

Tom Hogan
ARTAL
9 Jordan Street
Manchester
M15 4PY

Re: Desktop Review of Potential Solar Glare Impacts upon Network Rail Tracks

GIA have been instructed to undertake a desktop review of the proposed Cornbrook, Manchester development, in relation to solar glare impacts upon Network Rail train lines passing to the north-west of the Site.

As shown in the image below (Fig. 01), there is understood to be two relevant sets of tracks that travel to the north-west of the site:

- Eastbound (Orange) - carrying trains travelling from Trafford Park to Manchester Oxford Road Station/Deansgate; and
- Westbound (Blue) - carrying trains travelling from Manchester Oxford Road Station/Deansgate to Trafford Park.

We note there are two Metrolink tram lines also to the north-west of the site running parallel to the Network Rail tracks, but via Cornbrook Station. Of the tracks located to the north-west of the site, due to the two Network Rail tracks being located closest to the proposed development they have the greatest potential to experience solar glare impacts.

From a review of aerial imagery, we have been unable to identify any signals within the immediate vicinity of the site where a train drivers' visibility could be impacted by reflections from the proposed development.

This desktop review considers the following factors which are discussed below:

- Background - A summary of the relevant guidance that have informed the desktop review;
- Train Tracks - A summary of the tracks, relative location of the site and the key features; and
- Proposed Development - A summary of the design of the Proposed Development and how this performs in terms of solar glare.



Figure 1: Relevant Network Rail Tracks

Background

Glare is a phenomenon occurring in the eye that is caused by the presence of bright light sources within the visual field. It can lead to visual discomfort and, if the glare source is very bright compared to its surrounding, even be disabling in the sense that objects become hard or impossible to see. This is because they are cloaked by the high intensity glare source, whose light gets scattered within the eye.

The CIE 146:2002 Collection on Glare expresses the latter type of glare more formally as:

"Disability glare is glare that impairs vision (CIE, 1987). It is caused by scattering of light inside the eye [...]. The veiling luminance of scattered light will have a significant effect on visibility when intense light sources are present in the peripheral visual field and the contrast of objects to be seen is low. "

"Disability glare is most often of importance at night when contrast sensitivity is low and there may well be one or more bright light sources near to the line of sight, such as car headlights, streetlights or floodlights. But even in daylight conditions disability glare may be of practical significance: think of traffic lights when the sun is close to them, or the difficulty viewing paintings hanging next to windows."

Glare is of particular concern if it affects drivers of trains, since it might impair the visibility of signals, potentially putting the driver, passengers or other parties at risk.

Whether or not a sun reflection will cause an instance of glare depends upon a number of factors, these are summarised below:

- The location of the observer and his view direction;
- The sun's position in the sky, which changes not only with the hour of the day, but with the seasons too;
- The location and orientation of the reflective surface, e.g. a glazed facade, in relation to the observer's view direction;
- The specific quality of the reflective surface, e.g. sheen, specularity, etc.;
- The observer's physiology, e.g. age and eye pigmentation; and
- The background brightness defining the state of adaptation in the observer's eye;
- Understanding whether solar glare is likely to occur is based on the observer's position and view direction.

In the UK, guidance that is relevant to glare assessments is limited to a short section in Littlefair's Site Layout Planning for Daylight and Sunlight published by the BRE in 2011. This document is commonly referred to as BR 209. It suggests that:

"If it is likely that a building may cause solar dazzle the exact scale of the problem should be evaluated. This is done by identifying key locations such as road junctions and windows of nearby buildings, and working out the number of hours of the year that sunlight can be reflected to these points. BRE Information Paper IP 3/87 gives details."

BR IP3/87 provides more detailed instructions on why and how solar dazzle can be calculated.

As stated in CIE 146:2002, occurrences at angles beyond 30° would be of little significance in most situations, but may be relevant in exceptional circumstances.

Generally, solar reflection occurring at distances of greater than 0.5km from the Site are of little concern.

Train Tracks & Proposed Development

The proposed development comprises one 24 storey building (~75.5m in height about ground level), with the north, west and south elevations potentially visible within a train drivers field of view. The elevations are shown below.



Figure 2: Proposed Development - North Elevation



Figure 3: Proposed Development - South Elevation



Figure 4: Proposed Development - West Elevation

As demonstrated, the elevations are predominantly solid composition with punched windows, therefore any reflections that could occur from the proposed facades would be for short periods of time and broken up by the solid facade elements.

As noted earlier, we have been unable to identify any signals within this stretch of track however this ought to be confirmed in due course via signalling diagrams that would be provided by Network Rail.

For drivers on the westbound track, the majority of the proposed development is obscured from view by the existing Vox Manchester buildings. The lower 14-16 floors (approx.) of the western end of the north elevation would likely be visible to the right of the Vox Manchester buildings within the field of view, and then above levels 14-16 (approx.) the full elevation would likely be visible. Given the orientation of the northern elevation in relation to viewing angles for drivers on the westbound track, as well as the existing Vox Manchester buildings likely shading the north elevation in the early mornings, it is unlikely that any significant reflections would be generated within the field of view of train drivers on this track.

For drivers on the eastbound track, the full south elevation would likely be visible within a drivers field of view, and the full west elevation would also be visible but at a glancing angle. It is anticipated that reflections may be visible from both the south and west elevations within the field of view but outside the direct line of sight. The tracks are lined on the right side by substantial tree growth which will offer some protection from reflections, particularly from the lower floors. Any reflections that occur would be also broken up by solid facade elements, and likely above the driver visor cut-off line which could be deployed to mitigate reflections that do occur. It is likely that any reflections that do occur within the field of view of drivers travelling on the eastbound tracks would be no greater than those currently being generated by the existing Vox Manchester building's southern facade adjacent to the Proposed Development.

Should any reflections occur, the potential for glare is likely to be low and any concerns could be addressed through glazing selection. It is not proportionate to this stage of the design to have a selected glazing specification, therefore, it is recommended that once the glazing specification is known, a detailed solar glare assessment is undertaken and the results shared with Network Rail and MCC for sign off prior to commencement on site.

Conclusion

Overall, for the following reasons, we consider the proposed development is unlikely to result in a significant instance of solar glare towards train drivers on nearby tracks:

- The elevations are predominantly solid composition with punched windows, therefore any reflections that could occur from the proposed facades would be for short periods of time and broken up by the solid facade elements;
- There are not understood to be any relevant signals that drivers would need to sight;
- Due to the orientation and shading of the north elevation, it is unlikely that any significant reflections would be generated within the field of view of train drivers on the westbound track;
- For eastbound trains, reflections are likely to occur within the field of view but outside the direct line of sight, they would be: broken up by solid facade elements; located above the drivers visor cut-off line; partially obscured by trees that line the tracks; and would be no greater than those currently being generated by the existing Vox Manchester building's southern facade.

Should any reflections occur from the proposed development towards train drivers, the potential for an instance of solar glare is likely to be low and any concerns could be addressed through glazing selection. It is not proportionate to this stage of the design to have a selected glazing specification, therefore, it is recommended that once the glazing is known, a detailed solar glare assessment is undertaken and the results shared with Network Rail and MCC for sign off prior to commencement on site.

Given the low likelihood for solar glare being generated towards train drivers on the adjacent tracks and the likelihood that any concerns can be mitigated through glazing selection alone, it is not considered necessary for further assessment to be undertaken at this stage.

Yours sincerely

For and on behalf of GIA



Krystle Stewart
SENIOR ASSOCIATE DIRECTOR
krystle.stewart@gia.uk.com