Appendix P

Reflectivity Impact Assessment

Sydney Metro West

Sydney Olympic Park Over and Adjacent Station Development Reflectivity Impact Assessment

Appendix P

July 2022

Document Number: SMWSTEDS-SMD-OLP-SN400-EN-RPT-044002

REVISION	DATE	SUITABILITY CODE	TEAMBINDER DOCUMENT NUMBER	TB REVISION
E	21/07/2022	S4	SMWSTEDS-SMD-OLP-SN400-EN-RPT-044002	E

Approval Record

FUNCTION	POSITION	NAME	DATE
Author	Sciences Engineer	Benjamin Bleckly	21/07/2022
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Amendment Record

DATE	REVISION	AMENDMENT DESCRIPTION	AUTHOR
17/12/2021	A	Initial Issue	Benjamin Bleckly
25/02/2022	B	Second Issue	Benjamin Bleckly
25/03/2022	C	Third Issue	Benjamin Bleckly
14/04/2022	D	Final for submission	Benjamin Bleckly
21/07/2022	E	Web accessible	Benjamin Bleckly

Mott MacDonald Australia Pty Ltd

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Glossary

Term	Definition
2D	Two-dimensional
3D	Three-dimensional
ASD	Adjacent Station Development
BIM	Building information model
CAD	Computer-aided design
CBD	Central business district
Concept and Stage 1 CSSI Approval	Application SSI-10038, including all major civil construction works between Westmead and The Bays, including station excavation and tunnelling, associated with the Sydney Metro West line
Concept SSDA	A concept development application as defined in section 4.22 of the EP&A Act. It is a development application that sets out the concept for the development of a site, and for which detailed proposals for the site or for separate parts of the site are to be the subject of a subsequent development application or applications
CSSI	Critical State Significant Infrastructure
DPE	Department of Planning and Environment
Early morning	Between 6am and 8am (inclusive)
EP&A Act	*Environmental Planning and Assessment Act 1979*
GFA	Gross floor area
Hassall's Method	The method outlined in David N. H. Hassall's (1991) 'Reflectivity: Dealing with rogue solar reflections' publication
Late afternoon	Between 4pm and 7pm (inclusive)
LV	Veiling luminance
Mid-afternoon	Between 1pm and 3pm (inclusive)
Mid-morning	Between 9am and 11am (inclusive)
OSD	Over Station Development
RL	Relative level
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
SSDA	State Significant Development Application
SSI	State Significant Infrastructure
Stage 2 CSSI Application	Application SSI-19238057, including major civil construction works between The Bays and Hunter Street station
Stage 3 CSSI Application	Application SSI-22765520, including rail infrastructure, stations, precincts and operation of the Sydney Metro West line
Sydney Metro West	Construction and operation of a metro rail line and associated stations between Westmead and the Sydney CBD as described in section 1.1
The site	The site which is the subject of the Concept SSDA

Executive summary

This Reflectivity Impact Assessment Report supports a Concept State Significant Development Application (Concept SSDA) submitted to the Department of Planning and Environment (DPE) pursuant to part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Concept SSDA is made under section 4.22 of the EP&A Act.

Sydney Metro is seeking to secure concept approval for an over station development (OSD) and adjacent station development (ASD) on an area defined as Site 47 within the Central Precinct of Sydney Olympic Park (referred collectively as the 'proposed development'). The proposed development will comprise of one new commercial and retail building (Building 1) above the Sydney Olympic Park Station and two residential accommodation buildings (Buildings 2 and 3) with retail and commercial space, adjacent to the Sydney Olympic Park Station.

The Concept SSDA seeks consent for a building envelope and mixed-use purposes, maximum building height, a maximum gross floor area (GFA), pedestrian and vehicular access, circulation arrangements and associated car parking and the strategies and design parameters for the future detailed design of development.

Patrons traversing around or through the site, either by vehicle or on foot, are at risk of 'veiling glare', also known as "disability glare", is measured by the veiling luminance. This glare risk is due to solar reflections from the façades of the developments being concentrated and potentially temporarily blinding patrons. Veiling luminance was calculated at discrete points, representative of sensitive receptors traversing routes within the vicinity of the proposed development. A conservative approach has been considered by assuming entirely glazed façades without external shading elements on the façade and future developments that might otherwise shield glare.

Six routes were tested, with only the following routes expected to have veiling luminance impacts above the 500cd/m^2 criteria:

- Route 3: Drivers travelling west-south-west along Figtree Drive
- Route 4: Drivers travelling east along Figtree Drive.

In addition, seven pedestrian locations were tested within the site boundaries for pedestrians looking in various directions. With standard glazing, pedestrians at five of the seven locations were found to have the potential to experience disability glare (veiling luminance exceeding 500cd/m^2). However, the risk of glare impact on pedestrians is considered to be low as they can move or look away from the façade.

As part of this assessment, a sensitivity study was also undertaken to determine the effectiveness of using a lower reflective glazing. It was found that using a lower reflective glazing is an effective measure for reducing the glare risk but may not be sufficient to eliminate the risk. Therefore, further mitigation measures are recommended to further minimise the glare risk to sensitive receptors near the proposed development. The following are suggested as effective mitigative measures:

- using a less reflective glazing
- different material (non-glazed and/or non-reflective)
- shielding the façade
- changing built form.

These mitigative measures will be considered and analysed in future Detailed SSDAs for the final building designs.

1 Introduction

1.1 Sydney Metro West

Sydney Metro West will double rail capacity between Greater Parramatta and the Sydney Central Business District (CBD), transforming Sydney for generations to come. The once in a century infrastructure investment will have a target travel time of about 20 minutes between Parramatta and the Sydney CBD, link new communities to rail services and support employment growth and housing supply.

Stations have been confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and Hunter Street (Sydney CBD).

Sydney Metro West station locations are shown in Figure 1-1.

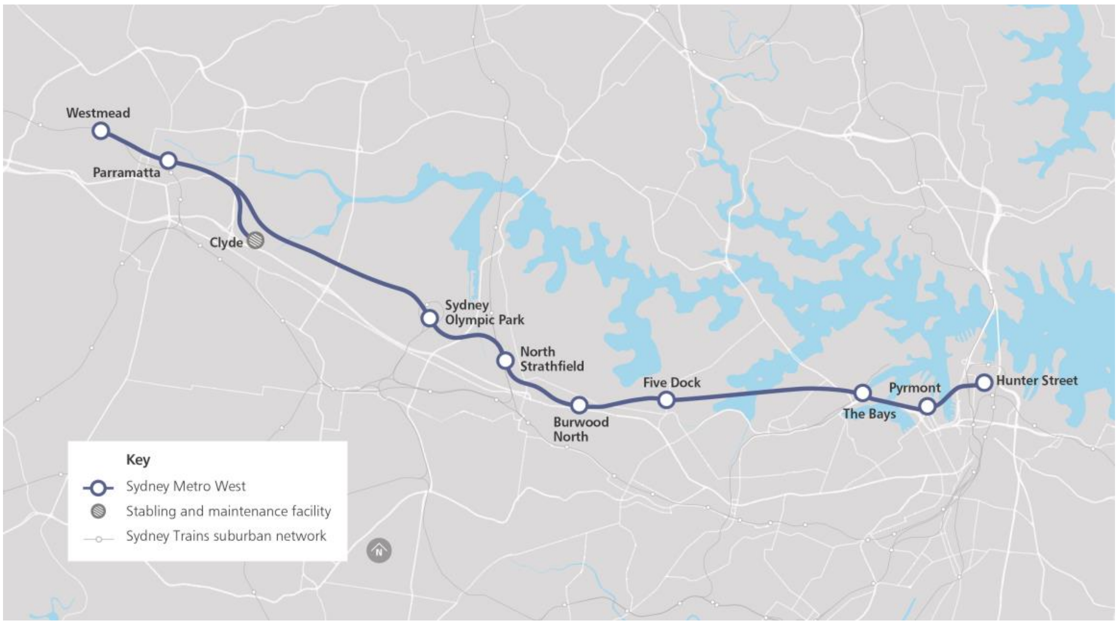

Figure 1-1 Sydney Metro West

1.2 Background and planning context

Sydney Metro is seeking to deliver Sydney Olympic Park Station under a two-part planning approval process. The station infrastructure is to be delivered under a Critical State Significant Infrastructure (CSSI) application subject to provisions under division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). While the over and adjacent station developments are to be delivered under a State Significant Development (SSD) subject to the provisions of part 4 of the EP&A Act.

1.2.1 Critical State Significant Infrastructure

The State Significant Infrastructure (SSI) planning approval process for the Sydney Metro West metro line, including delivery of station infrastructure, has been broken down into a number of planning application stages, comprising the following:

- Stage 1 CSSI Approval (SSI-10038) – All major civil construction works between Westmead and The Bays including station excavation, tunnelling and demolition of existing buildings (approved 11 March 2021).

- Stage 2 CSSI Application (SSI-19238057) – All major civil construction works between The Bays and Sydney CBD (under assessment).
- Stage 3 CSSI Application (SSI-22765520) – Tunnel fit-out, construction of stations, ancillary facilities and station precincts between Westmead and the Sydney CBD, and operation and maintenance of the Sydney Metro West line (under assessment).

1.2.2 State Significant Development Application

The SSDA will be undertaken as a staged development with the subject Concept State Significant Development Application (Concept SSDA) being consistent with the meaning under section 4.22 of the EP&A Act and seeking conceptual approval for a building envelope, land uses, maximum building heights, a maximum gross floor area, pedestrian and vehicle access, vertical circulation arrangements and associated car parking. A subsequent Detailed SSD/s is to be prepared by a future development partner which will seek consent for detailed design and construction of the development.

1.3 Purpose of the report

This reflectivity impact assessment supports a Concept SSDA submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the EP&A Act. The Concept SSDA is made under section 4.22 of the EP&A Act.

This report has been prepared to specifically respond to the Secretary's Environmental Assessment Requirements (SEARs) issued for the Concept SSDA on 18 February 2022 which states that the environmental impact statement is to address the following requirements:

SEARs requirement	Where addressed in report
4. Environmental Amenity: • Assess amenity impacts on the surrounding locality, including lighting impacts, reflectivity, solar access, visual privacy, visual amenity, view loss and view sharing, overshadowing and wind impacts. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated.	Throughout this report

This Reflectivity Impact Assessment Report assesses the proposal for any glare resulting from sun light glancing off the façade and any impact on vehicles and pedestrians moving around the site and/or on nearby roads.

2 The site and proposal

2.1 Site location and description

The site is located within Sydney Olympic Park and is situated within the City of Parramatta Local Government Area. The site is in the Central Precinct of Sydney Olympic Park and defined as Site 47 in the Draft SOP Master Plan (Interim Metro Review). The broader metro site is bound by Herb Elliot Avenue to the north, Olympic Boulevard to the west and Figtree Drive to the south as shown in Figure 2-1.

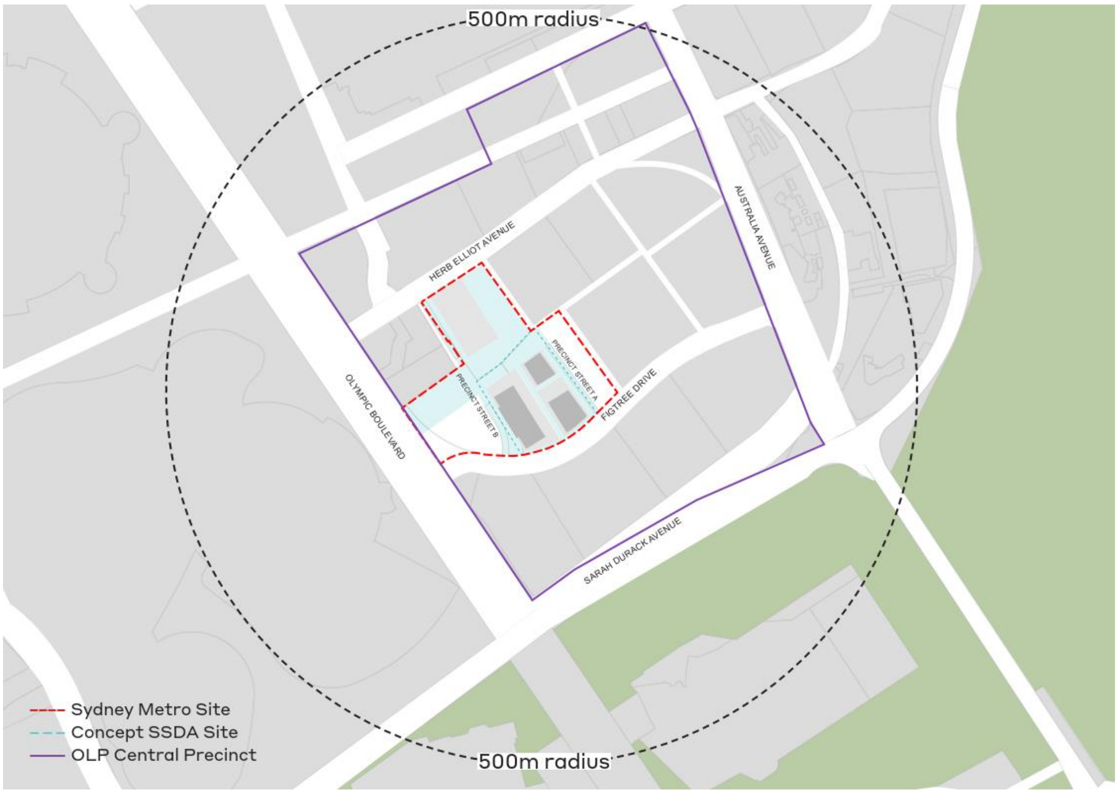

Figure 2-1 Sydney Olympic Park Station location precinct

As described in Table 2-1, the site comprises part of Lot 59 in DP 786296 and Lot 58 in DP 786296, and comprises approximately 11,407m^2 of land.

Table 2-1 Site legal description

Street Address	Legal description
5 Figtree Drive, Sydney Olympic Park	Lot 58 in DP 786296
7 Figtree Drive, Sydney Olympic Park	Lot 59 in DP 786296

2.2 Overview of this proposal

The Concept SSDA will seek consent for three building envelopes and the delivery of Precinct Street A as detailed in Table 2-2 and Figure 2-2.

Table 2-2 Sydney Olympic Park proposed development overview

Item	Description
Land use	**Building 1:** Commercial and retail **Building 2:** Commercial, retail and residential **Building 3:** Commercial, retail and residential
Building height (RL) / Number of storeys	**Building 1:** 120.20 / 21 storeys **Building 2**: 116.90 / 27 storeys **Building 3:** 171.50 / 45 storeys
Gross floor area (m^2)	**Building 1:** 28,517 **Building 2:** 12,089 **Building 3:** 27,384 **TOTAL: 68,000**
Car parking spaces	358

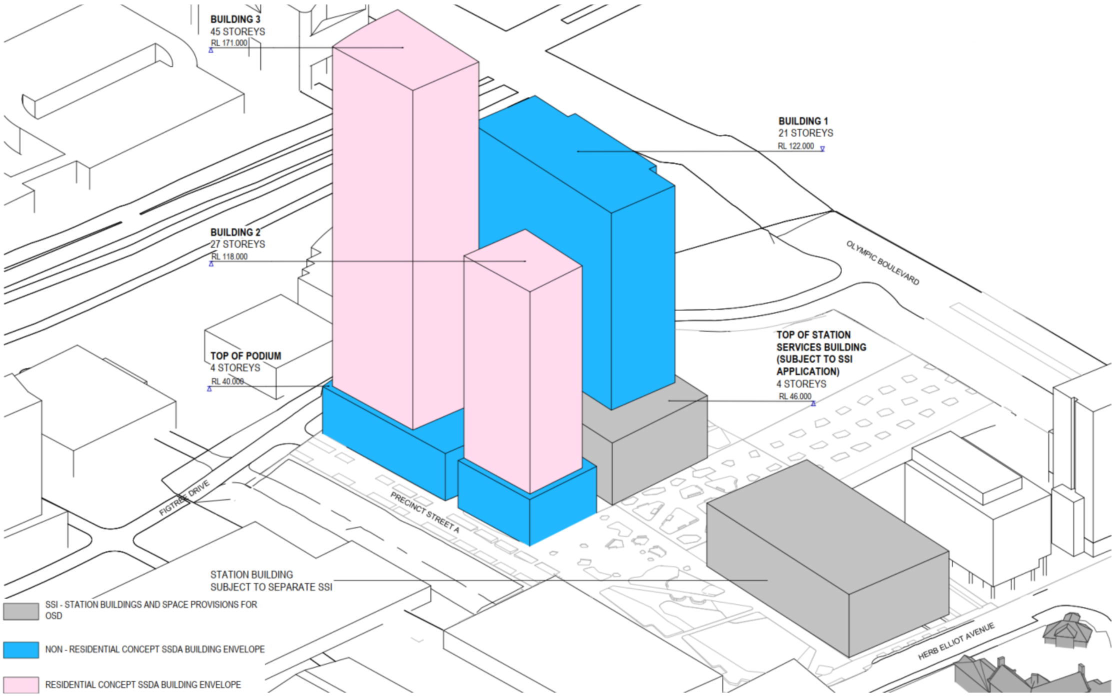

Figure 2-2 Proposed Concept SSDA development and CSSI scope

3 Scope of assessment

The built form and surrounding developments are shown below in Figure 3-1 and Figure 3-2. This assessment only considers the potential reflectivity impacts from the proposed development (Building 1 shown in blue and Buildings 2 and 3 in green). The analysis assumes that the façades are fully glazed and without any obstructions by way of external elements. Therefore, the risk of glare hazard on surrounding roads and pedestrians can be understood.

Glare analysis simulations were completed across six different local road routes and multiple pedestrian locations centred around the proposed development. Luminescence values across the year are calculated and are presented for each route and pedestrian location for the site. Buildings 1, 2 and 3 were assessed separately as it is assumed that they will act as an additional shading element to each other.

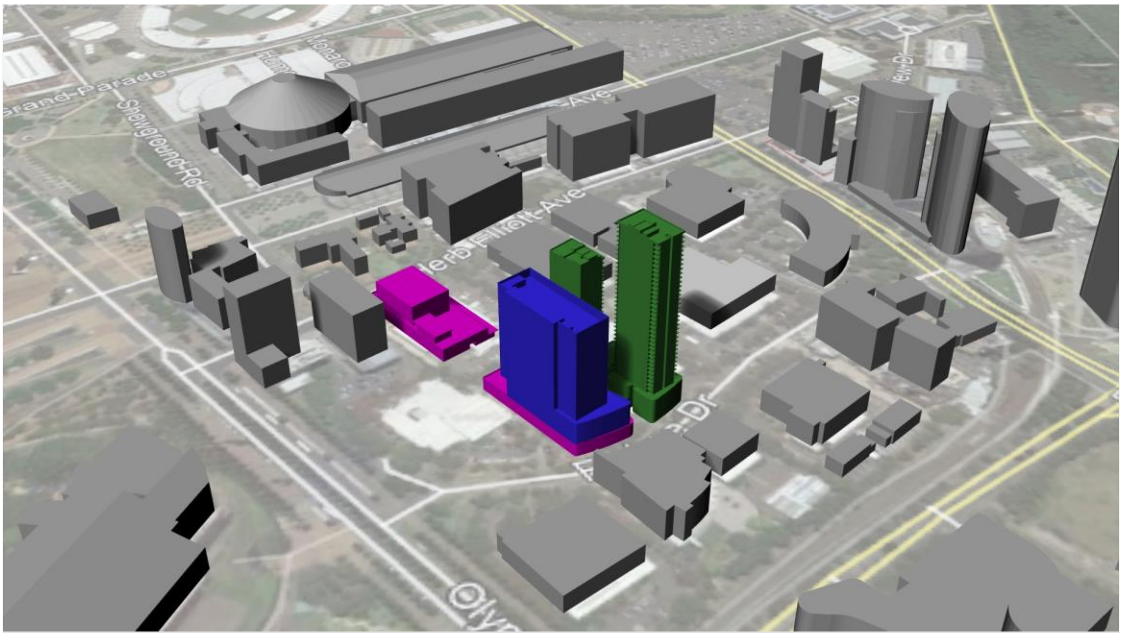

Figure 3-1 Site and surrounds model (viewed from the south)

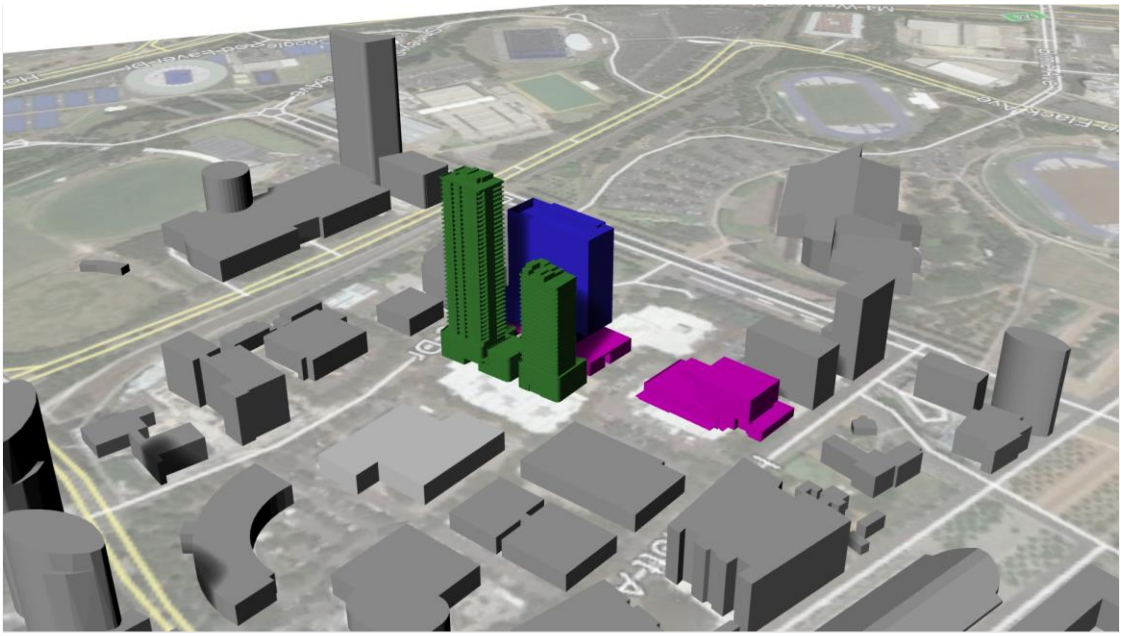

Figure 3-2 Site and surrounds model (viewed from the northeast)

3.1 Assessment criteria

The following planning policies and development control plans have been considered, with the relevant sections reproduced below, when preparing this report:

- State Environmental Planning Policy (Precincts – Central River City) 2021
- Sydney Olympic Park Masterplan 2030 (2018 Review)
- Sydney Olympic Park Masterplan 2030 (Interim Metro Review).

All three of these documents have a provision to address reflections from glazed façades. However, none of them prescribe a value or description around what constitutes a reflectivity impact or what would be considered a dangerous level of glare from the development. Therefore, the Hassall method and criterion (refer to section 4) will be used to quantify the reflectivity impact from the development and to show that the development can be formed and constructed in such a way that any potential glare can be mitigated such that it does not cause discomfort or threaten the safety of pedestrians or motorists.

3.1.1 State Environmental Planning Policy (Precincts – Central River City) 2021

Appendix 4 of the State Environmental Planning Policy (Precincts – Central River City) 2021 document outlines specific requirements for the Sydney Olympic Park site. Under section 30 (Design Excellence) there is a provision for reflectivity, the relevant section is reproduced below. However, this does not outline any criteria or conditions that must be met in order to not have a negative impact on vehicle operators and pedestrians within the precinct.

> "*30 Design Excellence*
>
> *(2) In considering whether proposed development exhibits design excellence, the consent authority must have regard to the following matters –*
>
> *(c) whether the building meets sustainable design principles in terms of sunlight, natural ventilation, wind, reflectivity, visual and acoustic privacy, safety and security and resource, energy and water efficiency.*"

3.1.2 Sydney Olympic Park Masterplan 2030

The 2030 master plan for the Sydney Olympic Park region was originally approved by the Minister for Planning in 2010. However, it has undergone a few reviews since then, notably the 2018 review and Interim Metro Review. While the 2018 review does not include any reflectivity requirements or assessment criteria, the Interim Metro Review considers the potential effect that reflective glass façades may have on patrons trying to safely navigate around the ground level. The applicable section from Annexure 11: Design Review Report is reproduced below.

> "*The panel note that glass buildings at the ground plane can prove difficult for vision impaired people to safely navigate due to reflective glass facades at the ground plane and recommend further attention be given to materiality at ground level in future stages.*"

Glare from reflective façades can affect all patrons, including those who are vision-impaired, as noted above. In addition, drivers operating in the vicinity of the site can also be affected by reflective glass façades above the ground level. Therefore, materiality and shading of glass façades should be considered to ensure the impact on all patrons and users is minimised.

4 Assessment

4.1 Glare characteristics

The term ‘glare’ describes adverse visual effects caused by large contrasts of luminance in the visual field. As such, glare is likely more significantly felt at times of low background luminance (e.g. during dawn and dusk hours) as compared to those of high background luminance (e.g. high noon), even if the amount of solar reflections from building surfaces remain the same.

There are many different types of glare, the impacts of which may range from causing mild discomfort to temporary blindness, as illustrated in Figure 4-1. For this proposed development, the type of glare of concern is ‘veiling glare’, also known as ‘disability glare’. It is caused by multiple reflections and the scattering within the eye by direct light from a bright source. It produces a perception that a thin veil has been overlaid on the visual scene, which can reduce the luminance contrast, impair visual tasks, and at times cause temporary blindness.

It is critical that sensitive receptors’, and particularly that of drivers’, views are unaffected by disability glare, as this has the potential to cause road accidents. The Hassall methodology focuses on prediction of this glare by calculating veiling luminance (LV).

Figure 4-1 Illustration of potential disability glare

Source: CBS58, 2020

4.2 Methodology

The method for this study is based on David N. H. Hassall’s (1991) ‘Reflectivity: Dealing with rogue solar reflections’ (Hassall’s Method), which is widely used to assess reflections off building projects in Sydney. The following steps were followed to undertake this assessment:

- Performed a high-level desktop assessment of at-risk drivers with the potential to experience disability glare from the proposed development by assessing site aerial imagery.
- Created a simplified three-dimensional (3D) model of the proposed building and surrounding context, including buildings, roads, topography and any other

significant structure that may impact the reflectivity of the site (refer to Figure 3-2). The model excludes small scale details such as joints, any expressed framing profiles, downpipes, etc. as they subtend insufficient angles in the visual field to reflect a large enough portion of the sun disk to cause unacceptable glare.

- Selectively identified sensitive receptor (driver) locations based on possible routes of approach and retreat from the development.
- Undertook parametric modelling (refer to Section 4.2.3) to assess reflectivity impacts of the proposed development on sensitive receptors based on sun paths in NSW.
- When the sun is reflected towards any observer, the equivalent veiling luminance in the eye of the observer is calculated and evaluated against the maximum allowed level of 500cd/m^2, as per Hassall's Method. This involves calculations of the strength of solar illumination, the position of the sun, the apparent position of the sun reflected in the façade, and the reflected solar illumination received by the observer.
- Undertook a series of sensitivity studies to assess effectiveness of various mitigative measures in reducing disability glare.
- Reflectivity values were calculated for each route and pedestrian location for all three buildings of the site. The assessment for Buildings 1, 2 and 3 were undertaken separately based on the assumption that they will provide an obstruction and additional shading to each other. Therefore, only sections of the façade that are not shielded by the neighbouring buildings are assessed. Where disability glare is present, the images for location and intensity are displayed within Appendix A.

4.2.1 Calculating veiling luminance

Veiling luminance is a parameter used to predict veiling glare (Van Derlofske, n.d.). Hassall (1991) proposed a workflow to estimate this by tracking solar geometry, estimating sun intensity, establishing actual façade reflectance, and numerically calculating a measure for the veiling effect. Veiling luminance is measured in candela per metre squared (cd/m^2) and is a representation of apparent brightness to the human eye. Veiling luminance accounts for the angular distance of the glare source from the centre of focus.

4.2.2 Assumptions and limitations

The analysis and results presented in this report are only accurate and valid for the design assessed. The following assumptions have been made:

- The built form (mass/scale and orientation) and surrounding development was developed from version 45 (V45) of the Sydney Olympic Park metro station federated building information model (BIM).
- Surface roughness and small details have a negligible impact.
- All façades are glazed.
- Drivers are looking ahead in the direction of the road they are driving on.
- Assessment heights are based on the assumed eye level of the person:
  - Vehicle driver – 2 m (Aberdeenshire Council, 2015)
  - Pedestrian – 1.5 m (Bartlett, 2022).
- No reflections from other buildings within the vicinity.

- No obstructions from the streetscape (e.g. vegetation, signage, etc.) within the vicinity.
- Reflections from construction methods (e.g. metal rivets, etc.) are not considered.
- Cloud coverage is not included, ensuring assessment of the worst-case scenarios.
- Only select routes are assessed.
- Disability glare for pedestrians can be managed by them moving and looking away from the source.
- Base case assumes sun visors are not used, which determines the worst-case scenario.
- Distance between assessment points on the façade of Building 1 is 4m, due to the width of the building.
- Distance between assessment points on the façade of Buildings 2 and 3 is 2m to ensure full resolution of the small façade surfaces.
- For the base case, the visible light external reflectance is 20%, with an angular specular reflectivity specification that changes with the angle of incidence as shown in Table 4-1. In Table 4-1, 'I' is the angle of incidence and S_R is the angular specularity.

Table 4-1 Assumed reflectivity of glazed surfaces with angle of incidence

I (deg)	0	10	20	30	40	50	60	70	80
S_R	0.19	0.183	0.181	0.184	0.194	0.212	0.247	0.332	0.542

Source: Hassall 1991

4.2.3 Parametric modelling

The method outlined by Hassall (1991) was implemented in a parametric modelling (Grasshopper and Ladybug (version 1.2.0) within Rhino 7) framework to consider the shielding effects of surrounding buildings, and hence provide a more realistic approach. Parametric modelling also enables the assessment of different days and times throughout the year to be automated. Thus, allowing the assessment at one-hour intervals throughout the entire year.

Grasshopper is a visual programming language and environment that runs within the Rhinoceros 3D computer-aided design (CAD) application. Ladybug imports standard EnergyPlus Weather files (.EPW) into Grasshopper. It provides a variety of two-dimensional (2D) and three-dimensional interactive climate graphics that support the decision-making process during the early stages of design. Ladybug also supports the evaluation of initial design options through solar radiation studies, view analyses, sunlight-hours modelling, and more. Integration with visual programming environments allows instantaneous feedback on design modifications and a high degree of customization.

Grasshopper can be used to undertake ray tracing and automate the calculation methods outlined by Hassall (1991). The ray tracing method in Grasshopper determines the position of the sun, for every hour of the year, the direction that the ray of light will impact the façades of the building and the direction of the reflected ray from the building façades (Figure 4-2). Using this information, it can be determined if the reflected sun ray intersects with the sensitive receiver and what the overall impact will be, based on Hassall's method.

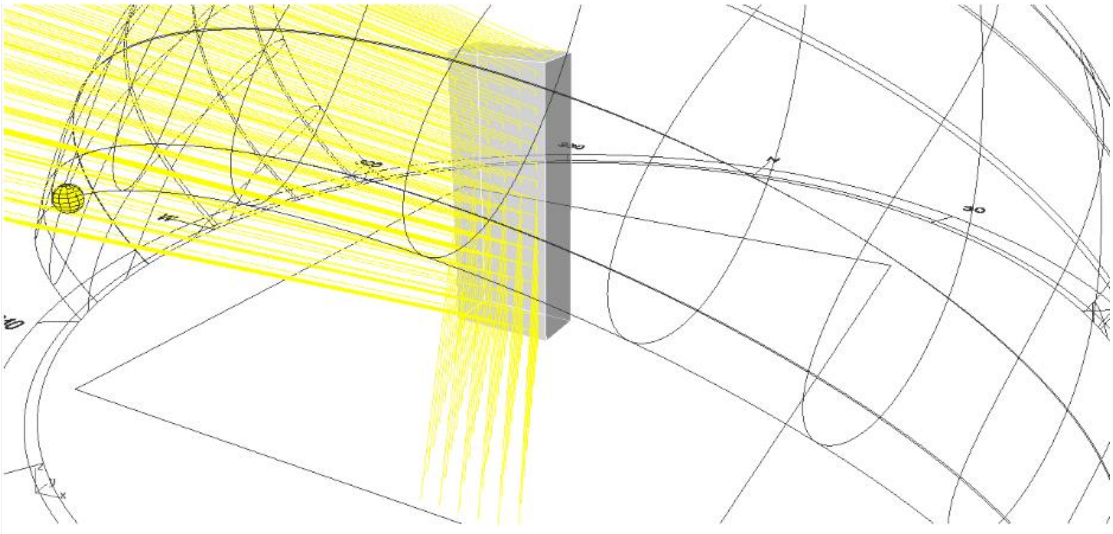

Figure 4-2 Ray tracing within Rhino using Grasshopper/Ladybug Tools

4.2.4 Assessment criteria

The impact of glare is subjective as it varies for different people, what may be considered as mildly annoying for one person could cause temporary blindness in another. As such, Hassall (1991) proposed a veiling luminance limit of 500cd/m², based on the Holladay formula, would be a practical and acceptable amount of reflected solar glare to which a driver should be exposed. Where this is exceeded, solar reflections are considered as potentially causing disability glare. This approach has been adopted in the present assessment and accepted as industry best practice.

4.3 Impact assessment

4.3.1 Rationale for route definition

There are many approach routes for passenger vehicles (drivers) to the Sydney Olympic Park Station (Figure 4-3). Assessment routes were selected based on these approach routes and their likelihood of being impacted by reflections from the proposed development as identified on a solar diagram for the site. The selected routes are shown in Figure 4-4 and include:

- Route 1: Drivers travelling north-north-west along Olympic Boulevard
- Route 2: Drivers travelling west-south-west along Sarah Durack Avenue
- Route 3: Drivers travelling west-south-west along Figtree Drive
- Route 4: Drivers travelling east along Figtree Drive
- Route 5: Drivers travelling north-north-west along Australia Avenue
- Route 6: Drivers travelling south-south-east along Olympic Boulevard.

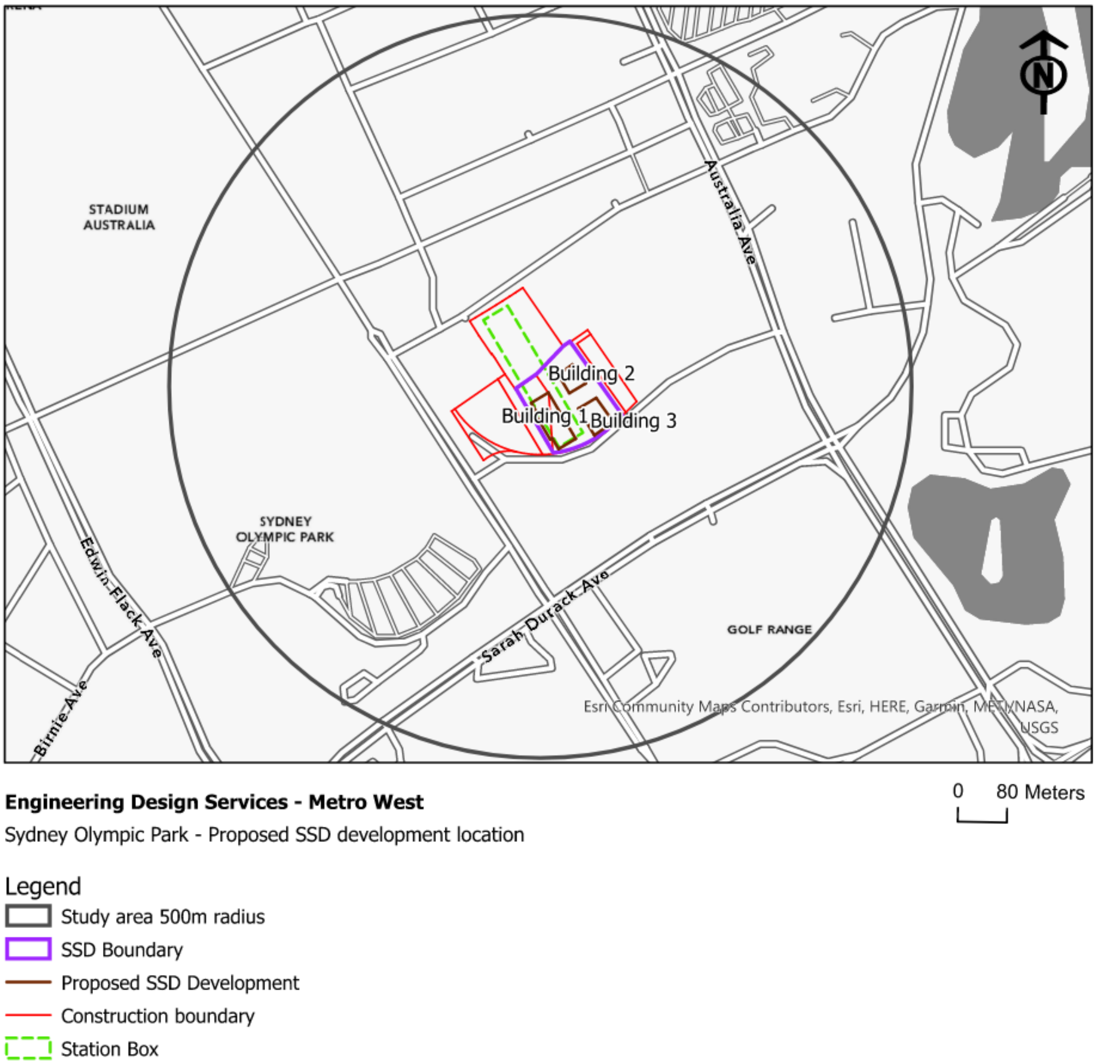

Figure 4-3 Road network around Sydney Olympic Park metro station

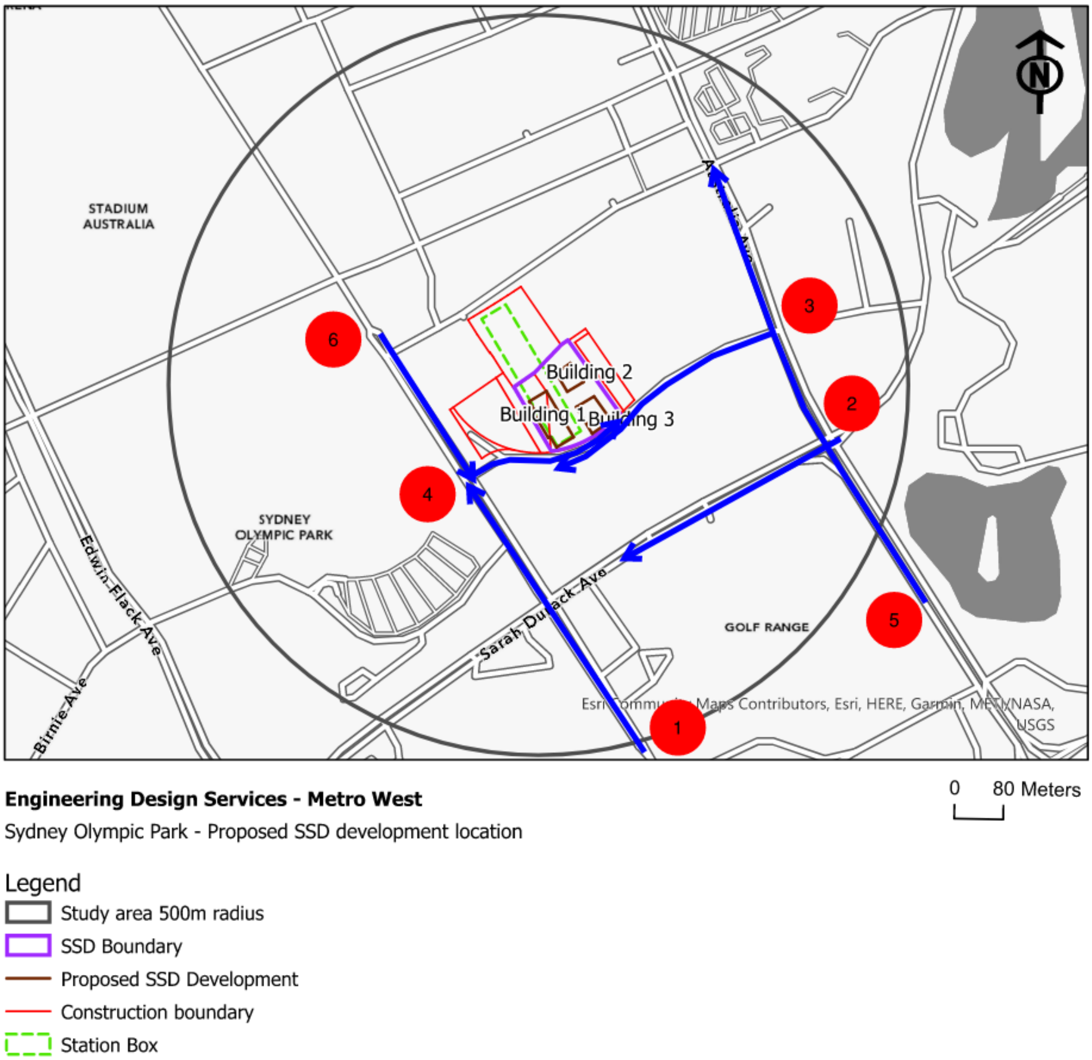

Figure 4-4 Assessment routes

For each assessment route, 11 locations were selected to be assessed. These assessment locations are shown in Figure 4-5 to Figure 4-10 and the locations are labelled 1 through to 11 (with 1 located the furthest from the proposed development and 11 being the closest).

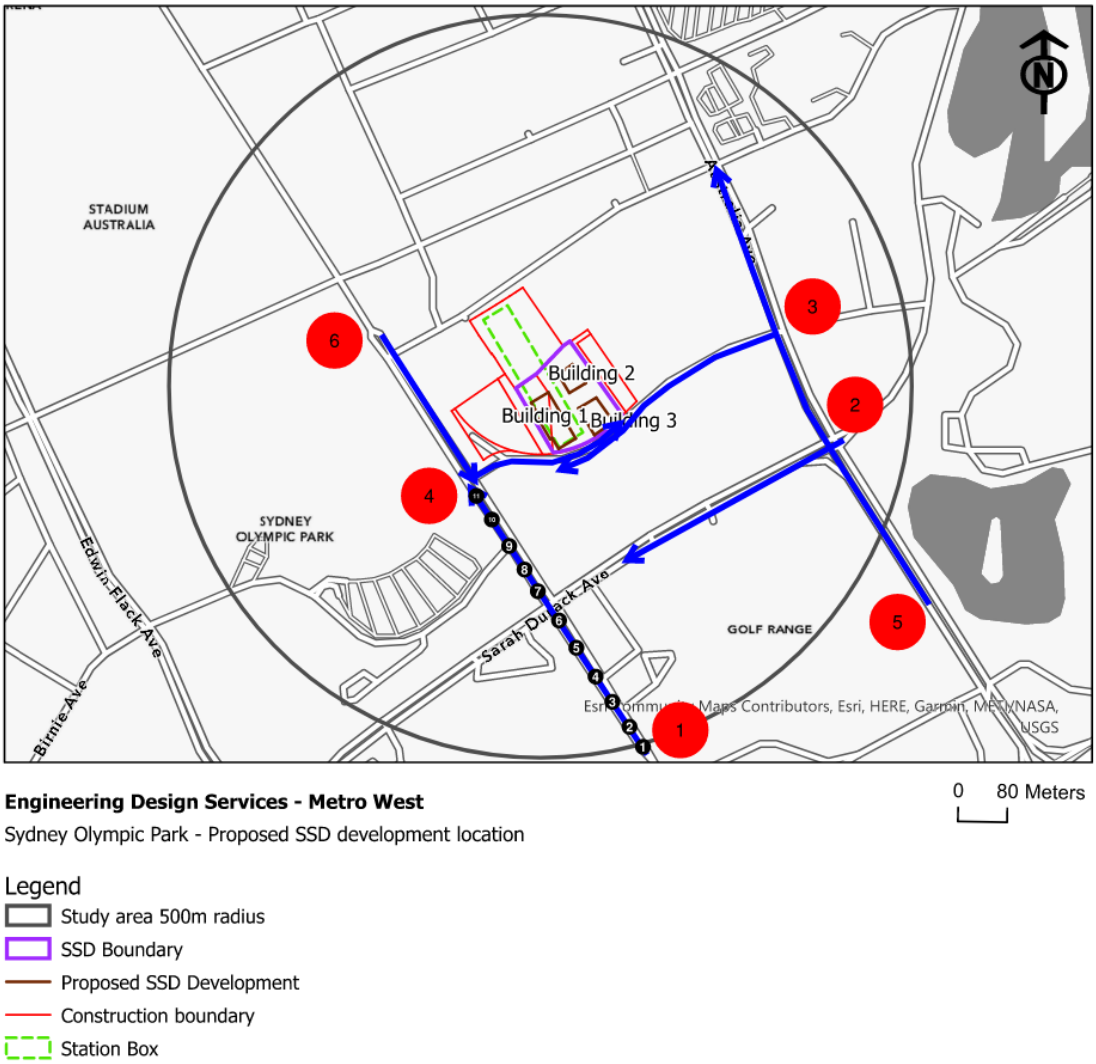

Figure 4-5 Assessment locations for vehicles travelling along Route 1

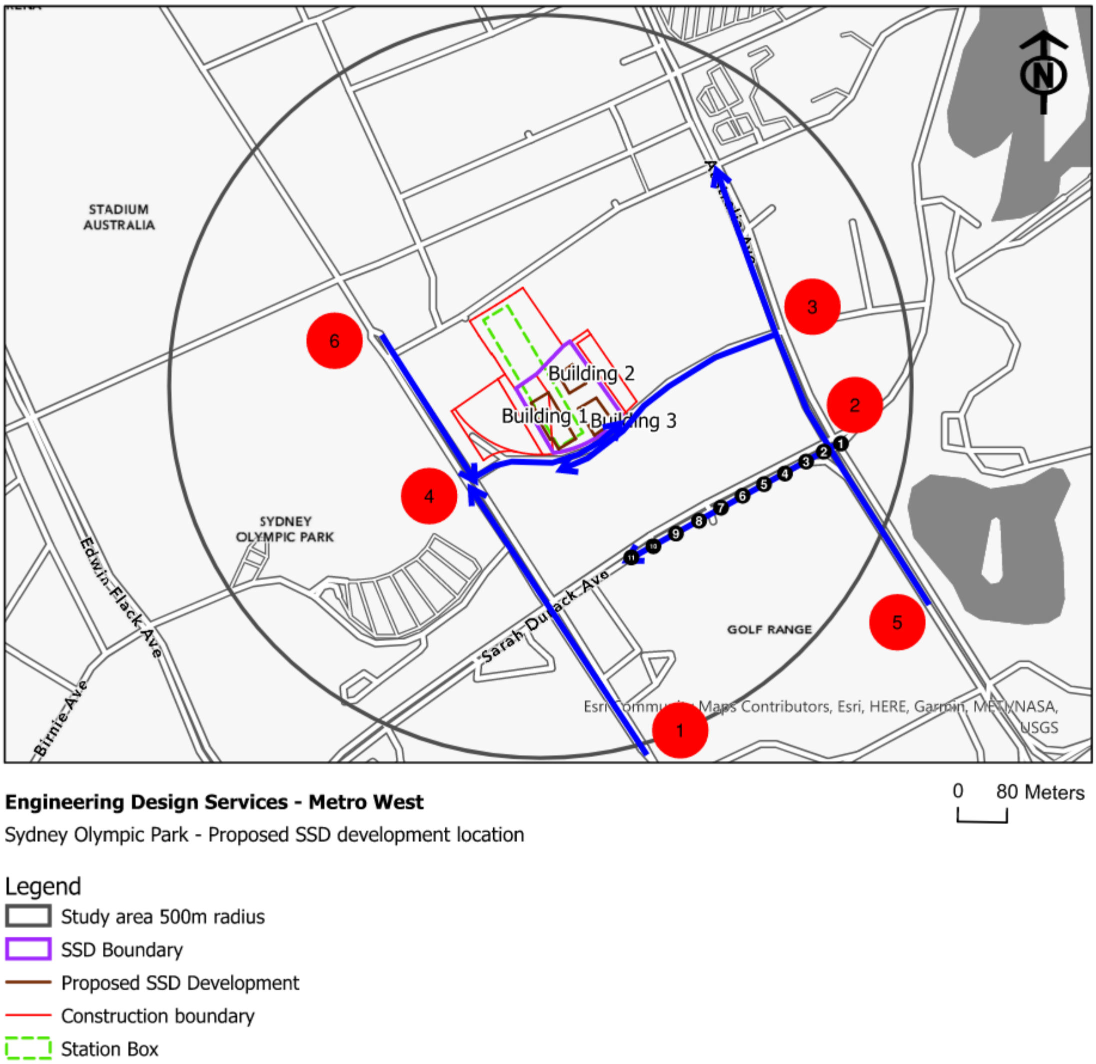

Figure 4-6 Assessment locations for vehicles travelling along Route 2

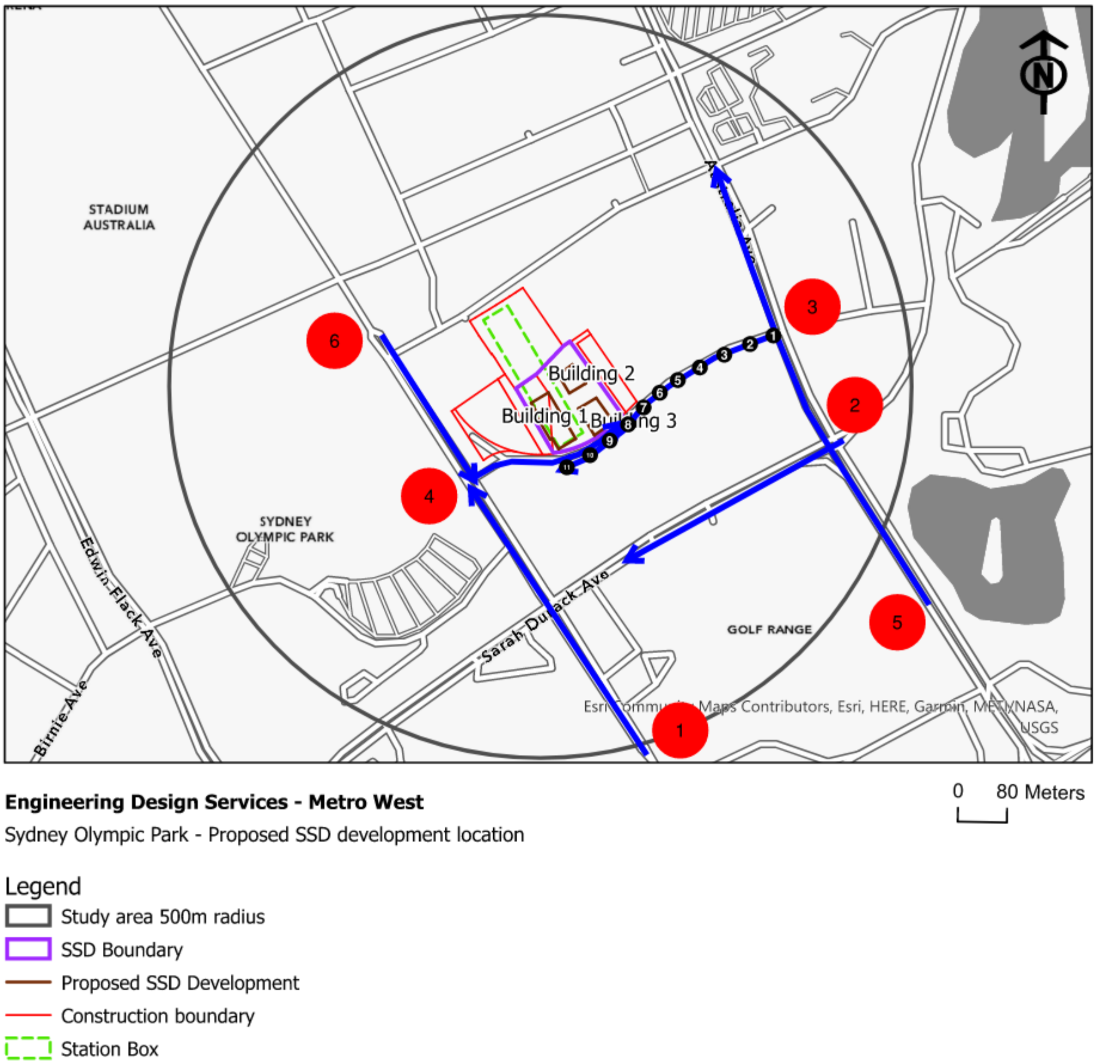

Figure 4-7 Assessment locations for vehicles travelling along Route 3

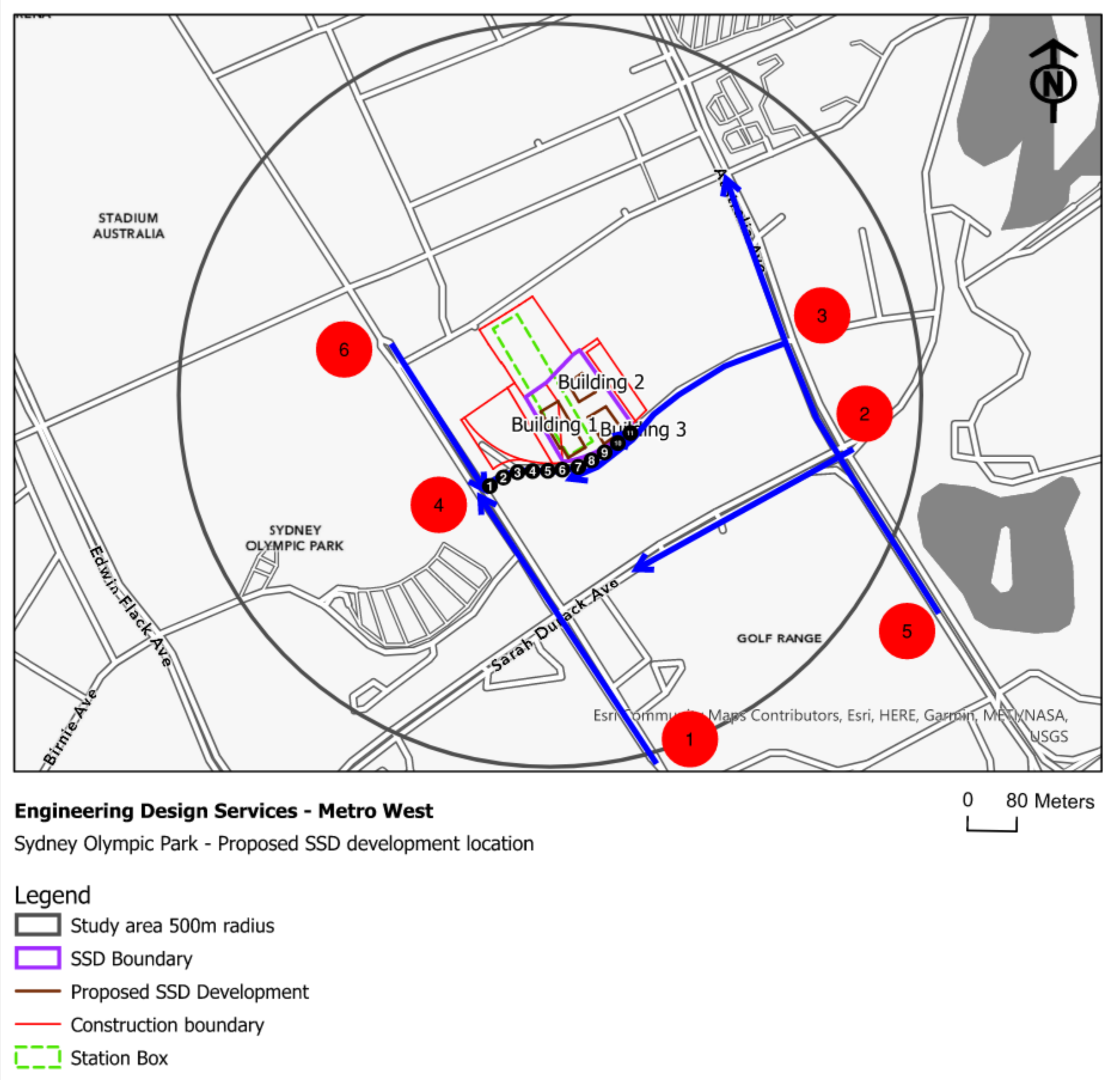

Figure 4-8 Assessment locations for vehicles travelling along Route 4

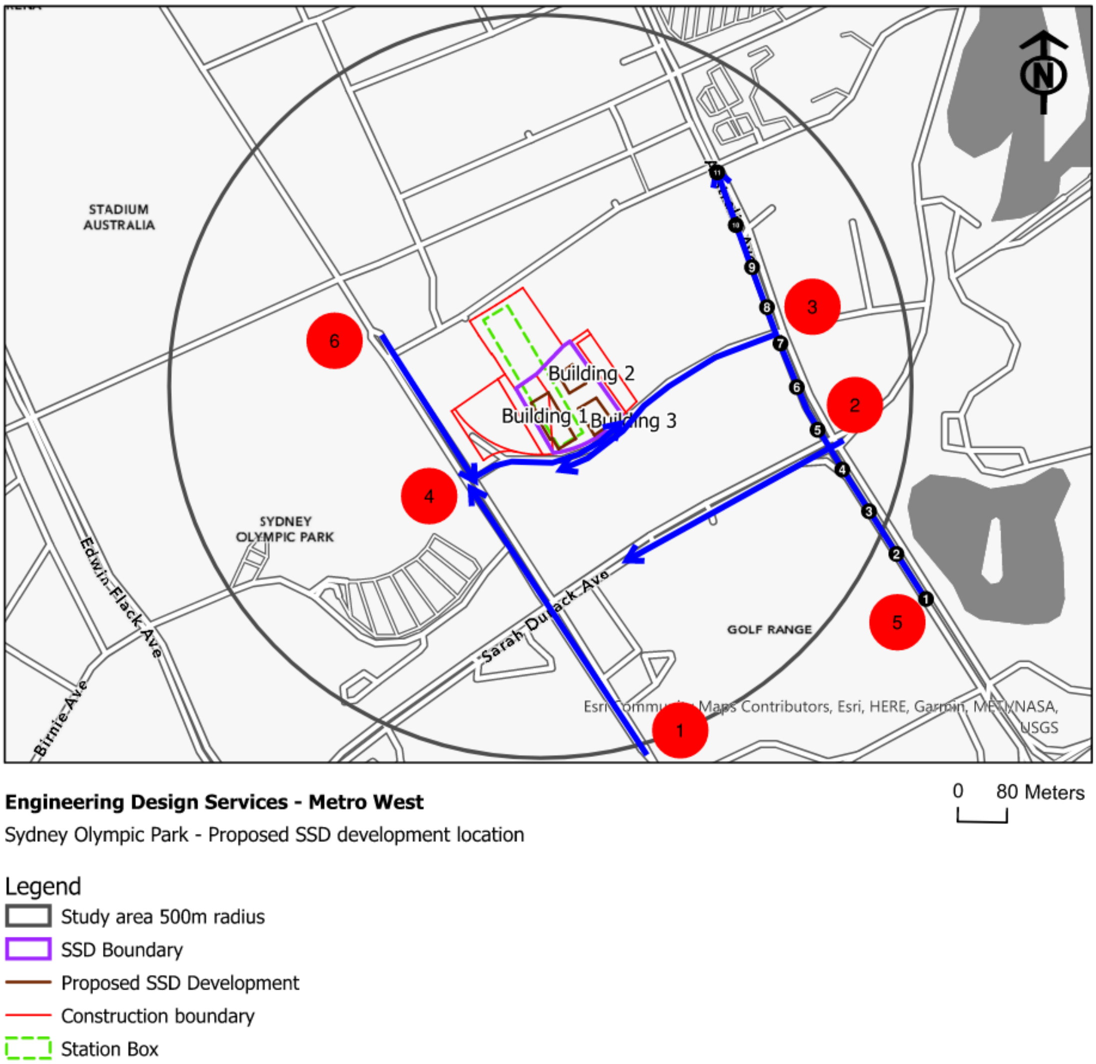

Figure 4-9 Assessment locations for vehicles travelling along Route 5

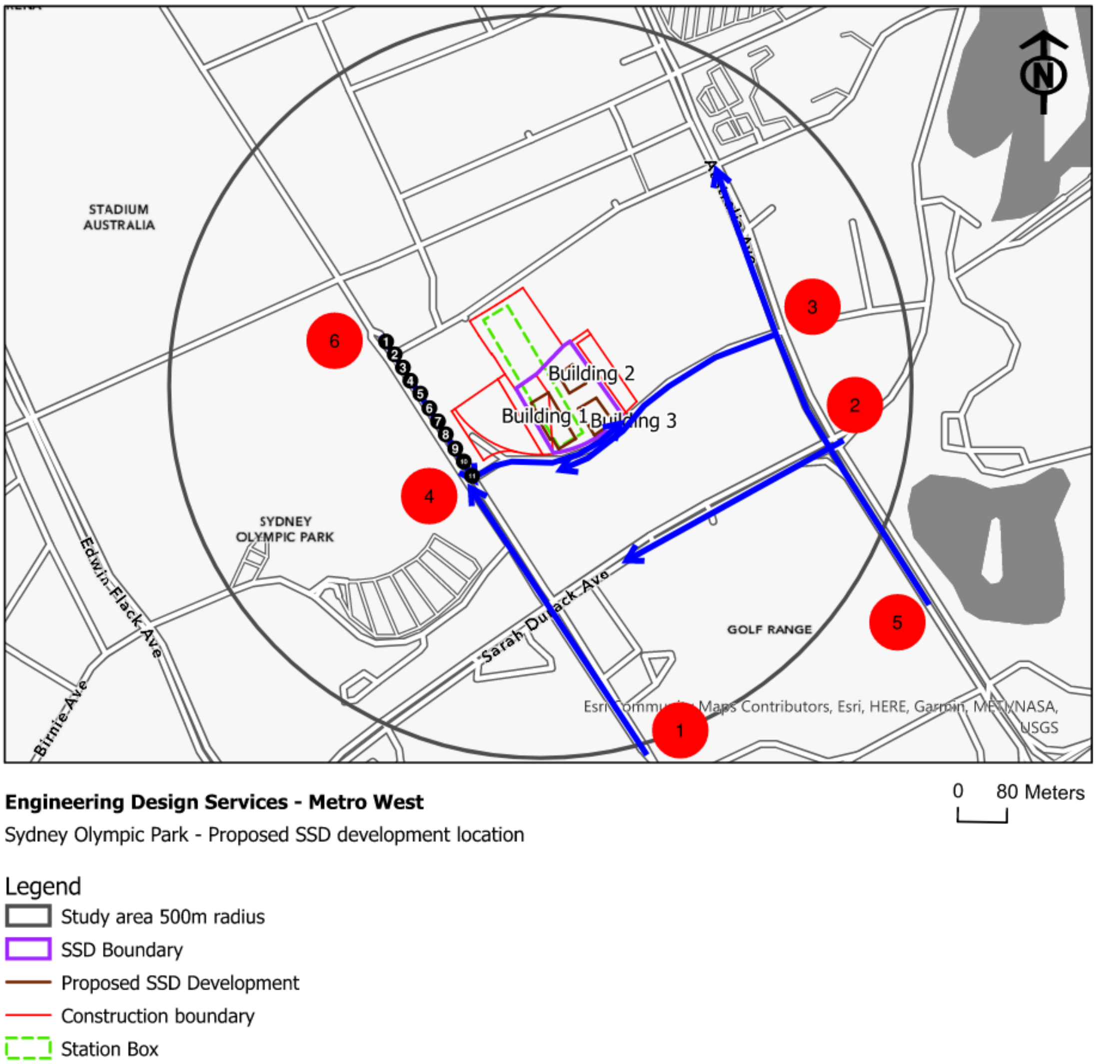

Figure 4-10 Assessment locations for vehicles travelling along Route 6

4.3.2 Rationale for pedestrian locations

At ground level in the surrounding area, there is landscaping and provision of floor space for commercial uses and therefore pedestrians will be utilising the outdoor ground floor area and may be impacted by glare from the building façades. Seven locations were assessed, based on potential locations that pedestrians will be utilising, with various views of the façade (refer to Figure 4-11). In Figure 4-11, view one is shown in black, view two is shown in red, and view three is shown in blue. These locations, and directions of view, were assessed to give an indication of the pedestrian experience. However, it is expected that the impact of disability glare to be low given their ability to look away from problematic glare.

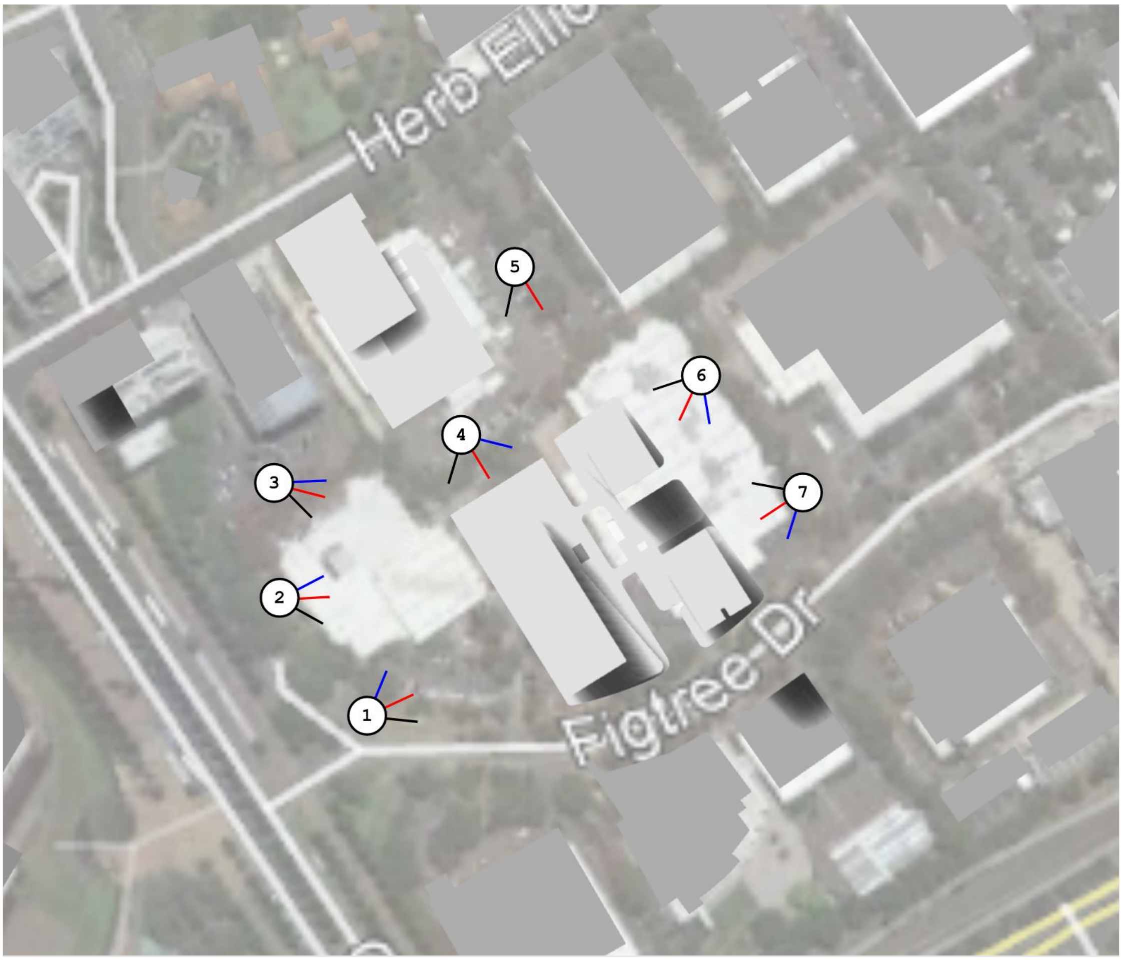

Figure 4-11 Pedestrian locations and directions of view

4.4 Results and discussion

4.4.1 Glare

The base case assumes that standard glazing is used for all façades. Individual results, for routes and pedestrian locations which experience disability glare, are provided within Appendix A. A summary of these results, showing which routes and pedestrian locations have exceedances of the 500cd/m^2 limit, is provided in Table 4-2.

Results from the simulations show that there are 7 instances where risk of disability glare is present. These cases are as follows:

- Route 4 – Building 1
- Route 3 – Buildings 2 and 3
- Pedestrian 1 – Building 1
- Pedestrian 3 – Building 1
- Pedestrian 5 – Buildings 2 and 3
- Pedestrian 6 – Buildings 2 and 3
- Pedestrian 7 – Buildings 2 and 3.

Given that pedestrians are likely able to move and/or look away from the glare source, the risk of disabling glare affecting pedestrians is low. Contrarily, drivers travelling along routes 3 and 4 are at risk of experiencing disabling glare, with a maximum veiling luminance of >10,000cd/m^2 from Buildings 2 and 3 and 3,730cd/m^2 from Building 1 expected for receptors on each route respectively.

The use of a sun visor can also be useful to mitigate the effects of reflections from the tall buildings as it blocks out the upper portion of the building. However, it cannot be used to assess compliance with any criteria as it cannot be expected that all vehicle drivers and train operators will use their sun visors (or have it in a position to block glare as soon as it occurs as there is a delay between the initial glare impact and someone deploying their sun visor).

Table 4-2 Summary of reflectivity impacts for the base case

Route/pedestrian location – development assessed	Maximum veiling luminance (cd/m^2)	Maximum number of hours LV is at risk of exceeding 500cd/m^2 in a day	Comment
Route 1 – Building 1	0	0	No disability glare risks found
Route 2 – Building 1	0	0	No disability glare risks found
Route 3 – Building 1	0	0	No disability glare risks found
Route 4 – Building 1	3,730	128	Numerous risks of disability glare in the afternoon
Route 5 – Building 1	0	0	No disability glare risks found
Route 6 – Building 1	0	0	No disability glare risks found
Pedestrian 1 – Building 1	2,210	94	Some risk of disability glare in the afternoon
Pedestrian 2 – Building 1	0	0	No disability glare risks found
Pedestrian 3 – Building 1	1,120	47	Some risk of disability glare in the mid-morning
Pedestrian 4 – Building 1	0	0	No disability glare risks found
Pedestrian 5 – Building 1	0	0	No disability glare risks found
Pedestrian 6 – Building 1	0	0	No disability glare risks found
Pedestrian 7 – Building 1	0	0	No disability glare risks found
Route 1 – Buildings 2 and 3	0	0	No disability glare risks found
Route 2 – Buildings 2 and 3	0	0	No disability glare risks found
Route 3 – Buildings 2 and 3	> 10,000	300	Numerous risks of disability glare in the morning

Route/pedestrian location – development assessed	Maximum veiling luminance (cd/m^2)	Maximum number of hours LV is at risk of exceeding $500cd/m^2$ in a day	Comment
Route 4 – Buildings 2 and 3	0	0	No disability glare risks found
Route 5 – Buildings 2 and 3	0	0	No disability glare risks found
Route 6 – Buildings 2 and 3	0	0	No disability glare risks found
Pedestrian 1 – Buildings 2 and 3	0	0	No disability glare risks found
Pedestrian 2 – Buildings 2 and 3	0	0	No disability glare risks found
Pedestrian 3 – Buildings 2 and 3	0	0	No disability glare risks found
Pedestrian 4 – Buildings 2 and 3	0	0	No disability glare risks found
Pedestrian 5 – Buildings 2 and 3	5,880	87	Some risk of disability glare in the afternoon
Pedestrian 6 – Buildings 2 and 3	4,420	424	Numerous risks of disability glare in the morning
Pedestrian 7 – Buildings 2 and 3	1,500	296	Numerous risks of disability glare in the mid-morning

4.4.2 Mitigation measures

Implementation of several mitigation strategies are possible to reduce the impact of disabling glare to at-risk drivers and people utilising the surrounding precinct. These mitigations can be used individually, or in combination, to reduce the total glare the driver experiences to an acceptable value. Below is a non-exhaustive list into the mitigative methods/approaches.

- Using a less reflective glazing – reduces the amount of light that is reflected from the façade.
- Different material – using a non-reflective material or materials with increased roughness, will help to control the impact of reflections.
- Shielding the façade – introducing a non-reflective structure, design, or landscaping that shields the glazed façade will help to control the impact of reflections.
- Changing built form – incorporating different built forms can help disperse light reflections. Note that concave-built forms should be avoided as these will instead concentrate sunlight, exacerbating the glare risk.

4.4.3 Sensitivity studies

This assessment included a sensitivity study to assess the reflectivity impacts for a different standard of glazing. This study assumes that the glazing is designed with a lower reflectivity and angular specularity, refer to Table 4-3. In Table 4-3, ‘I’ is the angle of incidence and S_R is the angular specularity.

Table 4-3 Assumed reflectivity of glazed surfaces with angle of incidence

I (deg)	0	10	20	30	40	50	60	70	80
S_R	0.084	0.084	0.085	0.087	0.093	0.111	0.158	0.276	0.542

Source: Mott MacDonald, 2021

Individual results for this study (“Study One”) are shown in Appendix B, with a comparison of the summary results shown in Table 4-4.

Table 4-4 Summary of the reflectivity impacts for the two analyses

Route/pedestrian location	Maximum veiling luminance (cd/m^2)		Maximum number of hours LV is at risk of exceeding 500cd/m^2 in a day		Comment
	Base Case	Study One	Base Case	Study One	
Route 1 – Building 1	0	N/A	0	N/A	No disability glare risks found
Route 2 – Building 1	0	N/A	0	N/A	No disability glare risks found
Route 3 – Building 1	0	N/A	0	N/A	No disability glare risks found
Route 4 – Building 1	3,730	1,680	128	90	Some risk of disability glare in the afternoon
Route 5 – Building 1	0	N/A	0	N/A	No disability glare risks found
Route 6 – Building 1	0	N/A	0	N/A	No disability glare risks found
Pedestrian 1 – Building 1	2,210	910	94	87	Some risk of disability glare in the afternoon
Pedestrian 2 – Building 1	0	N/A	0	N/A	No disability glare risks found
Pedestrian 3 – Building 1	1,120	516	47	47	Some risk of disability glare in the mid-morning
Pedestrian 4 – Building 1	0	N/A	0	N/A	No disability glare risks found
Pedestrian 5 – Building 1	0	N/A	0	N/A	No disability glare risks found
Pedestrian 6 – Building 1	0	N/A	0	N/A	No disability glare risks found
Pedestrian 7 – Building 1	0	N/A	0	N/A	No disability glare risks found
Route 1 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found
Route 2 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found
Route 3 – Buildings 2 and 3	> 10,000	> 10,000	300	122	Numerous risks of disability glare in the morning
Route 4 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found
Route 5 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found
Route 6 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found
Pedestrian 1 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found
Pedestrian 2 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found

Route/pedestrian location	Maximum veiling luminance (cd/m^2)		Maximum number of hours LV is at risk of exceeding $500cd/m^2$ in a day		Comment
	Base Case	Study One	Base Case	Study One	
Pedestrian 3 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found
Pedestrian 4 – Buildings 2 and 3	0	N/A	0	N/A	No disability glare risks found
Pedestrian 5 – Buildings 2 and 3	5,880	814	87	43	Some risk of disability glare in the afternoon
Pedestrian 6 – Buildings 2 and 3	4,420	2,000	424	390	Numerous risks of disability glare in the morning
Pedestrian 7 – Buildings 2 and 3	1,500	734	296	162	Numerous risks of disability glare in the mid-morning

4.5 Next steps

The built form and results presented in this report are based on the concept design stage for the proposed development. As such, future design work will most likely alter the built-form, materiality, and surrounding features, in terms of shielding, of the site. Therefore, design improvements can be included to further mitigate areas of the concept design which have the potential for glare impacts to occur. This report has identified sections of the developments where disability glare may not be mitigated through lower reflectivity glazing and therefore some, or all, of the below steps will need to be considered in future Detailed SSDAs to mitigate the potential glare risk:

- refine the materiality of the façade to assess only sections which are glazed, or will reflect sunlight
- work with the architects to alter the built form, where possible, to remove residual glare impacts
- more detailed analysis of the number of sensitive receivers
- refinement of the number and location of assessment points on the façade of the development
- include potential landscaping/canopy shading elements to determine their effectiveness
- analyse the glare impact times against future traffic data to further understand the risk profile.

5 Conclusion

A reflectivity analysis has been carried out assessing the potential for hazardous glare from the proposed development.

Veiling luminance was calculated at discrete points, representative of sensitive receptors (drivers and pedestrians) traversing routes within the vicinity of the development. A conservative approach has been considered by assuming entirely glazed façades without external shading elements on the façade and future developments that might otherwise shield glare. For all assessments undertaken, a veiling luminance limit of 500cd/m^2 was adopted as the acceptable amount of reflected solar glare to which a driver should be exposed.

It was found that two of the proposed routes had assessment locations that were expected to exceed the 500cd/m^2 limit at points along the route. The routes that are expected to pose a glare risk are:

- Route 3: Drivers travelling west-south-west along Figtree Drive
- Route 4: Drivers travelling east along Figtree Drive.

In addition, seven pedestrian locations were tested within the site boundaries for pedestrians looking in various directions. With standard glazing, pedestrians at locations 1, 3, 5, 6 and 7 were found to have the potential to experience disability glare (veiling luminance exceeding 500cd/m^2). However, the risk of glare impact on pedestrians is considered to be low as they can move or look away from the façade.

As part of this assessment, a sensitivity study was also undertaken to determine the effectiveness of using a lower reflective glazing. It was found that using a lower reflective glazing is an effective measure for reducing the glare risk but may not be sufficient to eliminate the risk. Therefore, further mitigation measures are recommended to further minimise the glare risk to sensitive receptors near the proposed development. The following are suggested as potential mitigative measures:

- using a less reflective glazing
- different material (non-glazed and/or non-reflective)
- shielding the façade
- changing built form.

These mitigation measures will be considered and analysed in future Detailed SSDAs for the final building design.

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Appendix A Results – Standard glazing

Results presented in this appendix are for assessments assuming that all façades are glazed using standard glazing (section 4.4.1).

A.1 Route 3 – Buildings 2 and 3

This route was assessed for the driver travelling west-south-west along Figtree Drive.

Based on the assessment, many exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur along Route 3 (refer to Table A-1). These were typically found to occur in the early morning during summer, autumn, and spring and mid-morning during summer, autumn, and winter.

View of the assessed façades and their veiling luminance are shown in Figure A-1 to Figure A-9 for the worst-case hour at each assessment location for locations where there is veiling luminance is expected (i.e. >0cd/m^2).

Table A-1 Reflectivity impacts on driver travelling along Route 3

Location	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	10	• Mid-morning in June	710
2	29	• Mid-morning in May, June, and July	640
3	15	• Mid-morning in May, June, and July	620
4	0	• Mid-morning in May	480
5	16	• Early morning in January, October, and November • Mid-morning in May	3,740
6	265	• Early morning in January, February, March, September, October, November, and December	>10,000
7	264	• Early morning in January, February, March, September, October, November, and December	>10,000
8	0	• Not applicable	270
9	300	• Early morning in January, February, March, September, October, November, and December • Mid-morning in January, February, and March	830
10	0	• Not applicable	0
11	0	• Not applicable	0

Figure A-1 Façades at risk of posing disability glare to a driver for Route 3 at Location 1

Figure A-2 Façades at risk of posing disability glare to a driver for Route 3 at Location 2

Figure A-3 Façades at risk of posing disability glare to a driver for Route 3 at Location 3

Figure A-4 Façades at risk of posing disability glare to a driver for Route 3 at Location 4

Figure A-5 Façades at risk of posing disability glare to a driver for Route 3 at Location 5

Figure A-6 Façades at risk of posing disability glare to a driver for Route 3 at Location 6

Figure A-7 Façades at risk of posing disability glare to a driver for Route 3 at Location 7

Figure A-8 Façades at risk of posing disability glare to a driver for Route 3 at Location 8

Figure A-9 Façades at risk of posing disability glare to a driver for Route 3 at Location 9

A.2 Route 4 – Building 1

This route was assessed for the driver travelling east along Figtree Drive.

Based on the assessment, numerous exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur along Route 4 (refer to Table A-2). These were typically found to occur in the late afternoon in summer and spring.

View of the assessed façades and their veiling luminance are shown in Figure A-10 to Figure A-14 for the worst-case hour at each assessment location for locations where there is veiling luminance is expected (i.e. >0cd/m^2).

Table A-2 Reflectivity impacts on driver travelling along Route 4

Location	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	118	• Late afternoon in January, February, November, and December	3,730
2	128	• Late afternoon in January, February, November, and December	2,700
3	103	• Late afternoon in January, February, November, and December	2,000
4	0	• Not applicable	300
5	0	• Not applicable	280
6	0	• Not applicable	0
7	0	• Not applicable	0

Location	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
8	0	• Not applicable	0
9	0	• Not applicable	0
10	0	• Not applicable	0
11	0	• Not applicable	0

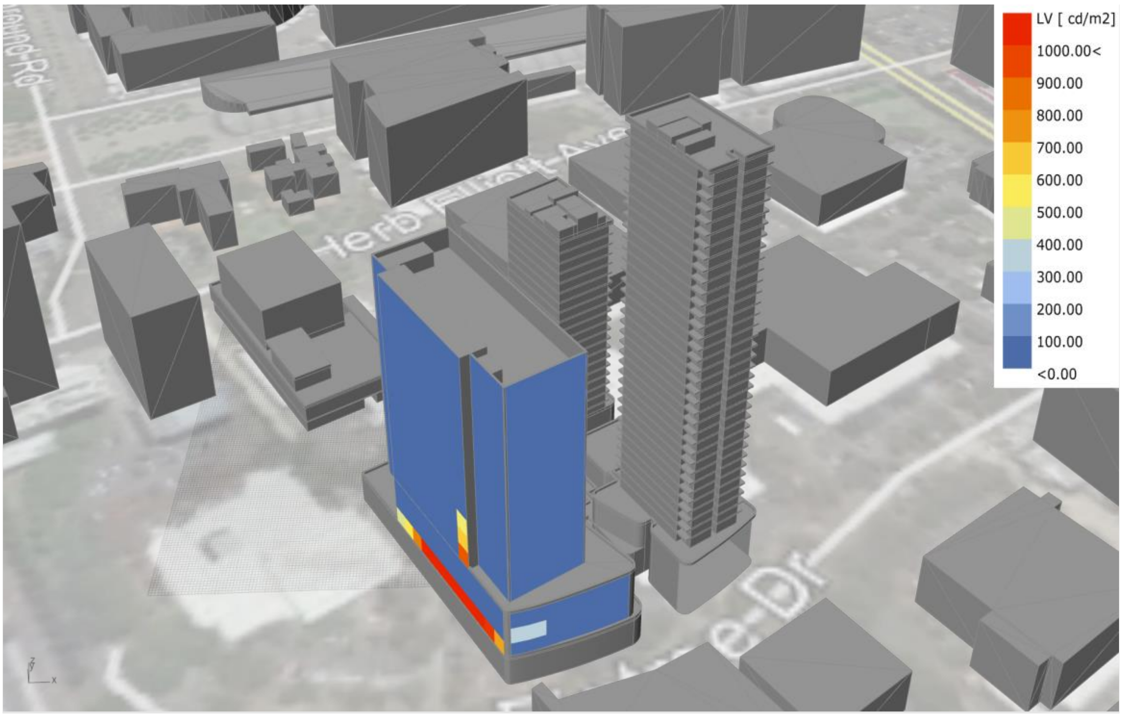

Figure A-10 Façades at risk of posing disability glare to a driver for Route 4 Location 1

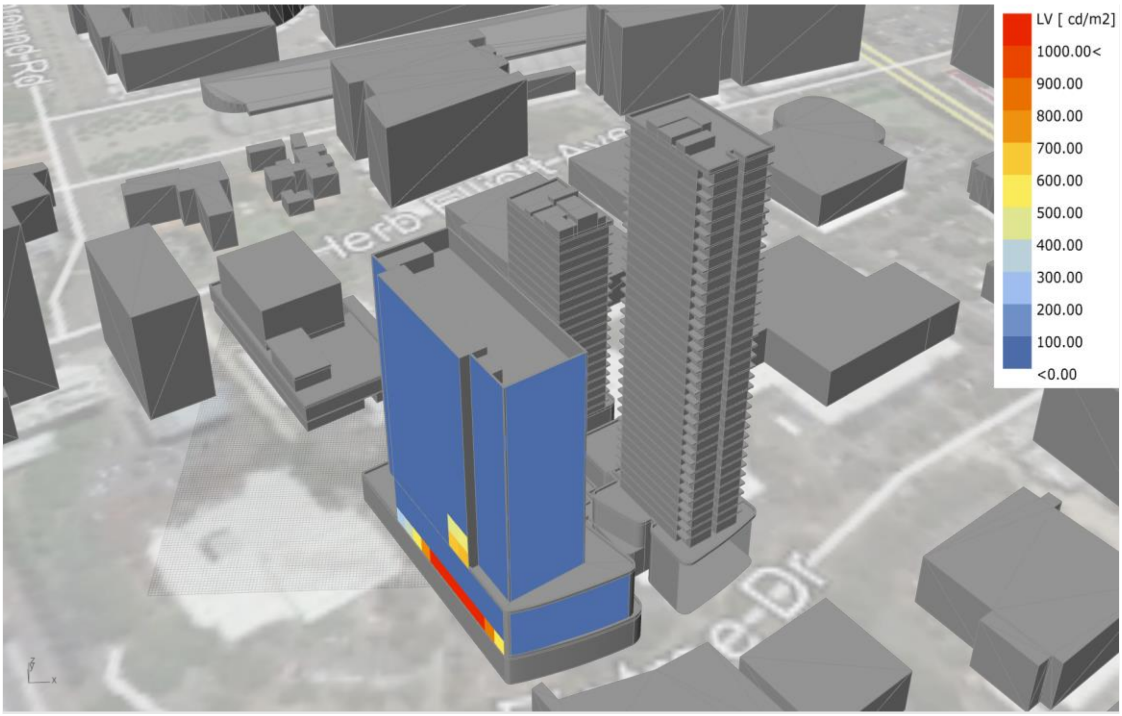

Figure A-11 Façades at risk of posing disability glare to a driver for Route 4 at Location 2

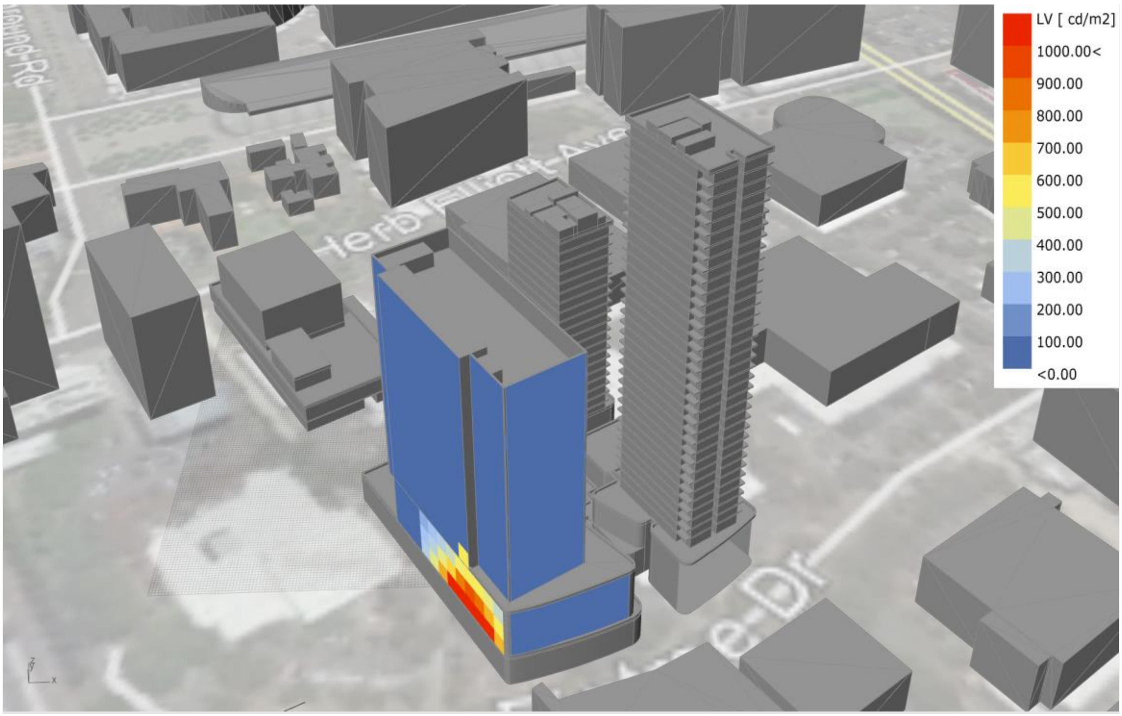

Figure A-12 Façades at risk of posing disability glare to a driver for Route 4 at Location 3

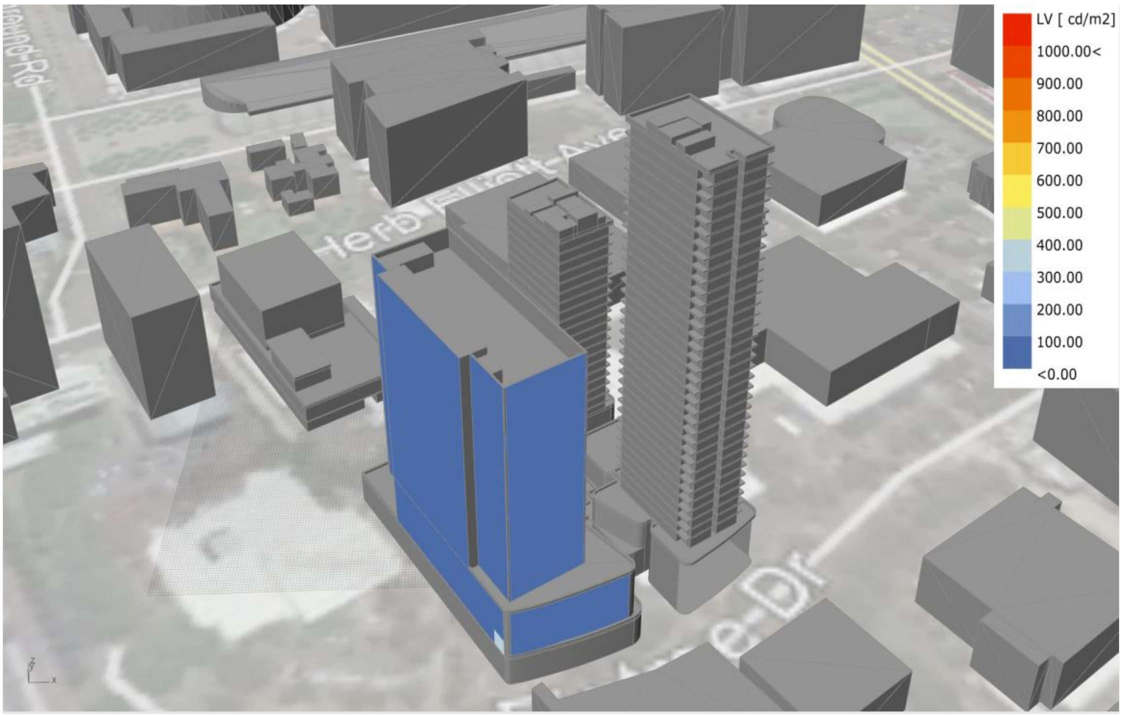

Figure A-13 Façades at risk of posing disability glare to a driver for Route 4 at Location 4

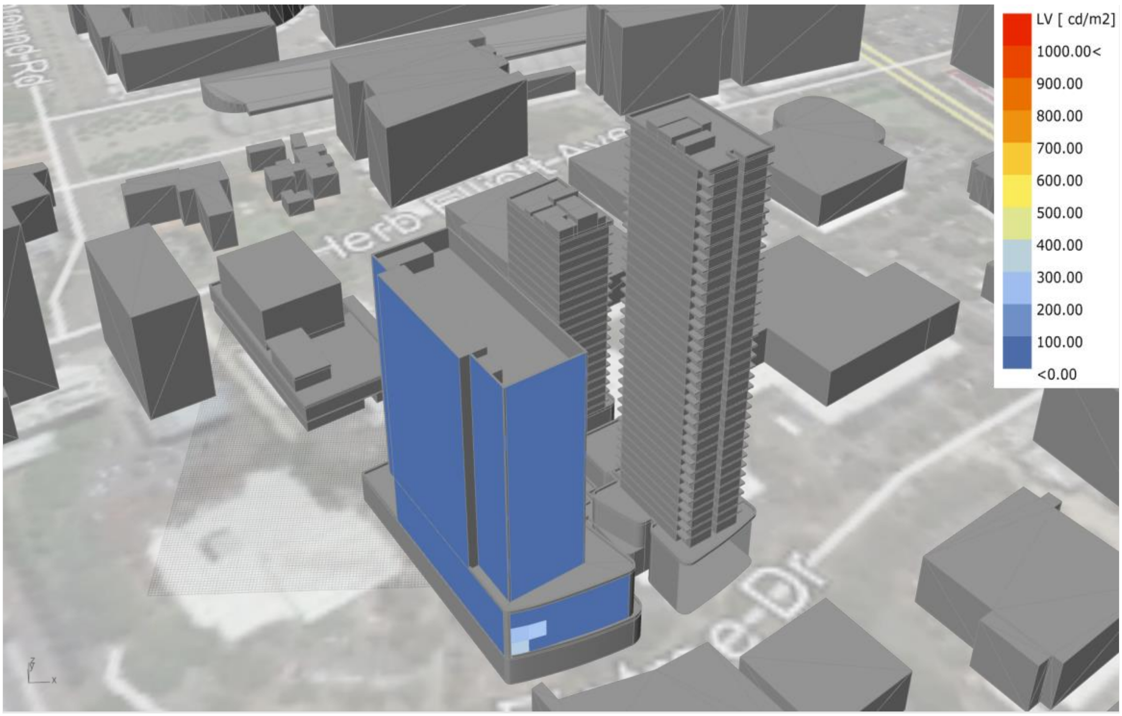

Figure A-14 Façades at risk of posing disability glare to a driver for Route 4 at Location 5

A.3 Pedestrian 1 – Building 1

This provides the first assessment for a pedestrian located within the site boundaries.

Based on the assessment, numerous exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 1 (refer to Table A-3). These were typically found to occur in the late afternoon during summer and spring.

View of the assessed façades and their veiling luminance are shown in Figure A-15 to Figure A-17 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table A-3 Reflectivity impacts on a pedestrian at Location 1

Direction	Number of hours LV is expected to exceed 500 cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	94	• Late afternoon in January, February, November, and December	2,210
2	83	• Late afternoon in January, February, November, and December	1,350
3	0	• Not applicable	240

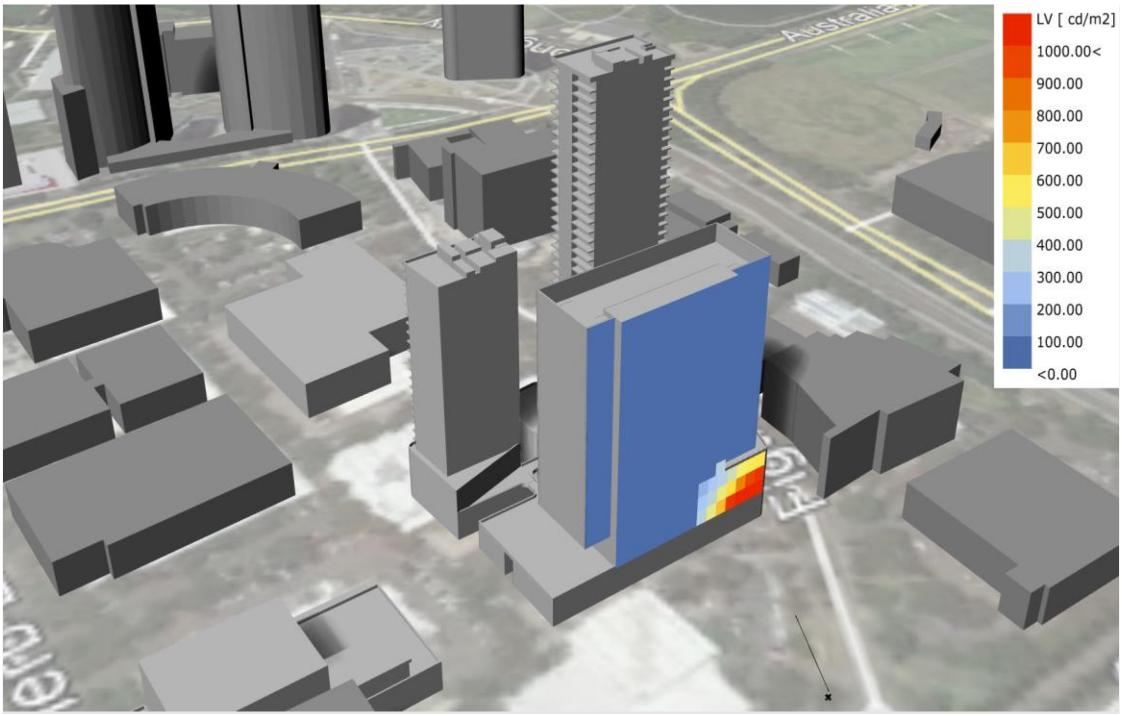

Figure A-15 Façades at risk of posing disability glare to a pedestrian at Location 1 (view 1)

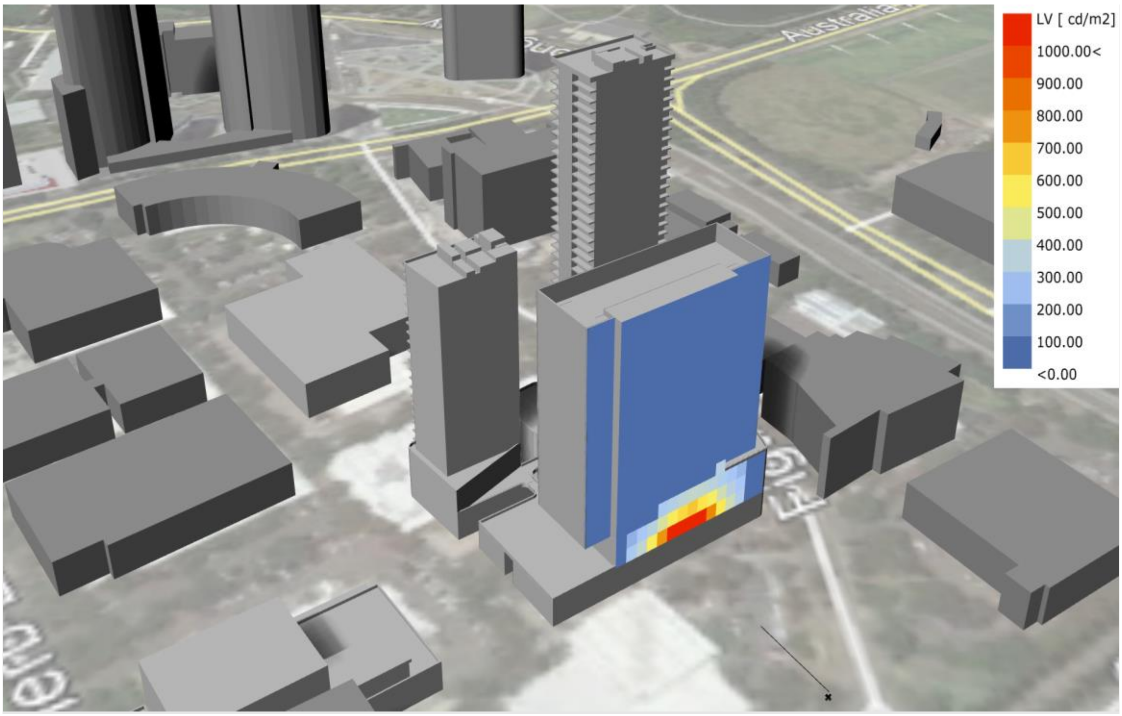

Figure A-16 Façades at risk of posing disability glare to a pedestrian at Location 1 (view 2)

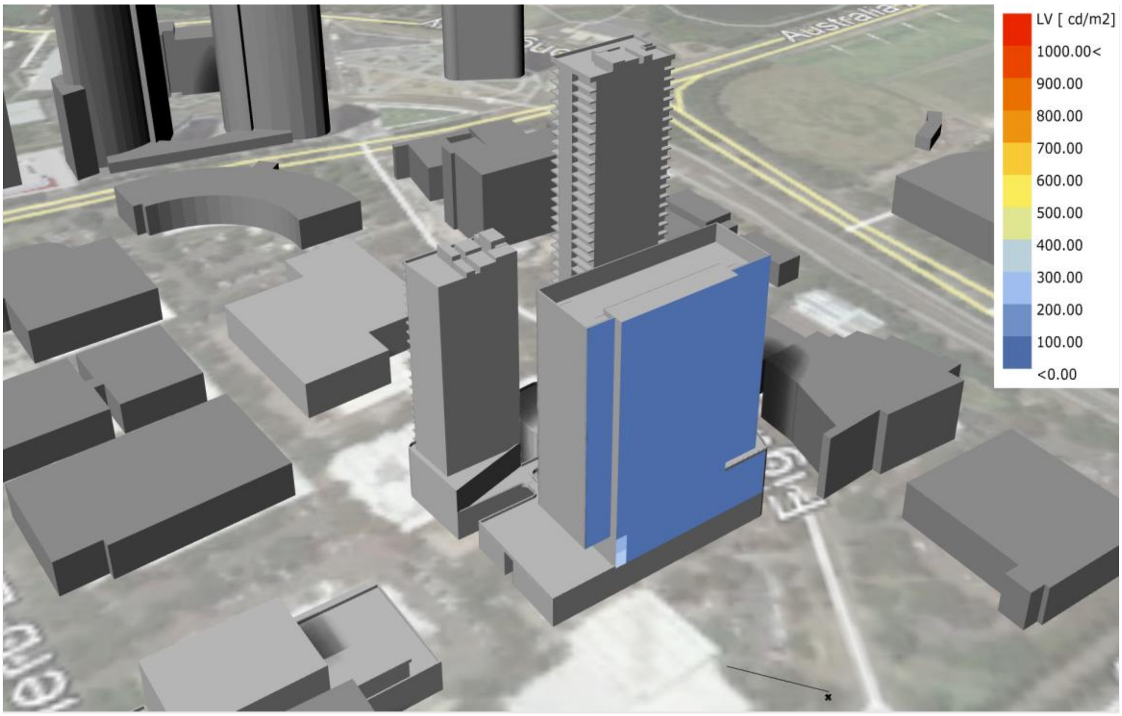

Figure A-17 Façades at risk of posing disability glare to a pedestrian at Location 1 (view 3)

A.4 Pedestrian 3 – Building 1

This provides the third assessment for a pedestrian located within the site boundaries.

Based on the assessment, some exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 3 (refer to Table A-4). These were typically found to occur in the mid-morning during winter.

View of the assessed façades and their veiling luminance are shown in Figure A-18 and Figure A-19 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table A-4 Reflectivity impacts on a pedestrian at Location 3

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	0	• Not applicable	0
2	47	• Mid-morning in June and July	1,120
3	47	• Mid-morning in June and July	760

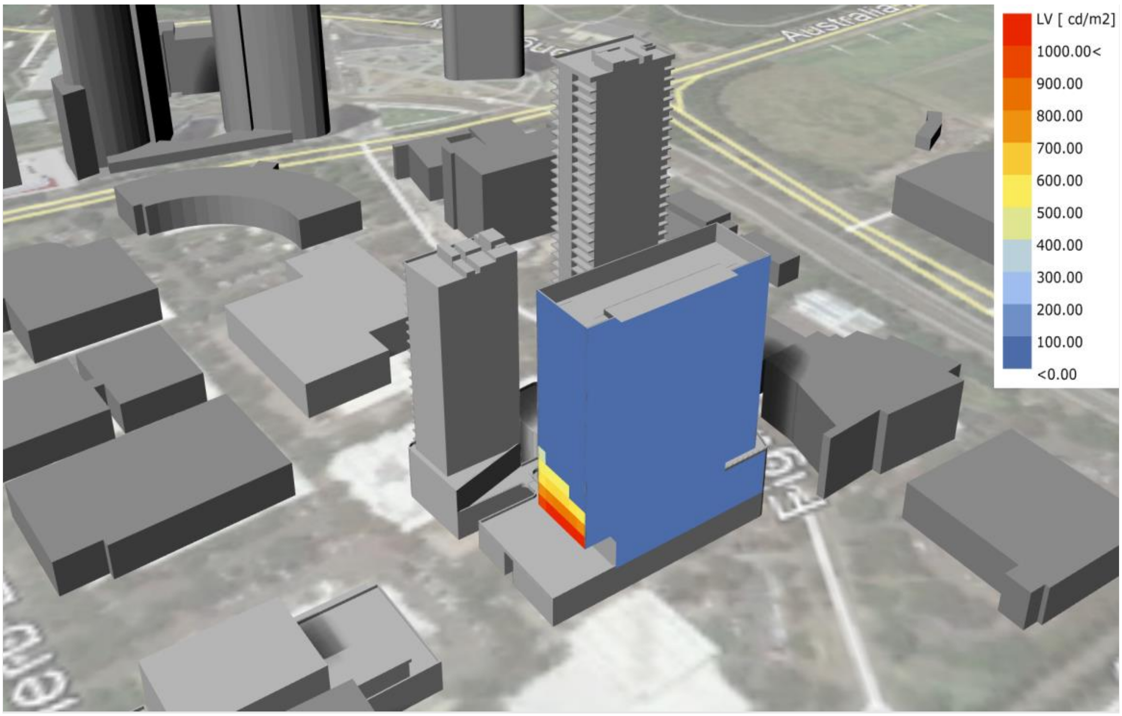

Figure A-18 Façades at risk of posing disability glare to a pedestrian at Location 3 (view 2)

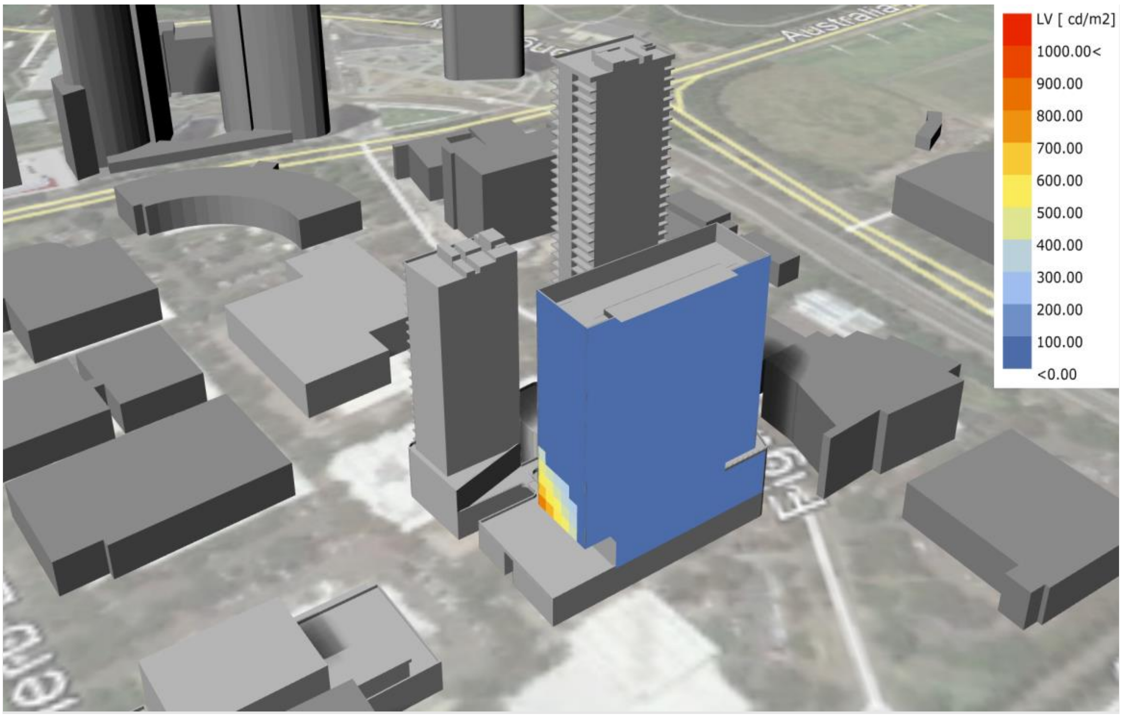

Figure A-19 Façades at risk of posing disability glare to a pedestrian at location 3 (view 3)

A.5 Pedestrian 5 – Buildings 2 and 3

This provides the fifth assessment for a pedestrian located within the site boundaries.

Based on the assessment, some exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 5 (refer to Table A-5). These were typically found to occur in the late afternoon during autumn and winter.

View of the assessed façades and their veiling luminance are shown in Figure A-20 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table A-5 Reflectivity impacts on a pedestrian at Location 5

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	0	• Not applicable	0
2	87	• Late afternoon in May, June, and July	5,880

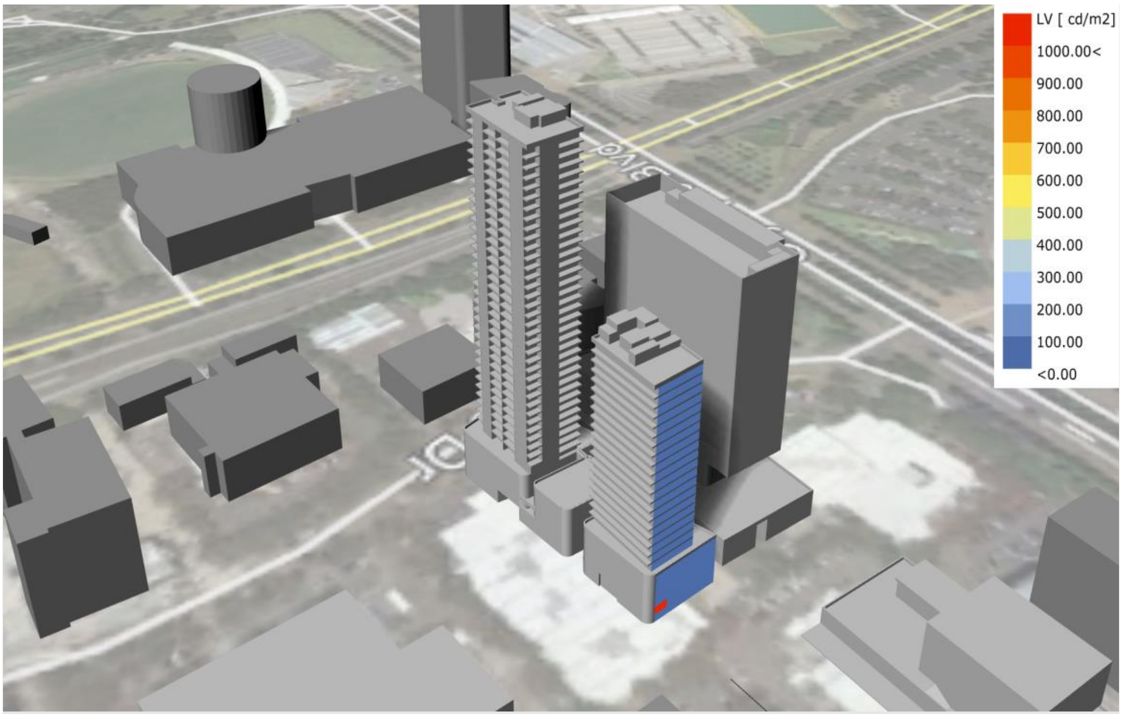

Figure A-20 Façades at risk of posing disability glare to a pedestrian at Location 5 (view 2)

A.6 Pedestrian 6 – Buildings 2 and 3

This provides the sixth assessment for a pedestrian located within the site boundaries.

Based on the assessment, many exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 6 (refer to Table A-6). These were typically found to occur in the early and mid- morning during autumn, winter and spring.

View of the assessed façades and their veiling luminance are shown in Figure A-21 and Figure A-22 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table A-6 Reflectivity impacts on a pedestrian at Location 6

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	424	• Early morning in March, April, May, August, September, and October • Mid-morning in March, April, May, June, July, August, and September	4,420
2	302	• Early morning in March, April, and September • Min-morning in March, April, May, June, July, August, and September	990
3	0	• Not applicable	0

Figure A-21 Façades at risk of posing disability glare to a pedestrian at location 6 (view 1)

Figure A-22 Façades at risk of posing disability glare to a pedestrian at location 6 (view 2)

A.7 Pedestrian 7 – Buildings 2 and 3

This provides the seventh assessment for a pedestrian located within the site boundaries.

Based on the assessment, numerous exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 7 (refer to Table A-7). These were typically found to occur in the mid-morning during autumn, winter and spring.

View of the assessed façades and their veiling luminance are shown in Figure A-23 and Figure A-24 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table A-7 Reflectivity impacts on a pedestrian at Location 7

Direction	Number of hours LV is expected to exceed 500 cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	0	• Not applicable	0
2	296	• Mid-morning in March, April, May, June, July, August, September, and October	1,500
3	0	• Not applicable	370

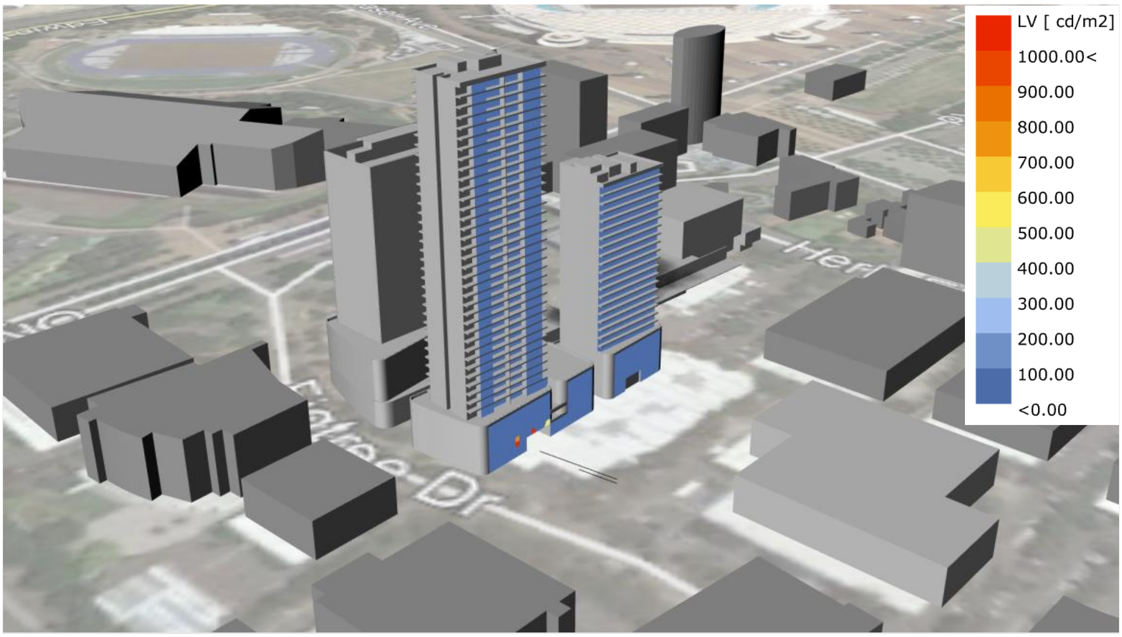

Figure A-23 Façades at risk of posing disability glare to a pedestrian at Location 7 (view 2)

Figure A-24 Façades at risk of posing disability glare to a pedestrian at Location 7 (view 3)

Appendix B Results – Lower reflectivity glazing

Results presented in this appendix are for assessments assuming that all façades are glazed using lower reflectivity glazing (section 4.4.3).

B.1 Route 3 – Buildings 2 and 3

This route was assessed for the driver travelling west-south-west along Figtree Drive.

Based on the assessment, many exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur along Route 3 (refer to Table B-1). These were typically found to occur in the early morning during summer, autumn, and spring and mid-morning during summer, autumn, and winter.

View of the assessed façades and their veiling luminance are shown in Figure B-1 to Figure B-9 for the worst-case hour at each assessment location for locations where there is veiling luminance is expected (i.e. >0cd/m^2).

Table B-1 Reflectivity impacts on driver travelling along Route 3

Location	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	0	• Not applicable	280
2	0	• Not applicable	310
3	0	• Not applicable	260
4	0	• Not applicable	0
5	0	• Not applicable	0
6	122	• Early morning in January, February, March, October, November, and December	> 10,000
7	104	• Early morning in January, March, October, November, and December	> 10,000
8	0	• Not applicable	0
9	0	• Not applicable	380
10	0	• Not applicable	0
11	0	• Not applicable	0

Figure B-1 Façades at risk of posing disability glare to a driver for Route 3 at Location 1

Figure B-2 Façades at risk of posing disability glare to a driver for Route 3 at Location 2

Figure B-3 Façades at risk of posing disability glare to a driver for Route 3 at Location 3

Figure B-4 Façades at risk of posing disability glare to a driver for Route 3 at Location 4

Figure B-5 Façades at risk of posing disability glare to a driver for Route 3 at Location 5

Figure B-6 Façades at risk of posing disability glare to a driver for Route 3 at Location 6

Figure B-7 Façades at risk of posing disability glare to a driver for Route 3 at Location 7

Figure B-8 Façades at risk of posing disability glare to a driver for Route 3 at Location 8

Figure B-9 Façades at risk of posing disability glare to a driver for Route 3 at Location 9

B.2 Route 4 – Building 1

This route was assessed for the driver travelling east along Figtree Drive.

Based on the assessment, numerous exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur along Route 4 (refer to Table B-2). These were typically found to occur in the late afternoon in summer and spring.

View of the assessed façades and their veiling luminance are shown in Figure B-10 to Figure B-14 for the worst-case hour at each assessment location for locations where there is veiling luminance is expected (i.e. >0cd/m^2).

Table B-2 Reflectivity impacts on driver travelling along Route 4

Location	Number of hours LV is expected to exceed 500 cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	36	• Late afternoon in January, February, November, and December	1,680
2	62	• Late afternoon in January, February, November, and December	1,220
3	90	• Late afternoon in January, February, November, and December	910
4	0	• Not applicable	200
5	0	• Not applicable	130
6	0	• Not applicable	0
7	0	• Not applicable	0

Location	Number of hours LV is expected to exceed 500 cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
8	0	• Not applicable	0
9	0	• Not applicable	0
10	0	• Not applicable	0
11	0	• Not applicable	0

Figure B-10 Façades at risk of posing disability glare to a driver for Route 4 at Location 1

Figure B-11 Façades at risk of posing disability glare to a driver for Route 4 at Location 2

Figure B-12 Façades at risk of posing disability glare to a driver for Route 4 at Location 3

Figure B-13 Façades at risk of posing disability glare to a driver for Route 4 at Location 4

Figure B-14 Façades at risk of posing disability glare to a driver for Route 4 at Location 5

B.3 Pedestrian 1 – Building 1

This provides the first assessment for a pedestrian located within the site boundaries.

Based on the assessment, numerous exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 1 (refer to Table B-3). These were typically found to occur in the late afternoon during summer and spring.

View of the assessed façades and their veiling luminance are shown in Figure B-15 to Figure B-17 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table B-3 Reflectivity impacts on a pedestrian at Location 1

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	87	• Late afternoon in January, February, November, and December	910
2	64	• Late afternoon in January, February, November, and December	560
3	0	• Not applicable	110

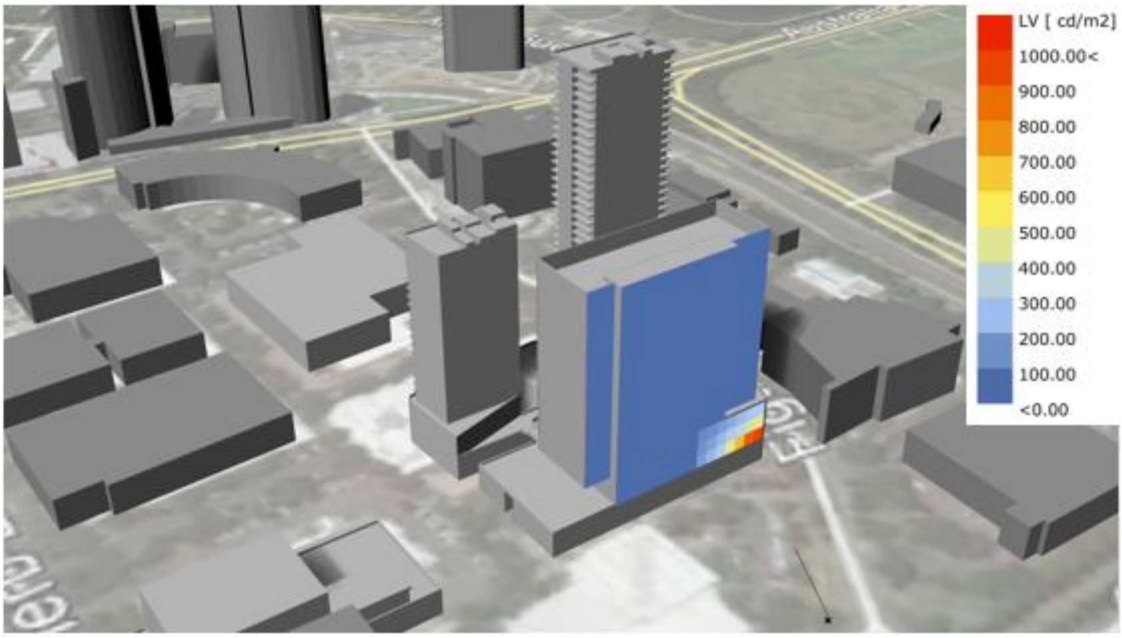

Figure B-15 Façades at risk of posing disability glare to a pedestrian at Location 1 (view 1)

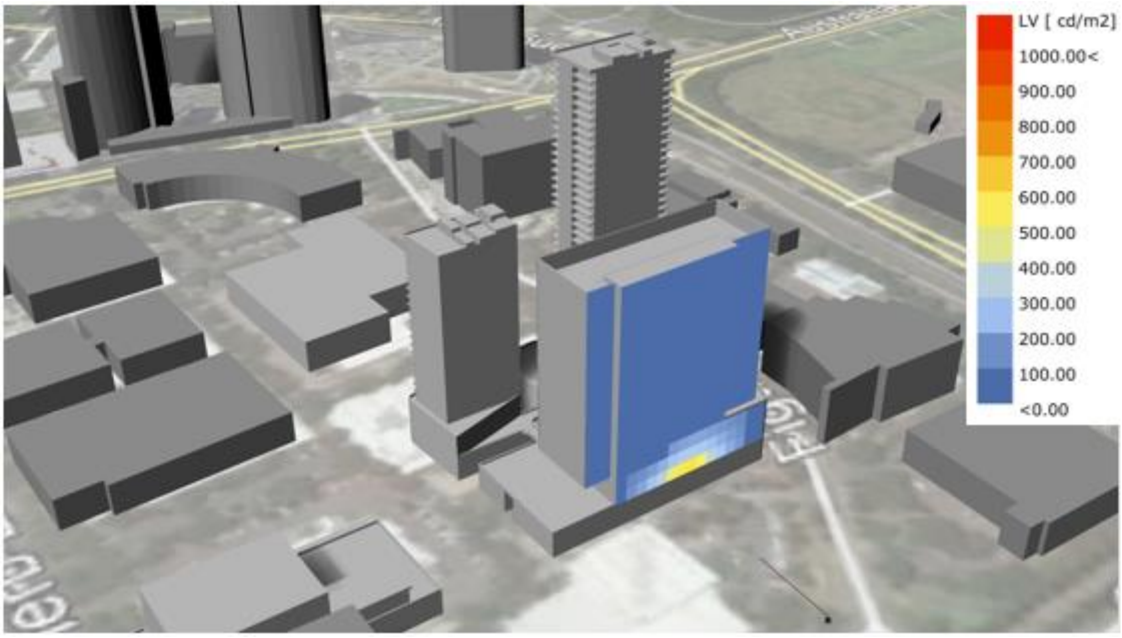

Figure B-16 Façades at risk of posing disability glare to a pedestrian at Location 1 (view 2)

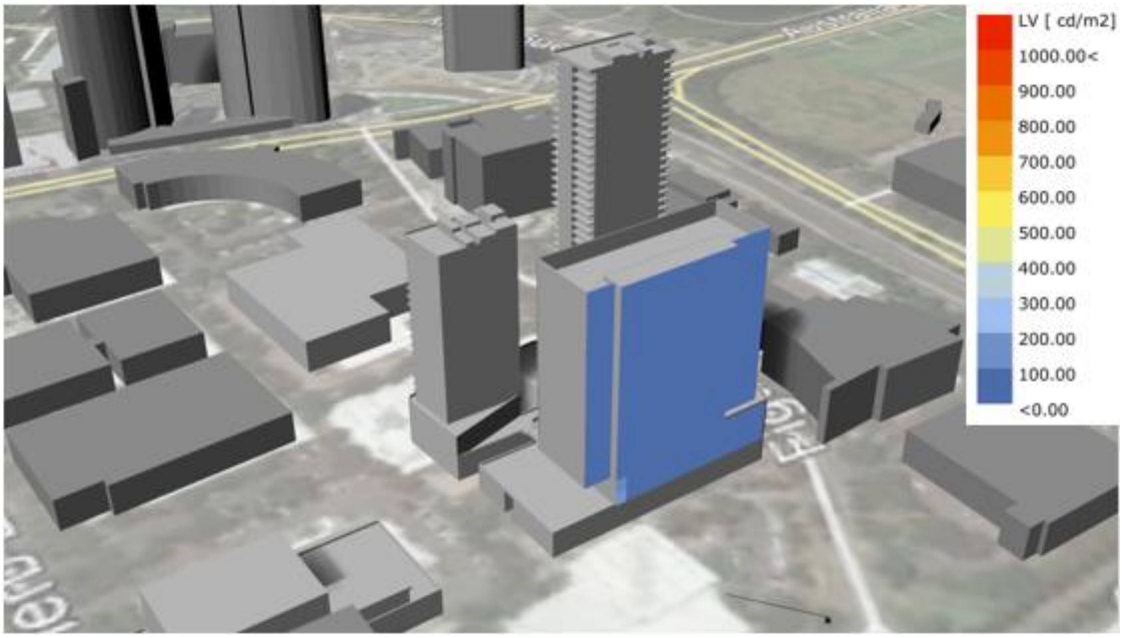

Figure B-17 Façades at risk of posing disability glare to a pedestrian at location 1 (view 3)

B.4 Pedestrian 3 – Building 1

This provides the third assessment for a pedestrian located within the site boundaries.

Based on the assessment, some exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 3 (refer to Table B-4). These were typically found to occur in the mid-morning during winter.

View of the assessed façades and their veiling luminance are shown in Figure B-18 and Figure B-19 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table B-4 Reflectivity impacts on a pedestrian at Location 3

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	0	• Not applicable	0
2	47	• Mid-morning in June and July	520
3	0	• Not applicable	350

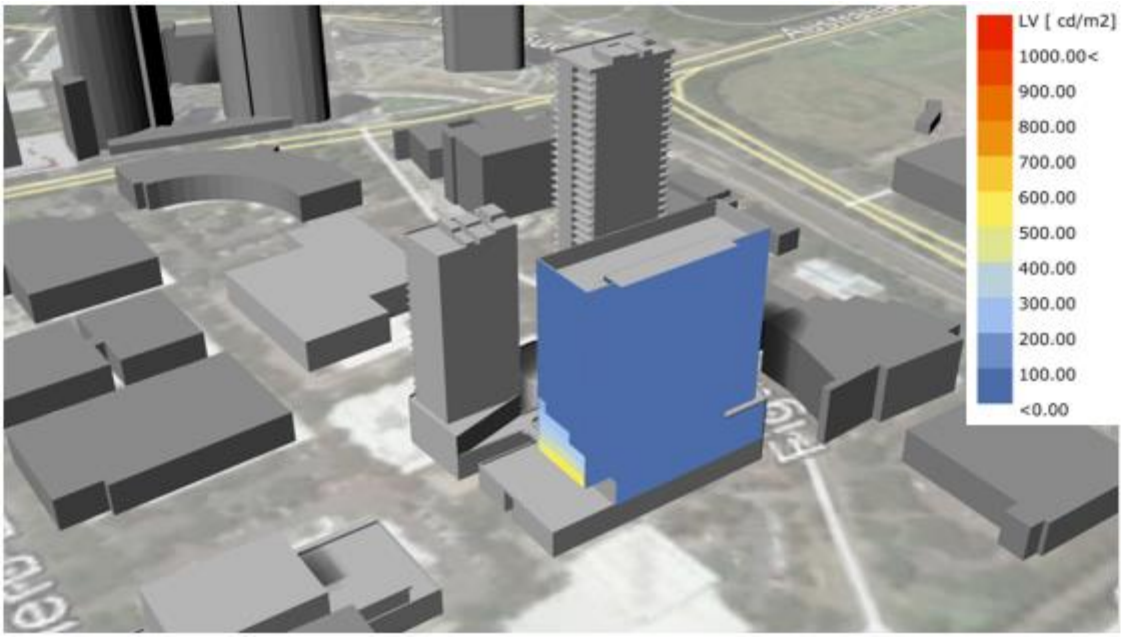

Figure B-18 Façades at risk of posing disability glare to a pedestrian at location 3 (view 2)

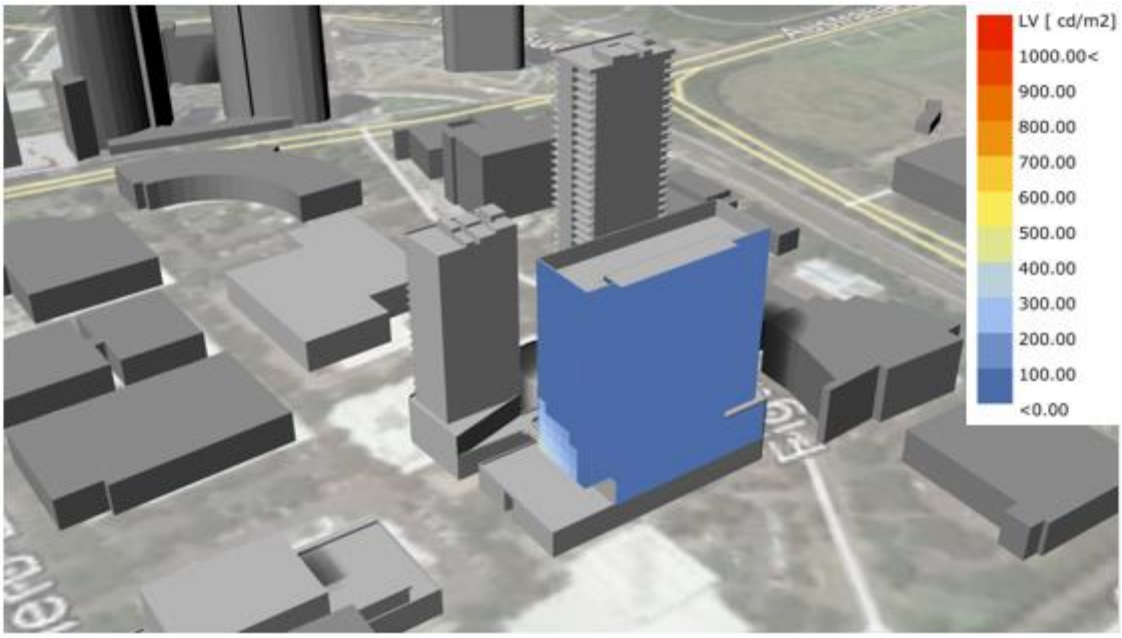

Figure B-19 Façades at risk of posing disability glare to a pedestrian at location 3 (view 3)

B.5 Pedestrian 5 – Buildings 2 and 3

This provides the fifth assessment for a pedestrian located within the site boundaries.

Based on the assessment, some exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 5 (refer to Table B-5). These were typically found to occur in the late afternoon during autumn and winter.

View of the assessed façades and their veiling luminance are shown in Figure B-20 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table B-5 Reflectivity impacts on a pedestrian at Location 5

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	0	• Not applicable	0
2	43	• Late afternoon in May, June, and July	810

Figure B-20 Façades at risk of posing disability glare to a pedestrian at location 5 (view 2)

B.6 Pedestrian 6 – Buildings 2 and 3

This provides the sixth assessment for a pedestrian located within the site boundaries.

Based on the assessment, many exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 6 (refer to Table B-6). These were typically found to occur in the early and mid-morning during autumn, winter and spring.

View of the assessed façades and their veiling luminance are shown in Figure B-21 and Figure B-22 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table B-6 Reflectivity impacts on a pedestrian at Location 6

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	390	• Early morning in March, April, May, August, September, and October	2,000

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
		• Mid-morning in March, April, May, June, July, August, and September	
2	0	• Not applicable	460
3	0	• Not applicable	0

Figure B-21 Façades at risk of posing disability glare to a pedestrian at location 6 (view 1)

Figure B-22 Façades at risk of posing disability glare to a pedestrian at location 6 (view 2)

B.7 Pedestrian 7 – Buildings 2 and 3

This provides the seventh assessment for a pedestrian located within the site boundaries.

Based on the assessment, numerous exceedances of the 500cd/m^2 veiling luminance criteria are expected to occur at pedestrian location 7 (refer to Table B-7). These were typically found to occur in the mid-morning during autumn, winter and spring.

View of the assessed façades and their veiling luminance are shown in Figure B-23 and Figure B-24 for the worst-case hour for each assessment direction for directions where there is veiling luminance is expected (i.e. >0cd/m^2).

Table B-7 Reflectivity impacts on a pedestrian at Location 7

Direction	Number of hours LV is expected to exceed 500cd/m^2 in a year	Expected period of LV exceedances	Maximum veiling luminance (cd/m^2)
1	0	• Not applicable	0
2	162	• Mid-morning in March, April, May, June, July, August, September, and October	730
3	0	• Not applicable	370

Figure B-23 Façades at risk of posing disability glare to a pedestrian at location 7 (view 2)

Figure B-24 Façades at risk of posing disability glare to a pedestrian at location 7 (view 3)