



11 November 2024

Adam Vincent
Planning Officer- Consents
Central Otago District Council
1 Dunorling Street
PO Box 122
Alexandra 9340

Dear Adam,

Land use consent application RC240065- Helios Mānīatoto Plain Solar Farm - Clarification in regards to Glint and Glare

Please find attached an advice notice undertaken by ITP Renewables in relation to the Mānīatoto Solar Farm. This advice notice has been prepared following the Central Otago District Council's S95A- F Decision for RC240065 (the "s95 notification"), to provide clarifications and additional explanation of glare hazards within the Glint and Glare assessment to assist with interpretation.

The addendum provides further definition of 'green glare' specifically in relation to Ranfurly Back Road. Based on the glare hazard plot and the FAA guidelines ITP do not consider the green glare received by road users on Ranfurly Back Road to be hazardous. The modelling provided by ITP Renewables demonstrates there is not a risk to the safety of road users as a result of the solar farm.

Kind Regards,

Sarah Brooks
Senior Environmental Planner, Helios Energy

Attachment: ITP Consultants Advice Note, Naseby Solar Farm Glare Study

CONSULTANT'S ADVICE NOTICE

Project	Naseby Solar Farm Glare Study	Project No.	23048
To	Sarah Brooks, Helios Energy	CAN No.	001
From	Nicholas Logan, ITP Renewables	Pages	3
Date	24/06/2024		
Subject	Glare Study Addendum		

Background

ITP Renewables conducted the glint and glare study for Helios Energy's proposed solar farm at 48 Ranfurly-Naseby Road in Central Otago. Helios has committed to limit backtracking to 10° to mitigate potential glare impacts. This advice notice is a response to the Central Otago District Council's S95A-F Decision for RC240065 (the "s95 notification"), including some clarifications and additional explanation of glare hazards. ITP assumes that readers are familiar with our original study.

Response to Council's assessment

Clarifications

Council addresses the potential glare effects of the solar farm on page 3 of the s95 notification.

- Council states that "the ITP assessment indicates that glare would be close to, it not within 50 degrees from the centreline of the field of view of road users." To clarify, the analysis only considers glare within 50° from the centreline, and hence all glare identified by the model is within this zone.
- Council also states that "they calculate that a stretch of Ranfurly Back Road alongside the site would be subject to glare for up to half an hour per day during the winter months." To clarify, this statement is broadly correct, although the intensity of received glare is an important consideration for evaluating the potential impact. The glare in question was categorised as "green" in our hazard assessment, which is generally considered to be not-hazardous and is discussed in more detail below.

Impact of residual green glare on road users

The Solar Glare Hazard Analysis Tool (SGHAT) assesses glare using a colour coded classification system based on the severity of ocular effects on the viewer. The three categories are:

- **Green glare**, which has low potential to cause temporary after-image
- **Yellow glare**, which has potential to cause temporary after-image
- **Red glare**, which can cause retinal burn and is not expected for solar PV as it requires concentration of sunlight.

Temporary after-image is also called temporary flash blindness and is caused by oversaturation of retinal visual pigments (e.g., the effect after viewing a camera flash in a dim room).¹ In the context of assessing glare from solar PV, yellow glare is the worst hazard level that usually occurs and is the primary focus of our mitigation efforts. Green glare has low potential to cause this effect, and hence very low risk of affecting visual tasks such as driving.

The US Federal Aviation Administration (FAA) publishes guidelines for airports assessing solar glare hazards. Many other aviation safety authorities follow this guidance, including in Australia, the UK, and New Zealand. When this guidance was originally published it required the use of SGHAT to evaluate potential glare impacts on airport operations and safety. The FAA assessment required:²

- No potential for glint or glare in the existing or planned air traffic control tower cab
- No potential for glare, or “low potential for after-image” along the final approach path for any existing landing threshold or future landing thresholds.

In other words, “low potential for after-image” (i.e. green glare) was considered an acceptable effect on the final approach flight path for major airports. Hence, we do not consider green glare to be hazardous to road users, and we do not recommend mitigation of green glare for safety reasons.

Green glare on Ranfurly Back Rd

The only residual glare identified in our study was green glare from one section of the array onto Ranfurly Back Rd, which received a cumulative total of 21.1 hours of green glare across the year. The road received up to 30 minutes of green glare in a single day (noting that most days received a shorter duration of glare), as shown in Figure 1. The glare occurred between 10:30 am and 11:45 am, from 21 May to 23 July.

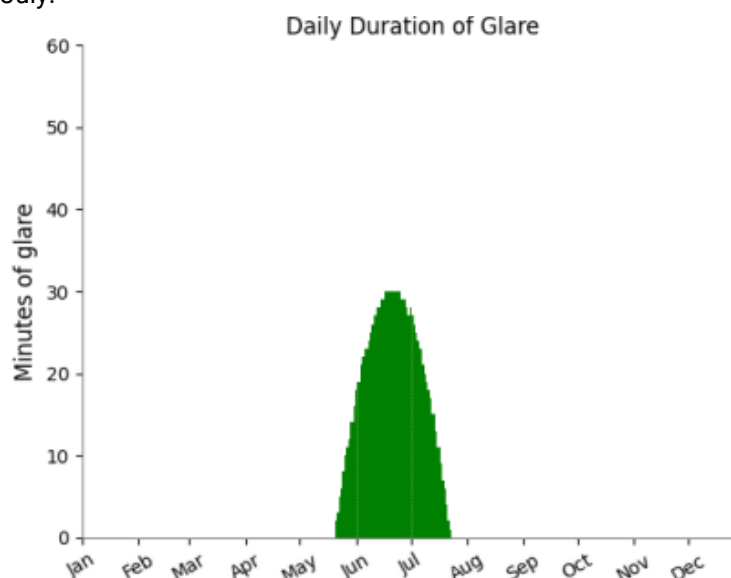


Figure 1: Daily glare duration

¹ Ho C.K., Khalsa S.S. (2010), *Hazard Analysis and Web-Based Tool for Evaluating Glint and Glare from Solar Collector Systems*. In proceedings of *SolarPACES 2010*, Perpignan, France, Sept. 21–24.

² Federal Aviation Administration (FAA), (2013). *Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports*. 78 FR 63276.

The hazard plot for this instance of glare is shown in Figure 2. The transitions between hazard levels are approximate, and glare impacts encompass a continuous spectrum. However, the vast majority of glare occurrences (the "Hazard from Source Data") are well within the green hazard zone. For context, the maximum retinal irradiance caused by this glare is less than one thousandth of viewing the sun directly.

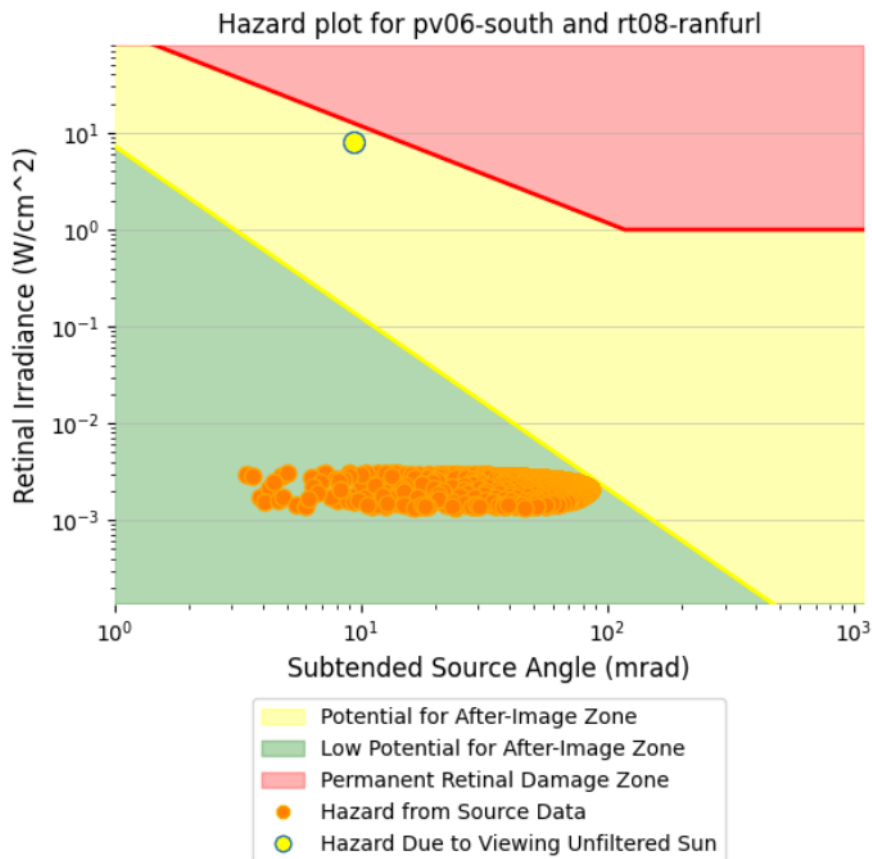


Figure 2: Glare hazard plot for the residual glare with a resting angle of 10°.

Conclusions

Based on the glare hazard plot and the FAA guidelines we do not consider the green glare received by road users on Ranfurly Back Road to be hazardous. Based on the relatively short duration of daily glare occurrences, and the limited traffic volume on Ranfurly Back Road, we consider the cumulative effect of exposure to be small. Due to the low impact of individual exposure and the small cumulative effect, we consider that the green glare will have less than minor effects on road safety.