

| 10 October 2019 review                                                                                                                                                                                                                                                                                                                    | Response 16 April 2020                                                                                         | 22 April 2020 review of amended approach                                                                                                                                                                                                                                                                                                                                                                | Email advice 7 June                                                                                                                                                                                                                                                                                                                                                                                                                                    | Review of updated report dated 16.10.20                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| It is not clear what view points have been considered in the analysis. For traffic scenarios there is a depiction of roads considered and direction of travel. However, extent of view points tested is not clear.                                                                                                                        | The assessment considered the key viewing direction rather than specific view points.                          | It is still not clear how glare risk is identified in the report with only a viewing direction. Glare is a function of magnitude of luminance and angular distance of the reflected light source from the line of sight. It therefore has to be calculation from specific points or range of points.<br><br>More information requested to support method relied upon for 'key view direction' analysis. | Extent of viewpoints and view analysis:<br><br>The following viewpoints will be studied:<br>Edwin Flack Avenue – southbound<br>Intersection of Birnie Avenue and Edwin Flack Avenue – southbound<br><br>Birnie Avenue – northbound<br><br>Western Motorway – eastbound and westbound<br><br>Shane Gould Avenue – westbound<br>Carter Street – eastbound<br><br>Olympic Park public area to the north – looking toward the 12-14 Birnie Ave development | The viewpoints have been shown.<br><br>However, it appear the viewpoints have not have been used in the analysis in all cases as multiple viewpoints share a single result, which would not be the case given the view sensitive nature of veiling luminance:<br><br>- 4.4 Birnie Ave, Travelling Northeast has two view points with a single result.<br><br>- 4.5 M4 Motorway and Carter Street, Travelling Southeast has two view points with a single result. |
| It is important for the views considered to capture all likely locations where glare could be a risk. As the veiling luminance formula adopted in the report is more sensitive to the angle of glare source from the line of sight than the magnitude of illuminance, this information is key to confirming adequacy of the glare report. | Where a glare risk is identified, the report will be revised to include view analysis based on key view points | It is noted that key view points are to be included.                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Key viewpoint analysis does not have angular information.                                                                                                                                                                                                                                                                                                                                                                                                        |
| Where overshadowing of buildings is relied upon do discounted the risk of predicted glare, the necessary overshadowing should be confirmed though shading for the relevant times of year.                                                                                                                                                 | Noted and in progress                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Overshadowing analysis has not been presented. Shielding from neighbouring structures is given as a key reason for glare risk mitigation from the North East facade of Buildings B (travelling south west of Shane Gould Avenue) but has not been demonstrated.<br><br>Successful glare mitigation needs to be adequately demonstrated.                                                                                                                          |

| 10 October 2019 review                                                                                                                                                                                                                                                                                                                                                                                                        | Response 16 April 2020                                                                                                                                      | 22 April 2020 review of amended approach                                                                                                                                                                                                                                                | Email advice 7 June                                                                                                                                                                                                                   | Review of updated report dated 16.10.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| The report uses a Reference Meteorological Year as the basis for the glare analysis. This is a departure from the published Hassall method and we do not agree this is a valid approach when assessing disability glare risk. Use of a referencing meteorological year is likely to significantly underestimate glare risk due to key times of year and/or day being cloudy or partially cloudy in the reference year chosen. | The assessment used RMY weather data to derive the sun's position (azimuth and altitude). No other component of the RMY file has been used in the analysis. | RMY (Reference Meteorological Year) files only record hourly positions of the sun and are therefore not fit for purpose to assess glare risk. The sun travels a significant angular distance in an hour and it is therefore necessary to check for glare at intervals less than 1 hour. | We will use a 30 minute timestep as a screening assessment, and use a smaller timestep around peaks that are identified as part of the screening.<br><br>We will use Hassall's method for calculating solar position at each timestep | 30 minute time steps have been used but only for the 21st day of each month.<br><br>The assessment of only of a day per month is not adequate to identify glare risk form solar reflections.<br><br>A full 15 degrees of vertical sun angle can be missed completely from analysis with with only one day a month assessed.<br><br>This method cannot be accepted and an alternative and adequate assessment method is required. This requires a fully representative range of sun angles to be considered, or the proper application of the Hassell method, where sun angles that present a risk of glare through solar reflection are identified by plotting the virtual sun position. |
| The glare analysis should be conducted assuming clear sunny conditions.                                                                                                                                                                                                                                                                                                                                                       | The assessment was based on clear sky conditions                                                                                                            |                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                       | Not confirmed in report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| We support the use of calculated veiling luminance rather than reliance only on the glare protractor that compliments the Hassall method. However, the report should include view analysis where glare is identified.                                                                                                                                                                                                         |                                                                                                                                                             |                                                                                                                                                                                                                                                                                         | Hassall glare protractor to be overlaid with approximate building form shown                                                                                                                                                          | Detailed assessment using raytracing is discussed ion the report but meaningful results from raytracing are absent from the report. It is impossible to confirm adequate analysis has been undertaken.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| The report should include view analysis where glare risk is identified that also confirm the angular distance to the glare source(s).                                                                                                                                                                                                                                                                                         |                                                                                                                                                             |                                                                                                                                                                                                                                                                                         | Hassall glare protractor to be overlaid with approximate building form shown                                                                                                                                                          | 3D images presented for key view do not show raytracing or reflections.<br><br>Email advice that the Hassall glare protractor would be overlaid has not been followed. The analysis of glare risks remains inadequate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| 10 October 2019 review                                                                                                                                                                                                                                                                                                | Response 16 April 2020 | 22 April 2020 review of amended approach | Email advice 7 June | Review of updated report dated 16.10.20                                                                                                                                                                                                                                                                                                                             |
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| The graphs confirming the results should be clearly labeled as to what veiling luminance value is being presented. Given the results are suggested to represent a path of travel and a whole month, it should be clear whether this is worst case of all points and hours or whether there is a process of averaging. | Noted and in progress  |                                          |                     | <p>This has not been clarified.</p> <p>The method applied is not acceptable to confirm glare risk</p>                                                                                                                                                                                                                                                               |
| It is not clear how the hours per year is calculated and this should be explained.                                                                                                                                                                                                                                    | Noted and in progress  |                                          |                     | <p>This has not been explained and the graphs remain unclear. With the disclosure that only 1 day per month has been tested, it is not clear how hours of annual exceedance can be calculated.</p> <p>It is incorrect to assume that a single sampled day in the month will identify the worst glare condition or be representative of glare risk over a month.</p> |

| 10 October 2019 review                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Response 16 April 2020                                                                                                                                                                                        | 22 April 2020 review of amended approach                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Email advice 7 June                                                                                                                                                                                              | Review of updated report dated 16.10.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <p>It is not clear that the methodology properly considers the angular dependant reflective properties of glazing. Where the results and recommendations rely and the external reflection properties of glass, it should be clearly stated whether this is measured at normal reflectance or is incident reflectance. The percentage reductions applied in the results, to achieve necessary mitigation, infer both values are taken as incident reflectance, which would suggest the both reference case and recommendations and made on an incorrect basis.</p> | <p>We recognise that the Hassall Method does not allow for consideration of angular reflective properties. Consideration of angular dependence is beyond the Hassall Method, an industry standard in NSW.</p> | <p>Both statements are incorrect and suggest that formula used to calculate veiling luminance, which is required to assess whether the Hassall nominated glare threshold is exceeded, is not understood and has been misapplied by the authors of the report.</p> <p>The formula quoted in the reflectivity report is consistent with the Holladay veiling luminance formula for a point glare source: <math>L_v = 10 * EG / \theta^2</math> that is relied upon by Hassall. Importantly, Hassall defines EG as a product of R, which is Reflectivity of Glass at the angle of Incidence [refer Appendix 4.1 8 (b)].</p> <p>Hassall also covers the importance of incident reflection and the angular reflective properties of glass in more detail [refer Figure 3.2 and Figure 3.3].</p> <p>The statements regarding an inbuilt limitation of the Hassall method are inaccurate and demonstrate a lack of understanding of solar reflectivity.</p> <p>It is simply not possible to assess glare risk without an understanding of reflection at the angle of incidence.</p> | <p>We will use angular properties as discussed. We will document the function used in the report. We note that surface #1 will be the dominant reflection surface, especially at higher angles of incidence.</p> | <p>The angular reflection properties of glass have now been described but the extent of application is not clear from the results presented.</p> <p>Some results are seen to change and a very a significant glare risk is now shown for the NW facade Shane Gould Avenue travelling southwest.</p> <p>The recommended treatment to mitigate glare is to increase the density of vertical shades on the facade. However, the amount of increase required or performance requirements for adequate glare mitigation is not stated. Glare mitigation requirements need to be resolved, documented and demonstrated to be adequate.</p> <p>The view of the NE facade from this same view point is also shown to present a glare risk. This is said to be adequately mitigated by reducing glazing's reflectivity to limit glare to only 15.5 hours. However, the glare is still shown to exceed the Hassall disability threshold by over 300%. This risk is clearly unresolved.</p> <p>Glare from the Olympic Park is said to only occur only from reflections from the ground floor of the proposed development and therefore be fully screened by trees. However, this can not be the case for the stated times when glare is a risk. Vertical sun angles for the times given range from 6 to 18 degrees. This will be the range of vertical view angles for any reflection when looking toward the facade. A sun angle below 1 degree would be required for reflection to be limited to the ground floor, which is clearly not the case.</p> <p>Such fundamental errors suggest significant failings of the methodology applied.</p> |

| 10 October 2019 review                                                                                       | Response 16 April 2020               | 22 April 2020 review of amended approach | Email advice 7 June | Review of updated report dated 16.10.20 |
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| It is not clear how the % of spectrally selective facade has been used to inform the acceptability of glare. | To be included in revised assessment |                                          |                     | These references have been removed.     |