WINDTECH

Solar Light Reflectivity Analysis

for the proposed development known as

Site 4B, Sydney Olympic Park, Homebush Bay

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1.0 Introduction

This study is to investigate the potential impact of solar glare from the proposed development known as Site 4B at Sydney Olympic Park, Homebush Bay. The proposed development site is located on the south-eastern corner of the Olympic Boulevard and Herb Elliot Avenue intersection. The proposed development has a height of 7 levels above the ground.

An analysis has been undertaken, based on architectural drawings prepared by Bates Smart Architects Pty Ltd, dated November 10, 2006.

With regards to visible solar light reflectivity, this study addresses Section 6.2.4 of the Sydney Olympic Park Master Plan 2002, which states;

> *"Visible light reflectivity from building materials used on the façades of new buildings should not exceed 20%."*

A reflectivity analysis of the subject development has been carried out using the technique published by Mr David N. H. Hassall (1991)[1].

The limiting veiling luminance of 500 candelas per square metre for the comfort of vehicle drivers, suggested in Hassall (1991) has been adopted as a basis of assessing the glare impact from the subject development. In meeting this criterion for vehicle drivers, conditions will also be satisfactory for pedestrians. The glare impact onto occupants of neighbouring buildings is also discussed.

An aerial photograph of the site is presented in Figure 1. The various aspects of the proposal are presented on Figure 2.

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[1] D.N. Hassall, 1991, Reflectivity, Dealing with Rogue Solar Reflections (published by author)

Figure 1: Aerial Photograph of the Proposed Site

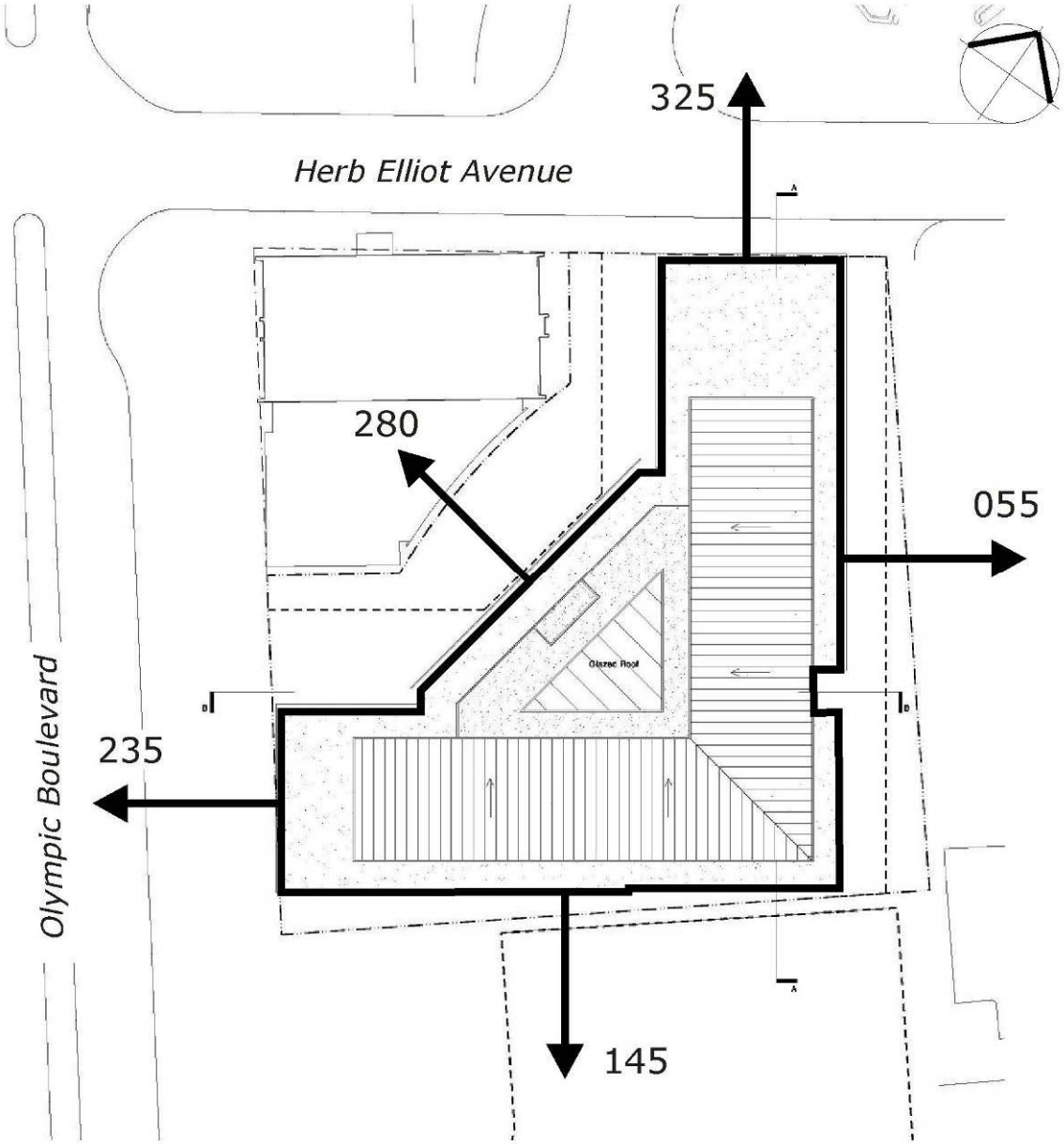

Figure 2: The Critical Aspects of the Proposed Development

2.0 Analysis

Solar charts for the various aspects of the proposed development are presented in Appendix B. Check zones for the selected aspects have also been identified based on the data obtained from the solar charts. The check zones highlight the zones that are potentially affected by solar reflections from each aspect. The various check zones for the subject development are described in Figure 3.

It should be noted that the check zones described in Figure 3 do not take into account the effect of overshadowing by neighbouring buildings or the shielding effect of any existing trees or other obstructions.

2.1 Impact onto Drivers and Pedestrians

From the study of the check zones and with consideration of the potential overshadowing effects of neighbouring buildings, 5 street level locations have been identified for analysis. These locations are indicated in Figure 3. Table 1 summarises the effect of the various aspects on the selected study locations.

Table 1: Aspects of the Development that affect each of the Study Points

Study Point	Aspects
Point 1	• 325˚ aspect
Point 2	• 325˚ aspect
Point 3	• 055˚ aspect
Point 4	• 055˚ aspect
Point 5	• 145˚ aspect

For each of the street level study points a photograph has been taken from the viewpoint of drivers and pedestrians at the study point location using a calibrated camera. These are presented in Appendix A of this report. A scaled glare protractor has been superimposed over each photograph.

The glare protractor is used to assess the amount of glare likely to be caused and to provide a direct comparison with the criterion of 500 candelas per square metre. Alternatively, the glare protractor can be used to determine the maximum acceptable reflectivity index for the glare to be within the criterion of 500 candelas/m^2.

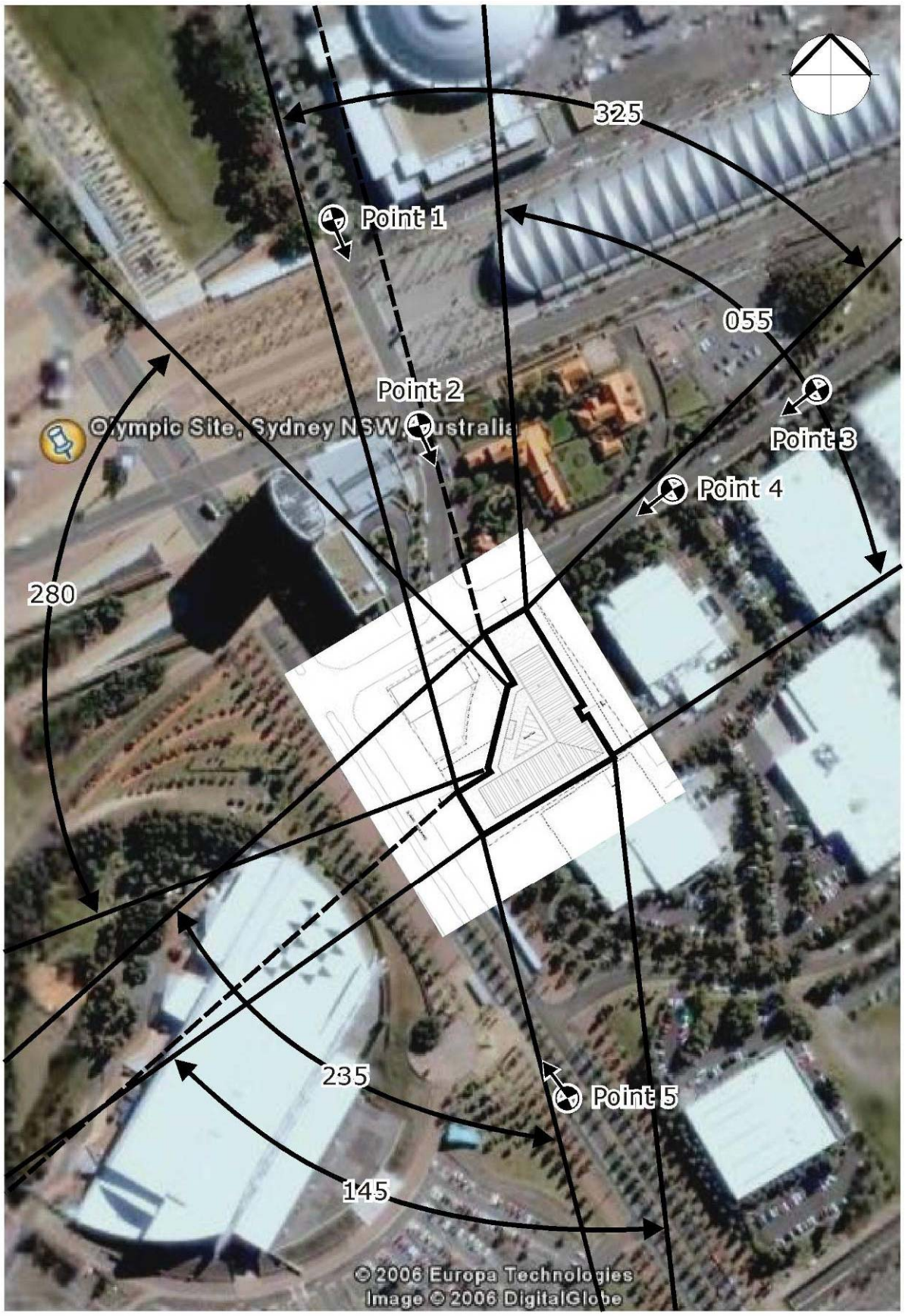

Figure 3: The Various Check Zones and Layout of Study Points

Point 1

Point 1 is located to the north of the proposed development site, on Showground Road. This point represents the most critical sightline of drivers heading south along Showground Road at this location. This point is located within the check zone for the 325 degree aspect of the proposed development (see Table 1 and Figure 3).

After a closer inspection of Figure 3, it is noted that Point 1 is only within the check zone for the 325 degree aspect at the south-western end of the development. This section of the development will be blocked from view for drivers and pedestrians at Point 1 by the existing trees along the western side of Showground Road and by the proposed Sofitel Hotel development, as indicated in Figure A1 of Appendix A.

Hence there will be no adverse glare from the proposed development to drivers and pedestrians heading south along Showground Road at this location.

Point 2

Point 2 is located to the north of the proposed development site, on Showground Road, next to the intersection with Dawn Fraser Avenue. This study point is located closer to the proposed development site than Point 1. This point represents the most critical sightline of drivers heading south along Showground Road at this location. This point is located within the check zone for the 325 degree aspect of the proposed development (see Table 1 and Figure 3).

After a closer inspection of Figure 3, it is noted that Point 2 is only within the check zone for the 325 degree aspect at the south-western end of the development. This section of the development will be blocked from view for drivers and pedestrians at Point 2 by the proposed Sofitel Hotel development, as indicated in Figure A2 of Appendix A.

Hence there will be no adverse glare from the proposed development to drivers and pedestrians heading south along Showground Road at this location.

Point 3

Point 3 is located to the north-east of the proposed development site, on Herb Elliot Avenue. This point represents the most critical sightline of drivers heading south-east along Herb Elliot Avenue at this location. This point is located within the check zone for the 055 degree aspect of the proposed development (see Table 1 and Figure 3).

The site survey of this point, shown in Figure A3 of Appendix A, indicates that the 055 degree aspect of the proposed development will be blocked

from the view of drivers and pedestrians at Point 3 by the existing trees along the southern side of Herb Elliot Avenue.

Hence there will be no adverse glare from the proposed development to drivers and pedestrians facing heading south-east along Herb Elliot Avenue at Point 3.

Point 4

Point 4 is located to the north-east of the proposed development site, on Herb Elliot Avenue. This study point is located closer to the proposed development site than Point 3. This point represents the most critical sightline of drivers heading south-east along Herb Elliot Avenue at this location. This point is located within the check zone for the 055 degree aspect of the proposed development (see Table 1 and Figure 3).

The site survey of this point, shown in Figure A4 of Appendix A, indicates that the 055 degree aspect of the proposed development will be blocked from the view of drivers and pedestrians at Point 4 by the existing trees along the southern side of Herb Elliot Avenue.

Hence there will be no adverse glare from the proposed development to drivers and pedestrians facing heading south-east along Herb Elliot Avenue at Point 4.

Point 5

Point 5 is located to the south of the proposed development site, on Olympic Boulevard. This point represents the most critical sightline of drivers heading north-east along Olympic Boulevard at this location. This point is located within the check zone for the 145 degree aspect of the proposed development (see Table 1 and Figure 3).

The site survey of this point, shown in Figure A5 of Appendix A, indicates that the development will be mostly obscured from view by the existing trees located along the median strip and eastern side of Olympic Boulevard. However, the visible areas of the 145 degree aspect of the development will not be within the zone of sensitive vision for drivers at Point 5.

Hence there will be no adverse glare from the proposed development to drivers and pedestrians facing north-east along Olympic Boulevard at Point 5.

2.2 Impact onto Occupants of Neighbouring Buildings

More research is required to properly assess what is considered an acceptable level of veiling luminance to occupants of surrounding buildings. Rofail and Dowdle (2004)[2] have highlighted the subjectivity of glare impact to occupants of surrounding buildings as it is highly affected by a number of factors, some of these are listed below:

- the intensity of glare
- duration of glare impact
- the type of use of the building
- type of glazing used on the neighbouring building (eg. Clear or Tinted)
- shading elements on the façade of the neighbouring building
- level of tolerance by the occupant of the neighbouring building

Our past experience, involving approximately 200 projects, tends to indicate that buildings that tend to cause nuisance to occupants of neighbouring buildings are those that have a normal specular reflectivity of visible light greater than 20%. This seems to justify the suggested limit of 20% reflectivity by many local government authorities and state planning bodies. This reflectivity is defined as the level of luminance or normal specular reflectivity of visible light.

Hence, a general recommendation is made that all glazing used on the facades of the development have a normal specular reflectivity of visible light of 20 percent or less to avoid adverse solar glare to occupants of neighbouring buildings.

[2] A.W. Rofail and B. Dowdle, 2004, "Reflectivity Impact on Occupants of Neighbouring Properties" International Conf. on Building Envelope Systems & Technologies, Sydney.

3.0 Conclusion

A reflectivity analysis of the proposed development known as Site 4B at Sydney Olympic Park, Homebush Bay, has been carried out using the technique published by Mr David N. H. Hassall.

To avoid any adverse glare from the façade of the proposed development to drivers and pedestrians on the surrounding streets of site, and to comply with the requirements of the Sydney Olympic Park Master Plan 2002, it is recommended that all glazing used on the facades of the proposed development have a maximum normal specular reflectivity of visible light of 20 percent.

With this recommendation satisfied, the results of this analysis indicate that the proposed development will not cause adverse solar glare to drivers or pedestrians in any of the surrounding streets and other outdoor areas. It is also it is expected that no adverse glare impacts will result with regards to the occupants of neighbouring buildings.

Appendix A

Analysis of Sight-Lines from the Various Study Locations

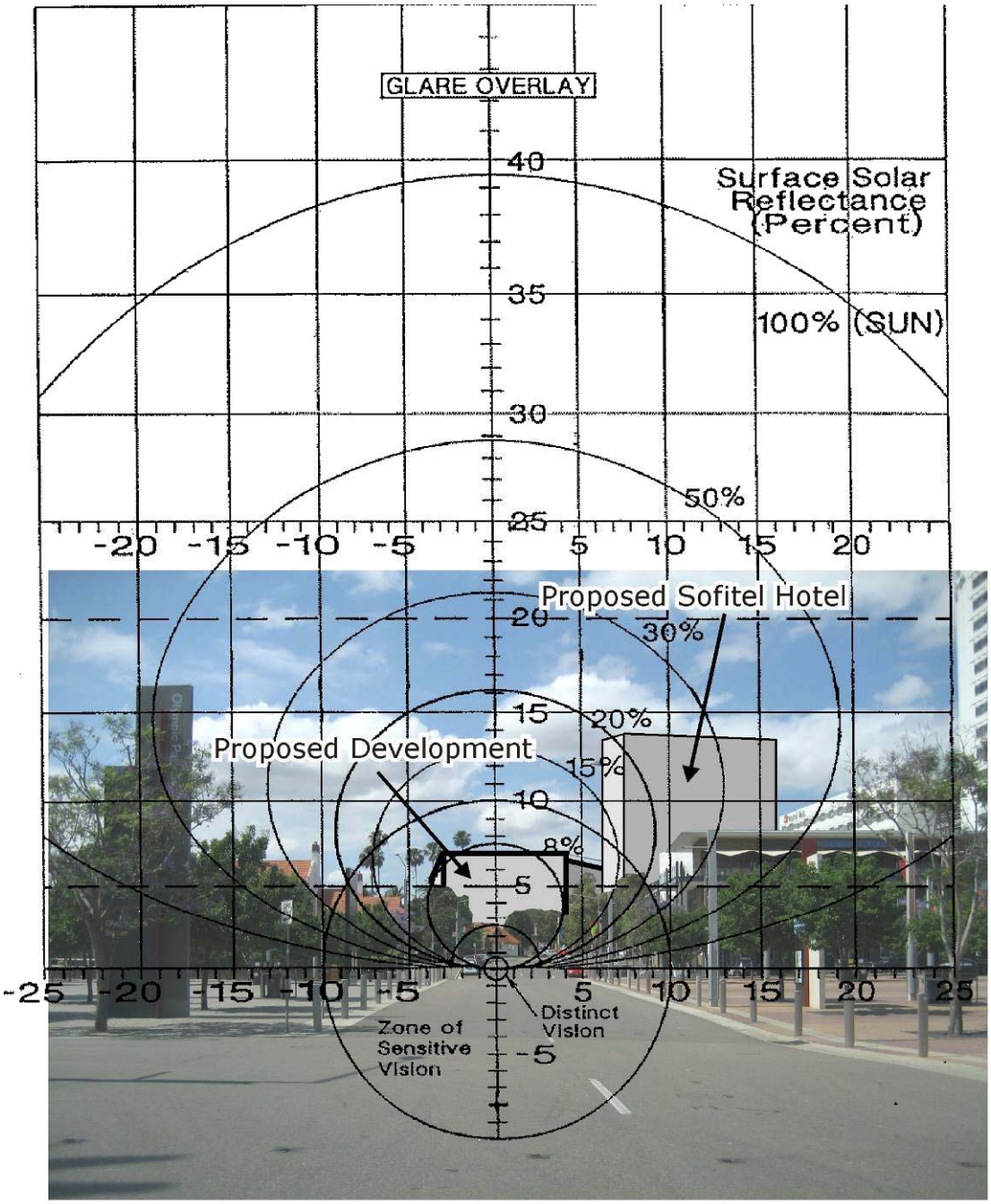

Figure A1: Glare Overlay for Point 1

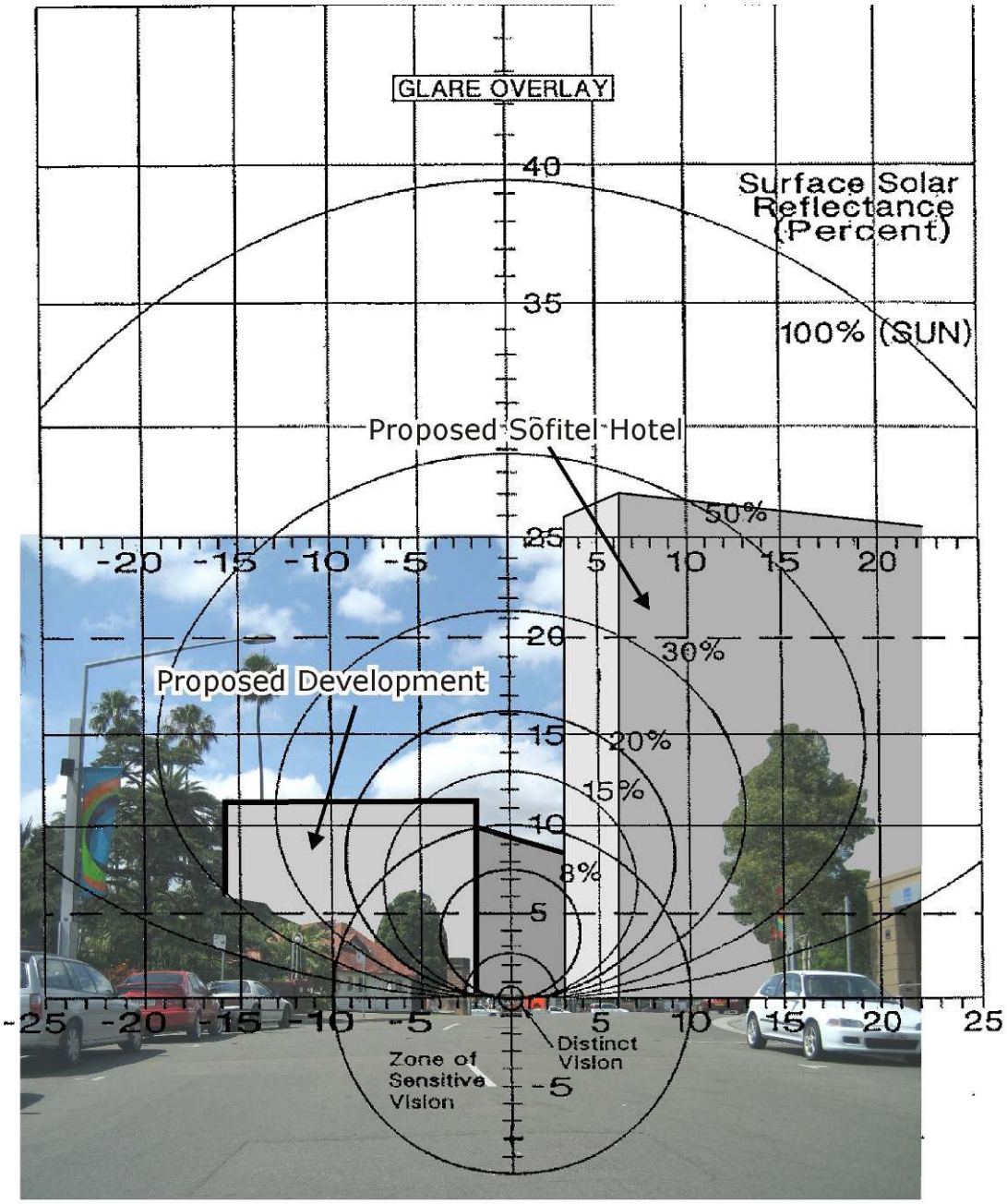

Figure A2: Glare Overlay for Point 2

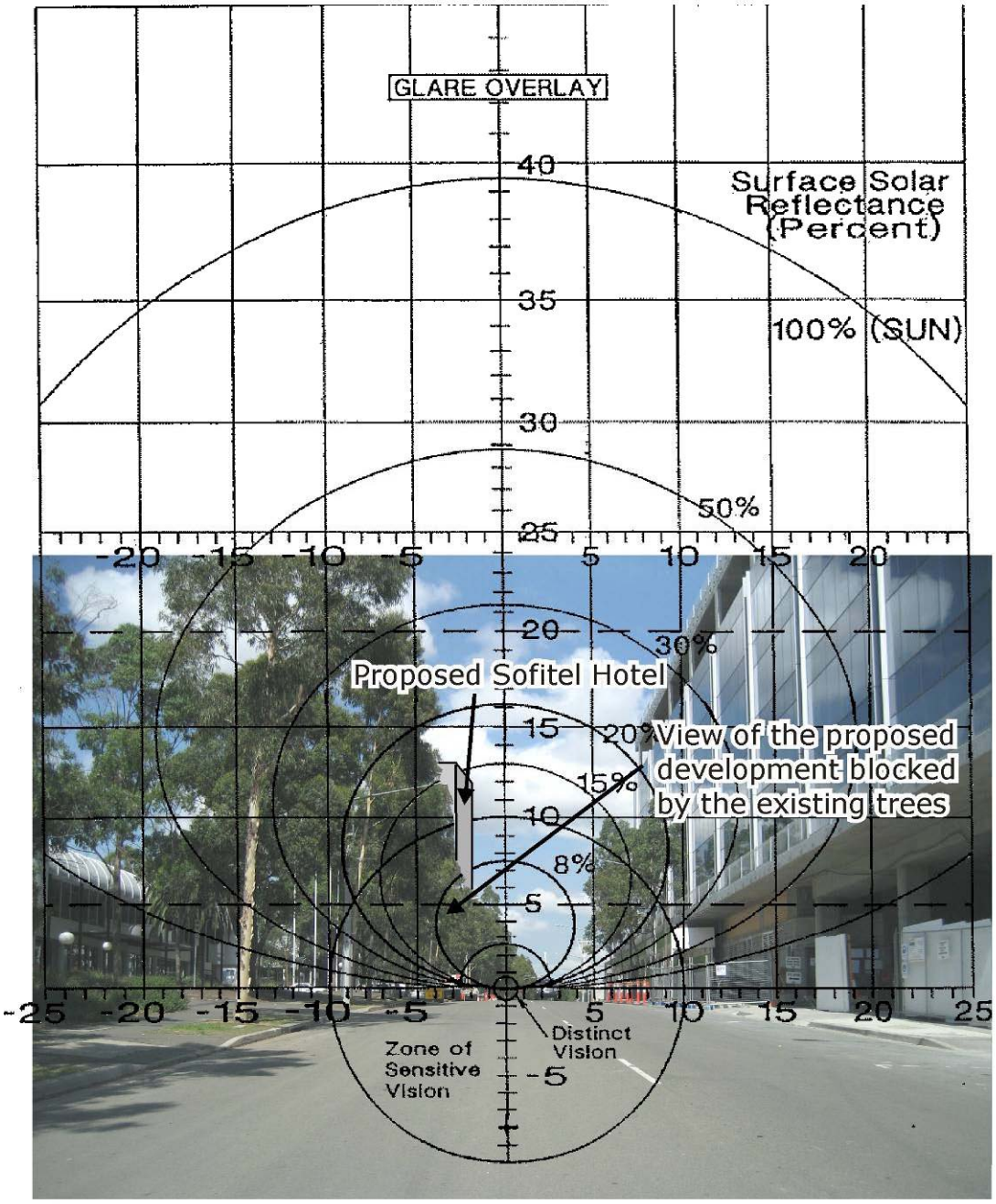

Figure A3: Glare Overlay for Point 3

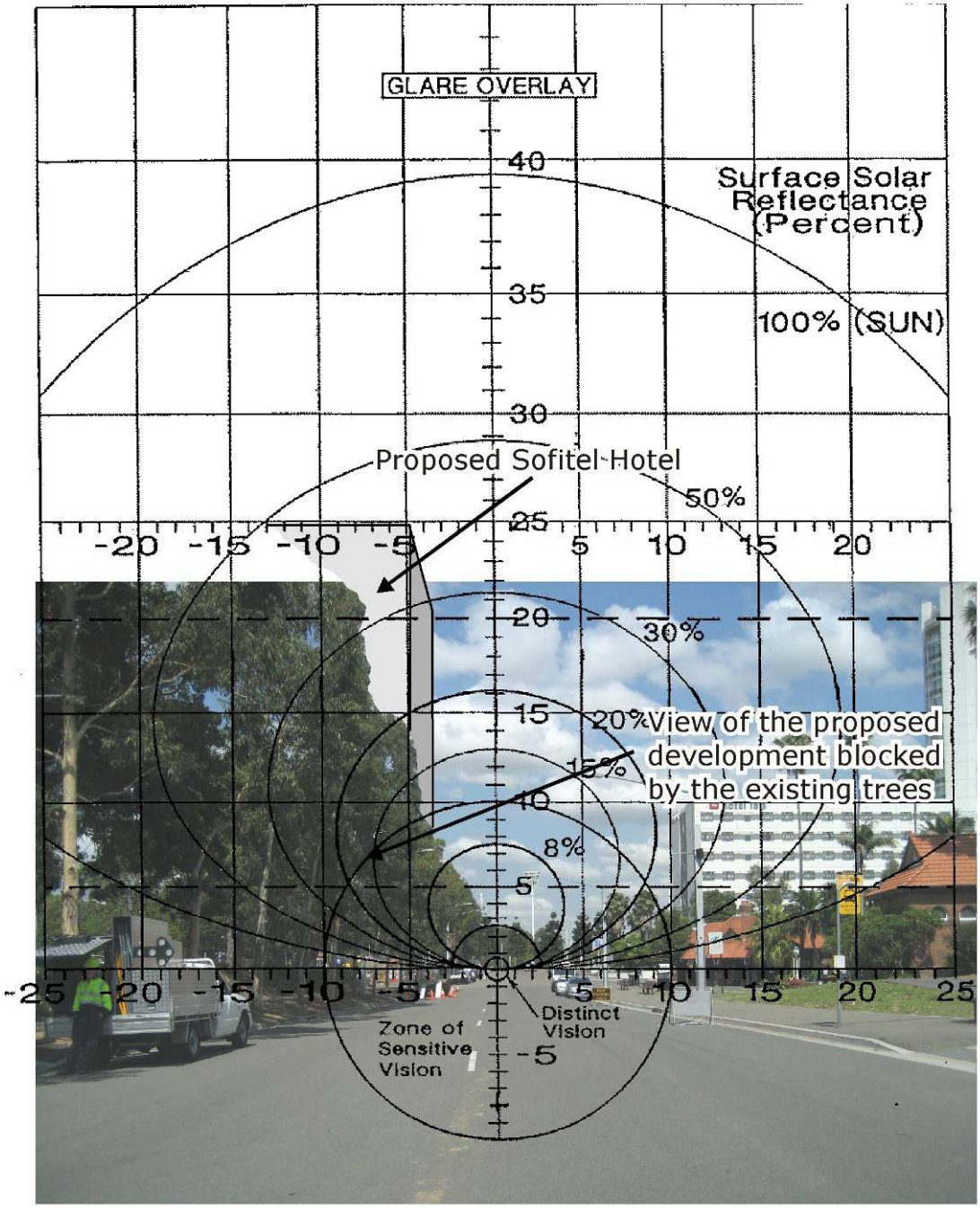

Figure A4: Glare Overlay for Point 4

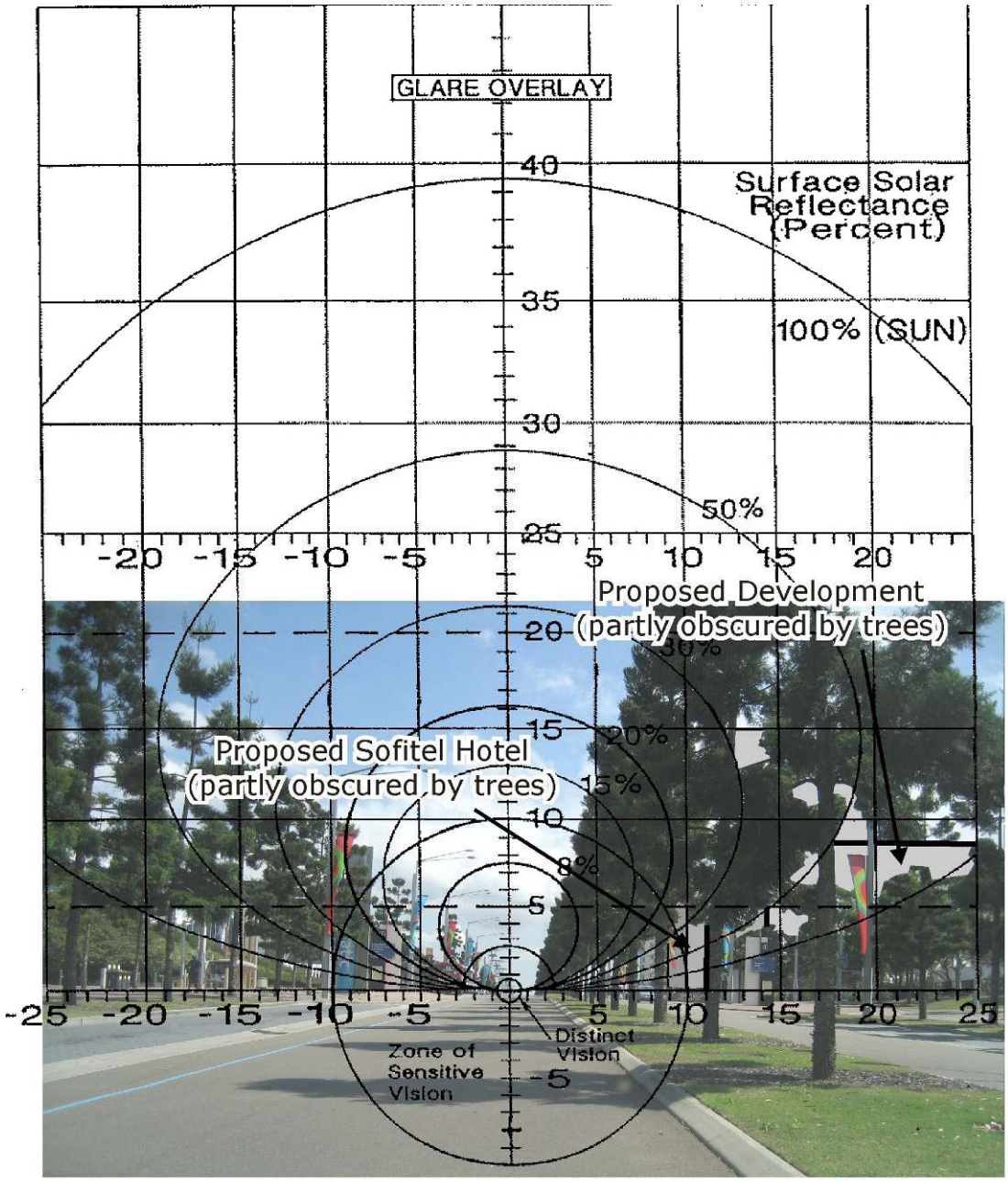

Figure A5: Glare Overlay for Point 5

Appendix B

Solar Charts for the
Various Aspects of the Proposal

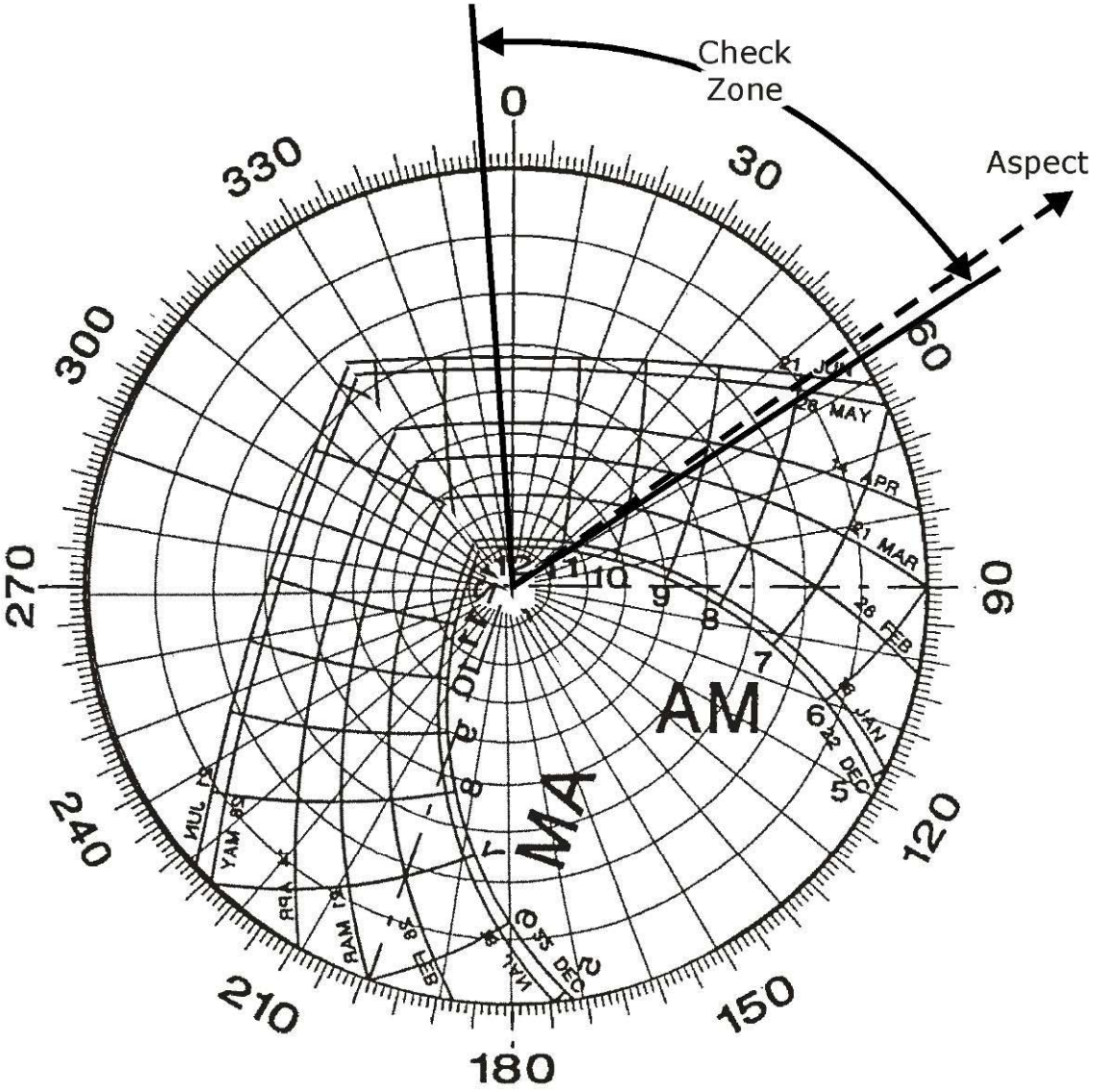

Figure B1: Sun Chart for Aspect 055°

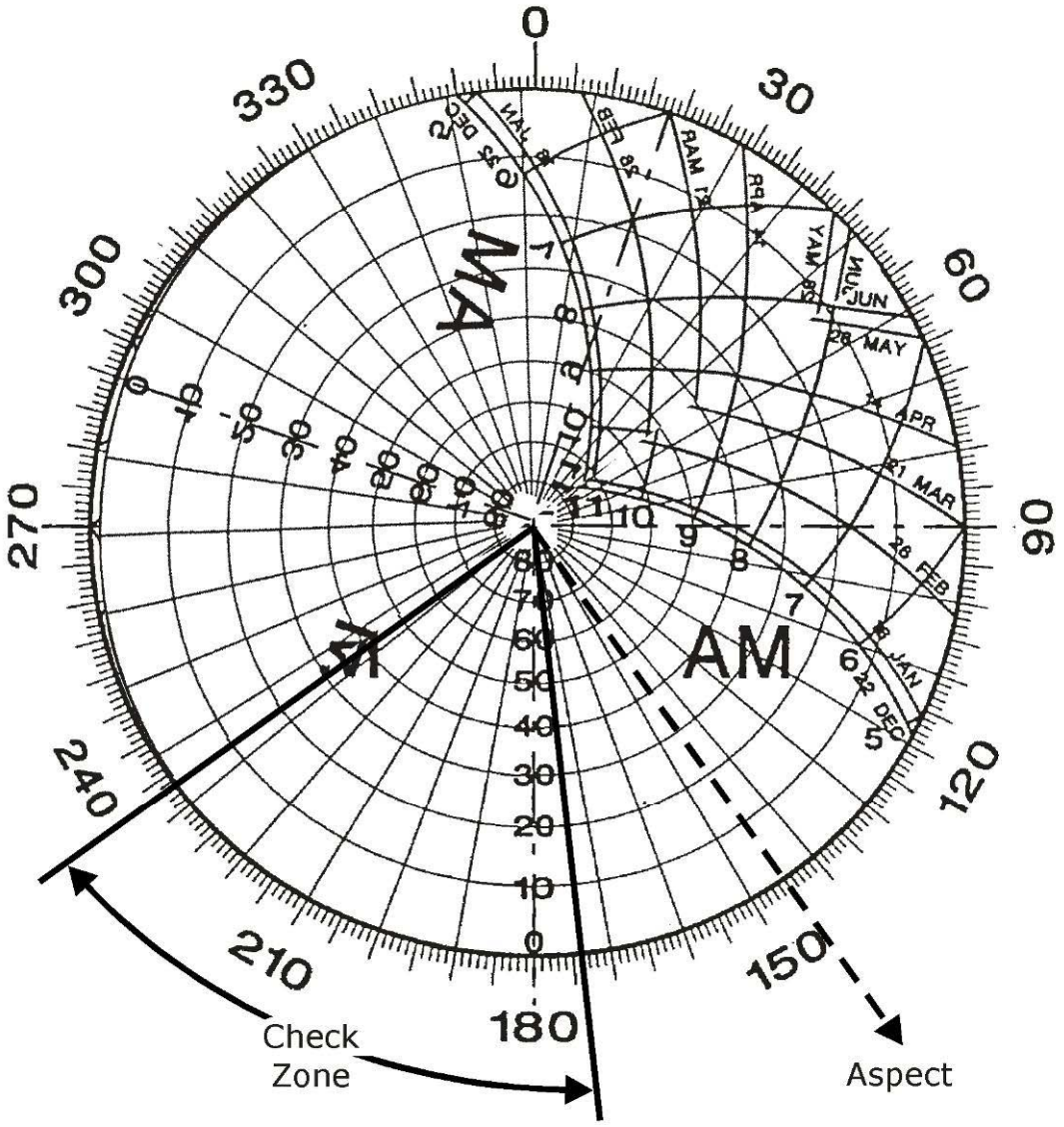

Figure B2: Sun Chart for Aspect 145°

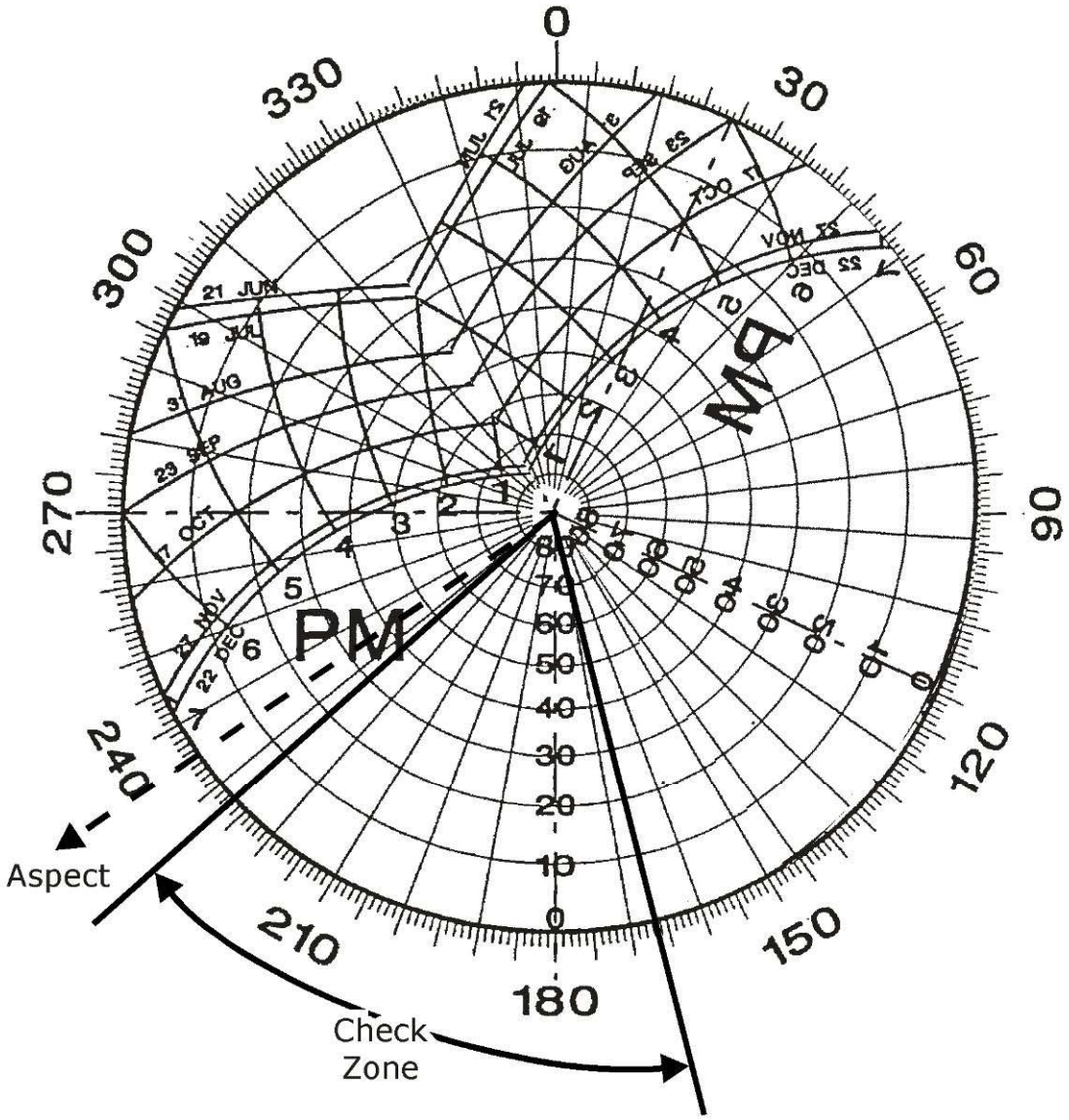

Figure B3: Sun Chart for Aspect 235°

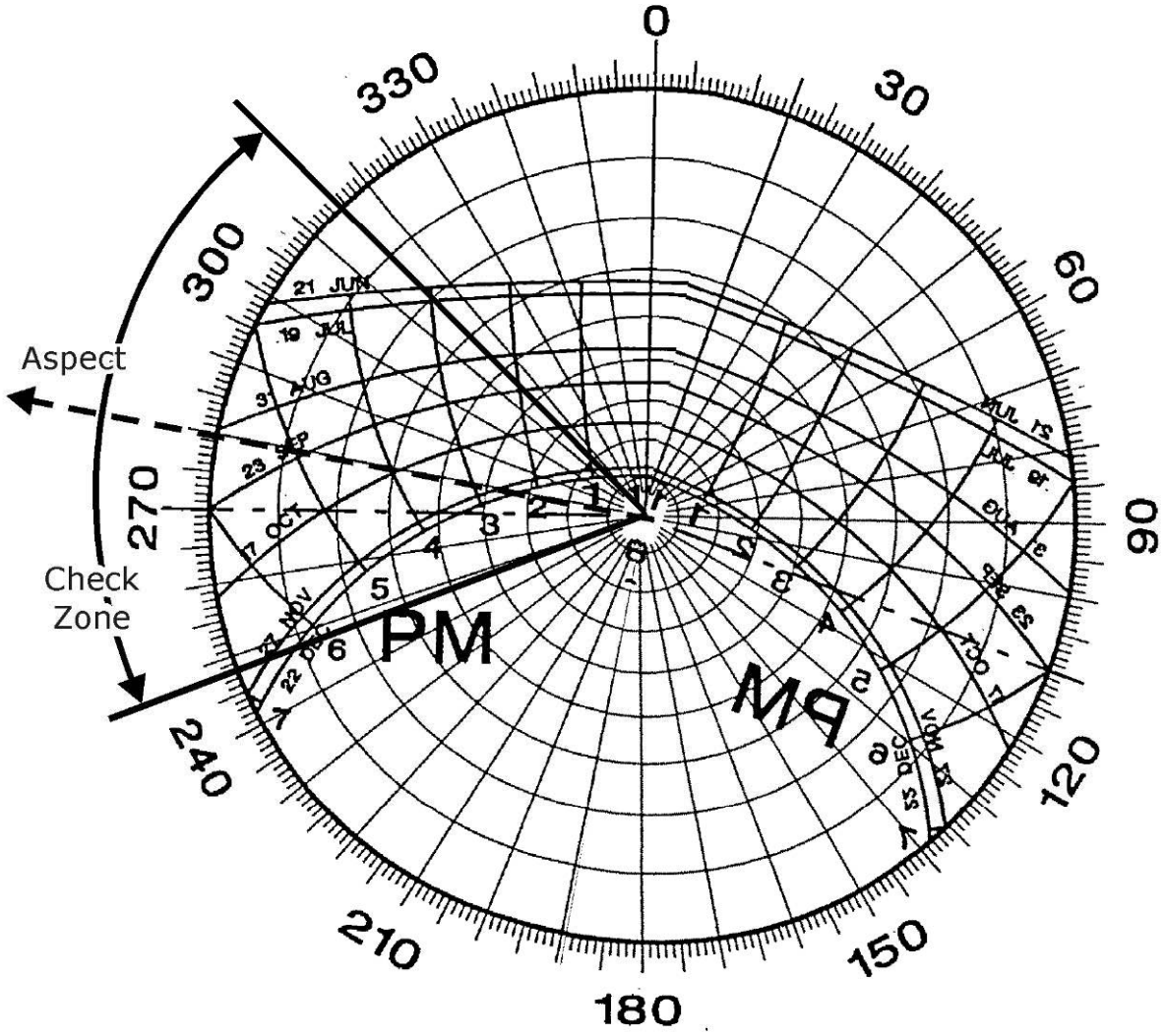

Figure B4: Sun Chart for Aspect 280°

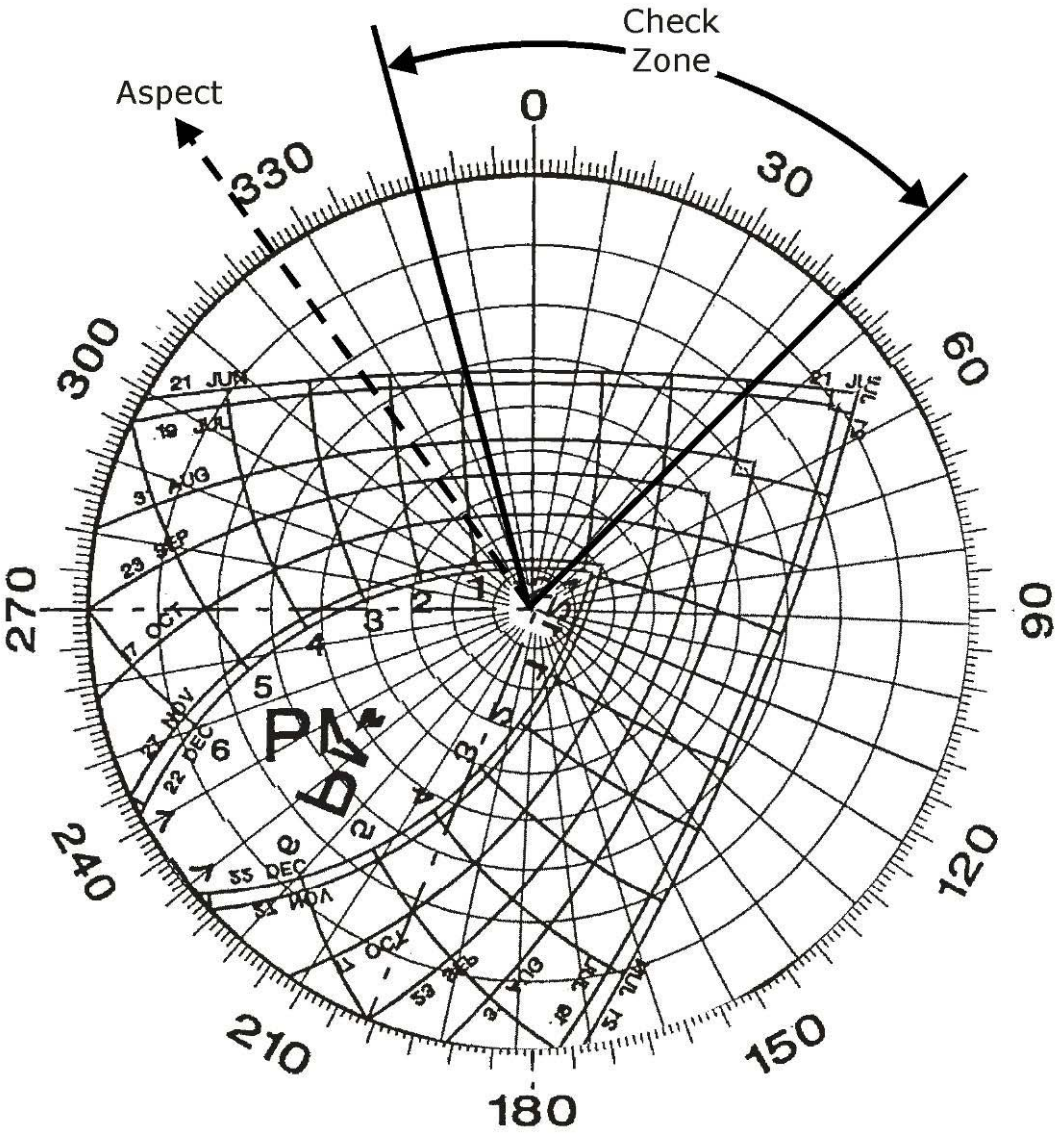

Figure B5: Sun Chart for Aspect 325°