



GLINT & GLARE ASSESSMENT

SHARP PROJECT SOLAR

Client: Ameresco

Version 1.0

EXPERTISE | KNOWLEDGE | SUPPORT

Document Version Control

Revision Control Table

Issue	Date	Change	Prepared	Approved
1.0	21/07/21	Report for submission	CPE	DA

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Contents

Document Attachments	4
1. Introduction	5
1.1. Project Details	5
1.2. Project Specification	5
1.3. Glint & Glare	6
1.4. Assessment of Impact	7
2. Results	8
3. Conslusions	10

DOCUMENT ATTACHMENTS

Table 0.1 Document Attachments

Document Title	Description
Appendix 1.1	Glint and Glare Route Assessment Map

1. INTRODUCTION

1.1. PROJECT DETAILS

Cogeo Planning & Environmental Services Ltd have been requested to carry out a glint and glare assessment of the proposed roof-mounted solar array at the The Sharp Project, Thorp Road, Manchester, M40 5BJ. A prior approval has been submitted by Paul Butler Associates under reference 130663/P14J/2021 with Metrolink requesting more information on the potential impact on the neighbouring line. This report provides a short summary on the potential impact on the Metrolink line receptors.

1.2. PROJECT SPECIFICATION

The details of the solar array and Metrolink receptors are within tables 1.1 and 1.2 below. These are the project parameters used within the glint and glare analysis which have then been cross-referenced against the receptor details for the Metrolink lines.

Table 1.1 Solar Array Specifications

Solar Array	Capacity	Number of Panels	Height from Roof	Angle	Building height
Phase 1			1m	8	7m
Phase 2 NE			0.2m	4	15.5m
Phase 2 SW			0.2m	4	15.5m

Table 1.2 Receptor Details

Receptor	Direction of Travel	Details
Route 1	West - East	Monsall – Central Park – Newton Heath & Moston Metrolink route between 05:01 and 23:54. Trams every 12 minutes. Journey time Monsall – Central Park 2 minutes. Central Park to Newton Heath & Moston 3 minutes.
Route 2	East – West	Newton Heath & Moston Metrolink route - Central Park – Monsall route between 06:21 and 01:25. Trams every 12 minutes. Journey time Newton Heath & Moston to Central Park 3 minutes. Central Park - Monsall 2 minutes.

1.3. GLINT & GLARE

Definitions of glint and glare relating to solar panels can vary, but it is generally accepted that they are defined as:

- Glint is a direct reflection of sunlight
- Glare is a less intense, continuous source of brightness

As solar panels are designed to absorb sunlight, rather than reflect it is generally considered to be of low risk within the UK.

The 2010 FAA Guidance included a diagram which illustrates the relative reflectance of solar panels compared to other surfaces. The figure shows the relative reflectance of solar panels compared to other surfaces. Surfaces in this figure produce reflections which are specular and diffuse. A specular reflection (those made by most solar panels) has a reflection characteristic similar to that of a mirror. A diffuse reflection will reflect the incoming light and scatter it in many directions. A table of reflectivity values, sourced from the figure 16 within the FAA guidance, is presented in Table 1.3 below.

Table 1.3 Surface Reflection Values

Surface	Reflection
Snow	80
White Concrete	77
Bare Aluminium	74
Vegetation	50
Bare Soil	30
Wood Shingle	17
Water	5
Solar Panels	5
Black Asphalt	2

Note that the data above does not appear to consider the reflection whether the type is specular or diffuse.

An important comparison in this table is the reflectivity compared to water which will produce a reflection of very similar intensity when compared to that from a solar panel. The study by Riley and Olsen study (2011) also concludes that still water has a very similar reflectivity to solar panels.

1.4. ASSESSMENT OF IMPACT

There is no specific methodology for assessing the effect of glint and glare on a receptor and due to the unpredictability of weather patterns, movement of receptors within the landscape and minor variances in onsite topography and vegetation there is no definitive threshold for acceptance or refusal. As such an accepted approach is to identify areas of potential issue and, where necessary, provide mitigation for the potential impact rather than attempting to provide non-permeable barrier to receptors.

It is generally accepted that glint and glare assessments should be assessed against receptors within 1km of the development.

2. RESULTS

The results demonstrate the potential for the current design to impact upon road users utilising bare-earth analysis only. No vegetation or built environment features are accounted for within the analysis of impact. The values have been derived from a set of static points along the Metrolink line to represent a transient route. The impact on each of the routes is summarised per-month in the table below with the earliest and latest timings of potential effect. The routes selected reflect the area surrounding The Sharp Project solar development where vegetation, built form and orientation were likely to provide the least limitation to potential visibility of the arrays.

Table 2.1 Glint and Glare receptor routes summary of time potential of impact

Receptor	Month	Earliest	Latest	Date Range
Route 1	January	N/A	N/A	N/A
	February	N/A	N/A	N/A
	March	N/A	N/A	N/A
	April	N/A	N/A	N/A
	May	N/A	N/A	N/A
	June	N/A	N/A	N/A
	July	N/A	N/A	N/A
	August	N/A	N/A	N/A
	September	N/A	N/A	N/A
	October	N/A	N/A	N/A
	November	N/A	N/A	N/A
	December	N/A	N/A	N/A
Route 2	January	14:42	15:20	1 st – 31 st
	February	15:34	16:40	1 st – 24 th
	March	None	None	N/A
	April	None	None	N/A
	May	None	None	N/A
	June	None	None	N/A
	July	None	None	N/A
	August	None	None	N/A
	September	None	None	N/A
	October	15:23	16:10	17 th – 31 st
	November	14:36	15:50	1 st – 30 th
	December	14:32	15:09	1 st – 31 st

Figure 2.1 shows the duration of glare per day for Route 2 receptors. There is no impact on the Route 1 receptors based on the study parameters.

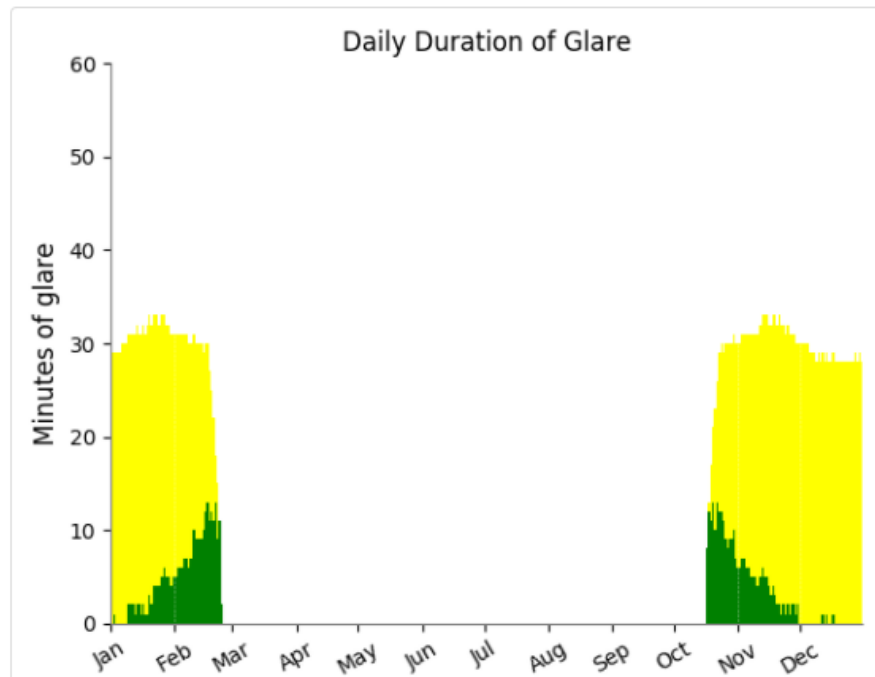


Figure 2.1 Shape Project Route 2 Glare Duration

The overall results from each array is showing in Table 2.2 below. The ocular impact of solar glare is quantified into three categories (Ho, 2011):

- Green - low potential to cause after-image (flash blindness)
- Yellow - potential to cause temporary after-image
- Red - potential to cause retinal burn (permanent eye damage)

These categories assume a typical blink response in the observer. Note that retinal burn is typically not possible for PV glare since PV modules do not focus reflected sunlight¹.

Table 2.2 Glare analysis per solar array

Array	Minutes of Glare per annum		
	Green	Yellow	Red
Phase 1	0	0	0
Phase 2 - NE	544	3,267	0
Phase 2 - SW	0	0	0

¹ ForgeSolar Glint & Glare analysis

3. CONSLUSIONS

The predicted glare times are based on bare-earth terrain and utilising the current maximum solar area design and layout. No screening has been included in the assessment. The assessment summarises the predicted impact considering the level of predicted screening, orientation of receptor and angle of view based on a desk-based review of the available imagery.

Whilst there is the potential for some glare impact on Route 2, the timings and duration of this impact cross-referenced against the likely journey timings give rise to a realistic impact on around 3 journeys per day. Further refining this, the receptor locations are limited to over 75m from the nearest part of the array, giving rise to a wide angle of view and orientation at an oblique angle to that of travel. The route angle which has direct orientation towards the array is covered by points 1 – 5 on Route 2, which does not account for the Sharp Project building, which is likely to partially, if not wholly obscure the view of the array.

It is concluded that whilst there may be a low impact on Route 2 during the winter months, the software assumes all-year-round sunshine. The reality of local climatic conditions combined with the mitigating factors of angle of view, built-area screening and orientation of the receptor is likely to lead to minor-negligible impact on a very limited number of journeys. No mitigation or system redesign is considered to be required as the level of impact is deemed acceptable.

APPENDIX 1.1

GLINT & GLARE ROUTE ASSESSMENTS MAP

Legend

Location - Impact

- △ Route 1 - No
- △ Route 2 - No
- △ Route 2 - Yes
- Solar Array

Map Details

Map shows the point locations for the glint and glare assessment of the potential impact on the Metrolink line from the proposed Sharp Project solar arrays.

0 50 100 m

Scale at A3: 1:2,500

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