from the proposal.

Ensure the assessment is:

- sensitive to view direction, having regard to the use of surrounding land and buildings
- defined for sunlight reflections and a brightness level representative of daylight.

- Where disability glare risk is identified, calculate and document disability glare to quantify the risk and impact on visual ability.

Design response

- Identify mitigation measures in response to identified risks.
- Adjust the design to respond, as required, and then repeat the assessment to test and confirm that mitigation measures are effective.

Reviewing a reflected glare assessment

When reviewing a reflected glare assessment, the responsible authority should ensure:

- Findings and applied mitigation measures are clear and implementable.
- Nearby transport corridors, glass of more than 15 per cent light reflectance, glass that is tilted upwards and extensive application of glossy finishes are carefully considered.

Suggested permit conditions

The following conditions are suggested to assist responsible authorities when deciding on an application where reflected glare risk can be reasonably managed to an acceptable level.

Planning permit conditions for reflected glare are best established on a case-by-case basis, considering the nature of the development proposal and the site’s context.

The following model conditions are provided as a guide for addressing typical issues generated by reflected glare, with the aim of minimising or mitigating reflected glare to acceptable levels. The responsible authority may adapt or add to these conditions as needed.

Reflected glare assessment

The condition below relates to both disability and discomfort glare risks and could be used if the responsible authority or a preliminary reflected glare assessment identifies that the risk and impact of reflected glare is low. It may also be necessary to stage the assessment of reflected glare based on project needs, however, this should only be contemplated in low-risk circumstances as early consideration of reflected glare during project inception and design is highly desirable.

Prior to the commencement of buildings and works, or at another time as agreed to by the responsible authority, a reflected glare assessment of external building materials and finishes, utilising an appropriate methodology prepared by a suitably qualified person, must be prepared and submitted to the satisfaction of the responsible authority.



Disability glare

This condition provides a useful upper limit to avoid overly reflective glass or cladding. Glass or cladding of higher than 15 per cent reflectance may be acceptable where all other reflected glare risks are otherwise minimised, such as in instances where it is used only for lower storeys of a building or where there is a lack of sensitive receptors.

Specular light reflectance must be less than 15 per cent for all external building glazing and cladding materials and finishes when measured at an angle of 90 degrees to the surface of the material (normal incidence), except with the written consent of the responsible authority.

This next condition will require an assessment of disability glare risks that considers exterior glazing and cladding materials and finishes.

External glazing and cladding materials and finishes must avoid disability glare to public transport operators, road users and aircraft, to the satisfaction of the responsible authority.

Discomfort glare

This condition aims to reduce prolonged impacts of discomfort glare. It highlights glazing arrangements and cladding finishes that are more likely to create prolonged periods of discomfort glare, which should be a particular focus during a glare assessment.

Extended periods of discomfort glare for pedestrians and occupants of surrounding buildings caused by glazing (including tilted glazing) and external cladding materials and finishes with specular or glossy finishes (including polished metal cladding, lished stainless steel, glazed tiles, high gloss paint finishes) must be avoided or minimised, to the satisfaction of the responsible authority.

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