AnsteyHorne

SOLAR GLARE ASSESSMENT

for

Charles Street
Manchester
M1 7BD

07 March 2024

REF: MH/JK/ROL01308

expertise
applied

CONTENTS

SECTION **PAGE NO.**

1. INTRODUCTION 1
2. SOLAR GLARE GUIDANCE 3
3. METHODOLOGY 6
4. APPROACH TO SIGNIFICANCE OF POTENTIAL SOLAR GLARE 7
5. SOURCES OF INFORMATION 9
6. SOLAR GLARE ASSESSMENTS 10
7. SUMMARY AND CONCLUSION 11

APPENDICES

APPENDIX A - SOLAR GLARE VIEW POINTS

1. INTRODUCTION

1.1 Anstey Horne have been instructed by Jadebricks (Charles Street) Ltd ("the Client") to undertake a Solar Glare assessment in relation to the proposed redevelopment at Charles Street, Manchester, M1 7BD ("the Proposed Development" / "the Site").

1.2 This report specifically considers potential instances of disability glare that could affect a train drivers' visibility when travelling in the direction of the Site.

1.3 To identify potential instances, aerial imagery is utilised to observe railway lines in the area; two points were identified. Viewpoints have then been created to simulate a train driver's field of view when travelling towards the Site:

- **Viewpoint 1:** Travelling west towards the Site adjacent to Granby Row; and
- **Viewpoint 2:** Travelling east towards the Site at the exit from Manchester Oxford Road Station at the crossover with Oxford Road.

1.4 See viewpoint locations on drawing no. 800, contained within Appendix A, and on the extract below:



Extract 01: Plan View of the Proposed Development and Viewpoint Locations

1.5 The assessments have been undertaken with reference to the Hassall Reflective Protractor (1991) and the Holladay description of 3^0 and 30^0 vision. This method of assessing solar glare is referenced from; Evaluation of solar *glare from reflective facades: A general method, V Lopes-Rioboo Gil, (2015).*

1.6 Each simulation assumes a clear sky throughout the year. Frequently, the sky will be overcast, particularly in the winter months, which is often when the most significant adverse effects occur due to the sun's low altitude. The assessment therefore represents a possible 'worst-case' scenario, which in UK winter, will rarely occur.

1.7 The following sections will outline the current solar glare guidance, guidelines for a train driver's line of sight, and discuss the assessment results.

2. SOLAR GLARE GUIDANCE

2.1 There is currently no industry accepted method of assessing solar glare, nor how to interpret the significance of incidences. Therefore, in determining our assessment methodology, we have reviewed the available literature and used a combination of the Hassall and Holladay methods.

2.2 The guidance is as follows:

Solar dazzle reflected from sloping glazed facades: P J Littlefair (1987)

2.3 Guidance on reflected solar glare is contained in the BRE information paper, IP3/87, *"Solar dazzle reflected from sloping glazed façades"* published in April 1987. This guidance is also mentioned at section 5.8 in the BRE Report 209, *Site Layout Planning for Daylight and Sunlight* – A guide to good practice (2022). This guidance can be used to predict the dates and times when reflected solar glare may potentially occur at a view point. It does not measure the intensity of reflections as the methodology does not take into account the reflectance of the materials or their specularity (i.e. how smooth and mirror like they are).

Evaluation of solar glare from reflective facades: A general method: V Lopez-Rioboo Gil (2015)

2.4 The research paper by *V Lopez-Rioboo Gill, Evaluation of solar glare from reflective facades: A general method (2015)*. States:

"……Hassall developed a Reflective Protractor in 1991. These methods can identify which reflections can get to the observer, their duration and the probability of the sun shining at those times".

"…….it is likely that any solar reflection within 3^0 of the line of sight will cause glare."

"Solar reflections beyond 30^0 of the line of sight do not usually cause glare but it is not impossible".

CIE 146/147: 2002 CIE Collection on Glare 2002

2.5 The CIE collection on Glare 146-147:2002 defines disability glare as "*glare that impairs vision. 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."*

2.6 The document indicates the importance of assessing disability glare stating that; *"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."*

2.7 The document further states that "*The magnitude of the veiling luminance depends on the intensity and distance of the glare source which together determine the relevant parameter Eglare, the illuminance at the eye caused by the glare source, and the angle between the glare source and the line of sight Q."*

2.8 The document sets out three formulae, based on empirical photometric studies, each valid within their angular domain. The formulae describe the influence of the angular function with the use of the power of the angle Q;

- Q3 for angles between 0.1° and 1°,
- Q2 for angles between 1° and 30° and
- Q for angles beyond 30°.

2.9 It can be deduced that the closer the instance of glare to the centre of the line of sight, the worse the veiling effect becomes with the increased likelihood that the glare will have a disabling effect on vision.

Signal Positioning and Visibility: Railway Group Standard GE/RT 8037: Rail Safety and Standards Board (2003)

2.10 The assessment points for the solar glare tests have been taken 2.75m above the rail track. This is based on the height of the driver's eye level as suggested in the Railway Group Standard GE/RT8037 (2003).The synopsis on the front page of this document states:

"This document mandates the requirements for positioning signals and indicators to ensure adequate viewing and clarity of meaningful drivers"

At page 7 under the heading "Driver's eye level" the document states:

"The height above rail level that is assumed for the driver's eye. This will vary according to the size of the cab, seat adjustment and the driver. For the purposes of signal sighting, the driver's eye level shall normally be assumed to be 2.75m above rail level unless sighting exclusively for trains of a non-standard height"

2.11 Whilst the above text sets out the heights of signal sighting, it is reasonable to assume the visual requirements should be measured at this level too.

3. METHODOLOGY

Solar Glare

3.1 The methodology described below is not aimed at addressing the intensity of an instance of reflected solar glare, but the occurrence and duration of glare throughout the year and the location of this occurrence in respect of a person's line of sight. This will inform whether mitigation is required at the detailed design stage.

3.2 The solar glare analysis reviews the likelihood of sunlight affecting sight throughout the year and at specific points in the day. The aim of this assessment is to identify the potential for issues to arise, as although the assessments might show glare occurring, it is dependent on there being a clear sky, with no cloud cover limiting the sun's potential to reflect off the proposed development.

Stereoscopic views

3.3 The stereoscopic views show the location of the reflected sun throughout the year and at hourly intervals in the day. Two stereoscopic images are created for each view point, one view shows the reflected solar glare throughout the day in hourly intervals, with the second showing glare potential on a monthly basis.

3.4 Taking the findings from Holladay's equation as outlined in "*Evaluation of solar glare from reflective facades: A general method V Lopez-Rioboogio (2015)*" we understand that:

- Solar glare is primarily known to cause a potentially hazardous affect within the line of sight anywhere between 0° and 10° from the centre of the eye. Solar reflections between 10 and 30 have the potential to cause glare, subject to their location relative to key signals and junctions, although these would be less serious than within 10. Effects outside of a 30° radius, are generally not considered to be such a risk in terms of their potential for solar glare that causes a disabling effect.

- Our assessment highlights the stereoscopic view of the 3° radius (the most critical vision) from the centre line of sight and the 30^0 radius from the centre line of sight.

3.5 Our software plots onto the façade a colour-coding to show the dates and times when reflected glare may be experienced at that view point, assuming clear sky conditions. The image showing the times and dates need to be considered together, not in isolation (i.e. where the 'time' image shows instances of glare at a certain time of day, the reader should then turn to the 'month' image, which will identify what time of the year the potential glare occurs, during those times).

Proposed Building Material Specification

3.6 The materials for the facades on the proposed building is glazing, WBS 4S silicon render K1.5mm (White). For the assessment, we have assumed a worst-case scenario of 100% reflectance for the glazing so as to obtain a more pronounced result. The rest of the façade has been assumed to be 0% reflective for this assessment.

3.7 For the assessment, all of the neighbouring buildings have been assumed to be non-reflective as we are establishing the additional effect of the proposal. In reality, other buildings which surround the proposed development can also reflect sunlight by way of glazing and metal finishes.

Limitations of solar glare assessment

3.8 This solar glare assessment reviews the likelihood of reflective solar glare at hourly intervals throughout the day and on a monthly basis. It does not assess the intensity of solar glare which can affect the driver's field of vision. Therefore, it should only be used as a tool for assessing the likelihood of solar glare. We have used feedback from Network Rails and our professional judgement to select the most relevant locations to test for solar glare, but there may be other points where glare occurs for a limited time.

4. APPROACH TO SIGNIFICANCE OF POTENTIAL SOLAR GLARE

4.1 As outlined above, this analysis is not a qualitative assessment for potential solar glare. It assumes that reflective materials carry a 100% reflectivity (i.e. like a mirror), and thus the results presented are a 'worst case scenario'. That is to say, the analysis does not consider the overall 'intensity' of potential solar glare. In reality, the glazing of the proposed development will not cause the same amount of glare as a mirror, and the effect will be considerably reduced by the time it reaches a driver's field of view.

4.2 In determining the significance of solar reflections at this stage, the angle of a reflection reaching a vehicle/train driver's eye is taken into account, in conjunction with the potential length of time the reflection is being caused. It is considered that the potential for significant solar glare (i.e. moderate adverse or major adverse) can occur where solar reflections reach the eye within an angle of 10°; within 3° being the most significant. It is considered that significant glare may also occur if it lasts for prolonged periods within the near periphery field of view (10°-30°); otherwise, it is generally considered that solar glare is unlikely to be significant if it falls outside the 10° field of view or for fleeting periods between 3°-10° (i.e. negligible or minor adverse).

4.3 The terms 'negligible', 'minor', 'moderate' and 'major' will be used to describe potential solar reflections within this report. In forming an overall conclusion as to whether the proposed development is likely to result in significant solar glare, the location of signalling equipment on the railway lines and wider mitigating measures is also considered.

Scale of Effect	Description
Negligible	Solar reflections occurring at angles of greater than 30° from the viewer's line of sight.
Minor	Limited solar reflections are visible between 10° and 30° from the viewer's line of sight.
Moderate	Lengthy occurrences of solar reflections are visible between 10° and 30° from the viewer's line of sight or limited occurrences between 3° and 10°.
Major	Solar reflections are visible within 3° of the viewer's line of sight or lengthy occurrences between 3° and 10°.

5. SOURCES OF INFORMATION

5.1 The following sources of information have been used to undertake the technical solar glare review:

- Simpson Haugh's Architect's RVT. model of the proposed scheme received February 2024.
- AccuCities photogrammetric tile received February 2024.

6. SOLAR GLARE ASSESSMENTS

View 1 – Travelling in an eastern direction (Drawing reference 801)

6.1 View 1 shows there is no potential for solar glare within proximity of the 30° radius vision area.

6.2 View 1 shows there is no potential for solar glare within proximity of the 3° or 10° radius vision area.

View 2 – Travelling in a western direction (Drawing reference 802)

6.3 View 2 shows there is no potential for solar glare within proximity of the 30° radius vision area.

6.4 View 2 shows there is no potential for solar glare within proximity of the 3° or 10° radius vision area.

7. SUMMARY AND CONCLUSION

7.1 A comprehensive assessment of the effects on a train driver's field of view when travelling towards the Site has been undertaken to establish the extent of potential disability glare that could arise from the Proposed Development.

7.2 The assessments considered a 'worst-case' scenario whereby the proposed glazing is 100% reflective (like a mirror) with clear skies, such that clouds will not be obstructing direct sunlight. This provides a more pronounced result than experienced in reality.

7.3 The assessment results showed:

- **Viewpoint 1:** No potential glare is experienced within the radius vision areas for train drivers travelling towards the Site in an easterly direction (Drawing No. 801); the effect of the Proposed Development in this location is therefore considered negligible.

- **Viewpoint 2:** No potential glare is experienced within the radius vision areas for train drivers travelling towards the Site in an westerly direction (Drawing No. 802); the effect of the Proposed Development in this location is therefore considered negligible. It should be noted that there are no windows on the façade of the Proposed Development that would face the train driver in this direction.

7.4 Based on the sources of information obtained, there is no potential for solar glare to either the foveal point of view, or the near periphery point of view. Therefore, we do not consider the Proposed Development to have an effect on a train driver's view when travelling towards the Site from and easterly or westerly orientation; the overall effect of the Proposed development is considered negligible in terms of potential solar glare.



ANSTEY HORNE

07 March 2024

APPENDIX A
-
SOLAR GLARE VIEW POINTS



SITE PLAN VIEW

AnsteyHorne
CHARTERED SURVEYORS
www.ansteyhorne.co.uk
London - 020 3744 2374
Birmingham - 0121 667 9902
Bristol - 0117 471 1574
Manchester - 0161 528 7690
Plymouth - 01752 270 315
Norwich - 01603 577 362

LEGEND:

Existing
Consented
Proposed
Cutback
12120 AOD Height (mm)

SOURCES OF INFORMATION:

EXISTING, SURROUNDING & ANALYSED BUILDINGS
ACCUCITIES
Received on 19/02/2024

Site and aerial photos.

PROPOSED BUILDINGS
SIMPSONHAUGH ARCHITECTS
Received on 20/02/2024

N W E S

REV	DESCRIPTION	DATE

© Copyright Anstey Horne & Co. Ltd
This drawing is the property of Anstey Horne & Co. Ltd. All rights reserved.
This drawing should not be reproduced without permission.
Do not scale from this drawing.

CLIENT: JADEBRICKS (CHARLES ST) LTD

PROJECT TITLE: CHARLES STREET
MANCHESTER

SCHEME REF: SCHEME RECEIVED: 20/02/2024

DRAWING TITLE: SITE PLAN VIEW

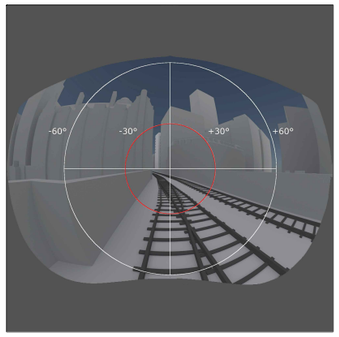
MODELLED BY:/ DRAWN BY	DATE:	SCALE:	
JSC	22/02/2024	N.T.S.	A3

PROJECT No:__ RELEASE No:__ VERSION No:	DRAWING No:
ROL01308_R01_V01_	800

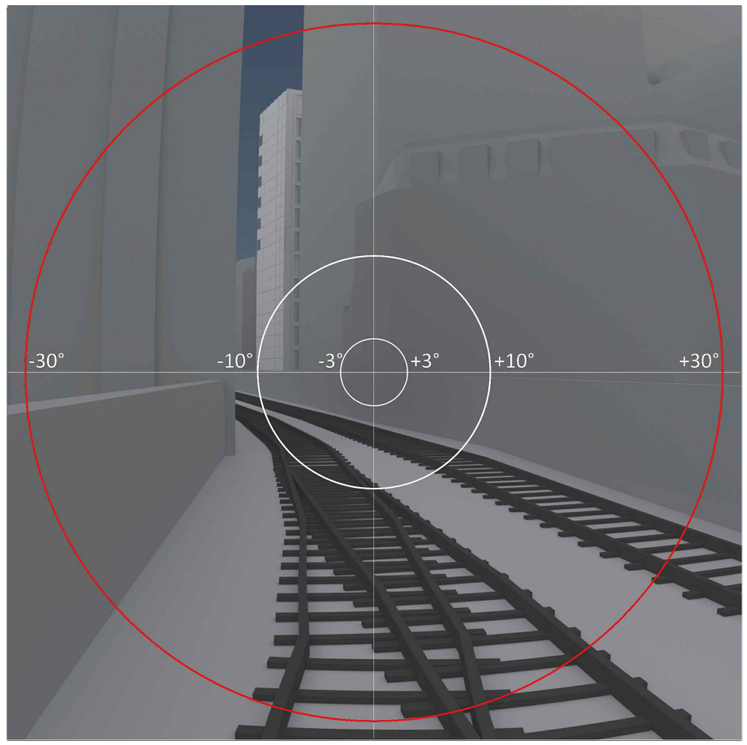
Site Plan

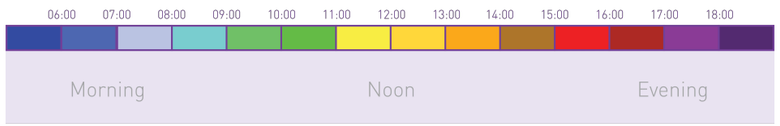
TIME

VIEW 1 - STEREOSCOPIC VISION



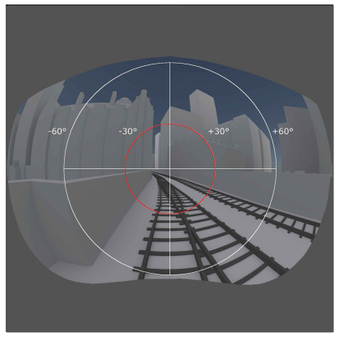
VIEW 1 - CLOSE UP



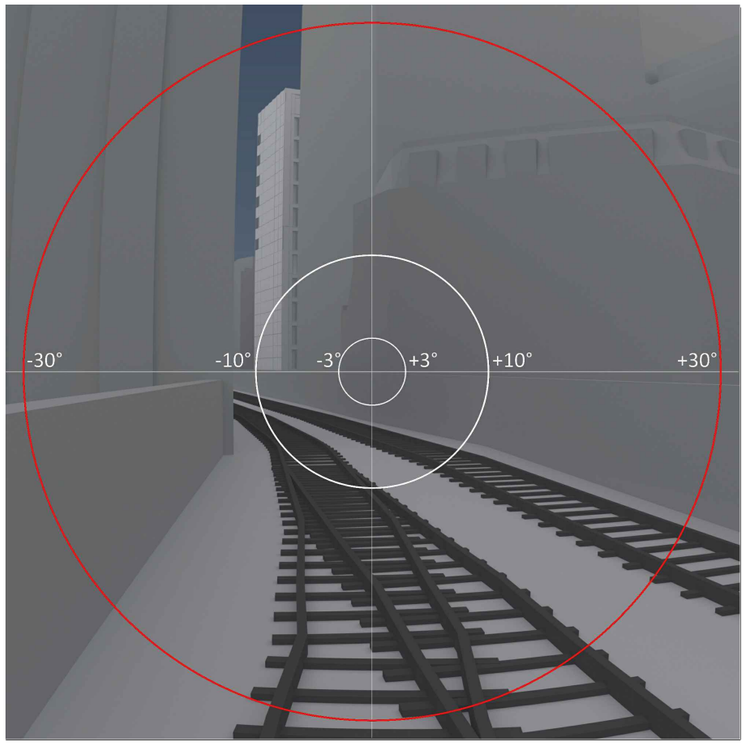


MONTH

VIEW 1 - STEREOSCOPIC VISION



VIEW 1 - CLOSE UP





AnsteyHorne
CHARTERED SURVEYORS
London - 020 3744 2374
Birmingham - 0121 667 9902
Bristol - 0117 471 1574
Manchester - 0161 528 7690
Plymouth - 01752 270 315
Norwich - 01603 577 362
www.ansteyhorne.co.uk

LEGEND:

Solar Glare - Location Point & direction of view

SOURCES OF INFORMATION:

EXISTING, SURROUNDING & ANALYSED BUILDINGS
ACCUCITIES
Received on 19/02/2024

Site and aerial photos.

PROPOSED BUILDINGS
SIMPSONHAUGH ARCHITECTS
Received on 20/02/2024



LOCATION PLAN

REV	DESCRIPTION	DATE

© Copyright Anstey Horne & Co. Ltd
This drawing is the property of Anstey Horne & Co. Ltd. All rights reserved.
This drawing should not be reproduced without permission.
Do not scale from this drawing.

CLIENT: JADEBRICKS (CHARLES ST) LTD

PROJECT TITLE: CHARLES STREET MANCHESTER

SCHEME REF: SCHEME RECEIVED: 20/02/2024

DRAWING TITLE: SOLAR GLARE ASSESSMENT

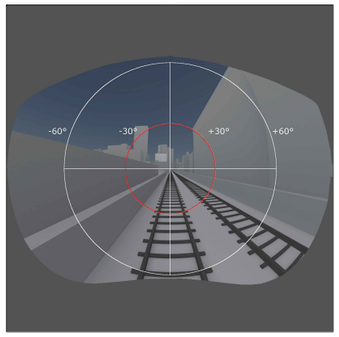
MODELLED BY:/ DRAWN BY	DATE:	SCALE:	
JSC	22/02/2024	N.T.S.	A3

PROJECT No:__RELEASE No:__VERSION No:	DRAWING No:
ROL01308_R01_V01_	801

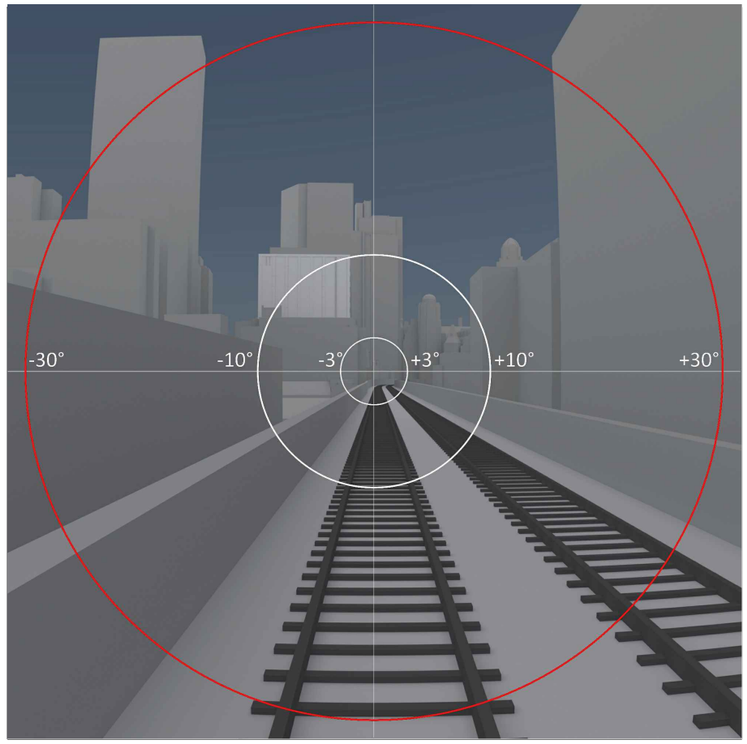
Daylight/Sunlight

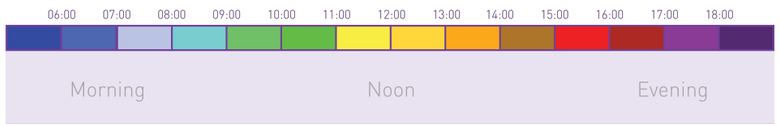
TIME

VIEW 2 - STEREOSCOPIC VISION



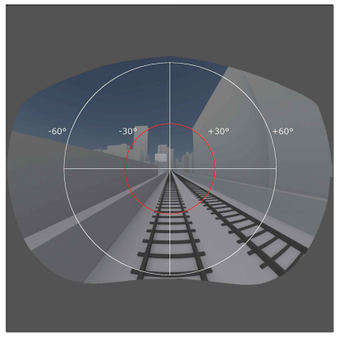
VIEW 2 - CLOSE UP



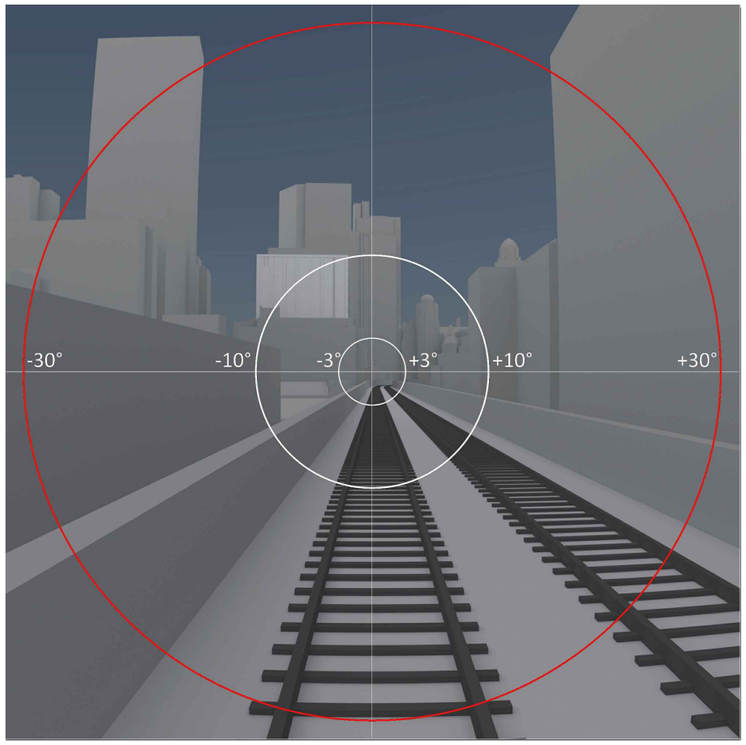


MONTH

VIEW 2 - STEREOSCOPIC VISION



VIEW 2 - CLOSE UP





AnsteyHorne
CHARTERED SURVEYORS
London - 020 3744 2374
Birmingham - 0121 667 9902
Bristol - 0117 471 1574
Manchester - 0161 528 7690
Plymouth - 01752 270 315
Norwich - 01603 577 362
www.ansteyhorne.co.uk

LEGEND:

Solar Glare - Location Point & direction of view

SOURCES OF INFORMATION:

EXISTING, SURROUNDING & ANALYSED BUILDINGS
ACCUCITIES
Received on 19/02/2024

Site and aerial photos.

PROPOSED BUILDINGS
SIMPSONHAUGH ARCHITECTS
Received on 20/02/2024



LOCATION PLAN

REV	DESCRIPTION	DATE

© Copyright Anstey Horne & Co. Ltd
This drawing is the property of Anstey Horne & Co. Ltd. All rights reserved.
This drawing should not be reproduced without permission.
Do not scale from this drawing.

CLIENT: JADEBRICKS (CHARLES ST) LTD

PROJECT TITLE: CHARLES STREET MANCHESTER

SCHEME REF: SCHEME RECEIVED: 20/02/2024

DRAWING TITLE: SOLAR GLARE ASSESSMENT

MODELLED BY:/ DRAWN BY	DATE:	SCALE:	
JSC	22/02/2024	N.T.S.	A3

PROJECT No:__RELEASE No:__VERSION No:	DRAWING No:
ROL01308_R01_V01_	802

Daylight/Sunlight

AnsteyHorne

ansteyhorne.co.uk

Regulated by RICS

Chartered Surveyors

Rights of Light | Party Walls | Building Consultancy | Fire Consultancy

LONDON BIRMINGHAM MANCHESTER BRISTOL PLYMOUTH NORWICH

expertise *applied*

AnsteyHorne

ansteyhorne.co.uk

Regulated by RICS

Chartered Surveyors

Rights of Light | Party Walls | Building Consultancy | Fire Consultancy

LONDON BIRMINGHAM MANCHESTER BRISTOL PLYMOUTH NORWICH

expertise *applied*