BEFORE A COMMISSIONER APPOINTED BY THE SELWYN DISTRICT COUNCIL

IN THE MATTER OF	the Resource Management Act 1991
AND	
IN THE MATTER OF	applications by KeaX Limited for resource consent to establish a solar array at 150 Buckleys Road, 115 Buckleys Road and 821 Hanmer Road, Brookside.

STATEMENT OF EVIDENCE OF AARON WILLIAMS

ON BEHALF OF THE APPLICANT

(GLINT AND GLARE)

Dated: 09 February 2023

KeaX Limited
Applicant
Campbell McMath
(campbell@keaenergy.nz)

Applicant
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1 INTRODUCTION

1.1 My full name is Aaron Musgrave Williams. I am employed as a Technical Analyst with Pager Power.

1.2 I have a 1st Class Bachelor's Degree in Mathematics from University College London.

1.3 I have gained two and a half years of experience as a Technical Analyst at Pager Power. In total, I have undertaken 88 glint and glare assessments in multiple countries, including New Zealand, the UK, Ireland, India, South Africa, the USA, Saudi Arabia, and Trinidad and Tobago.

1.4 My experience includes undertaking glint and glare assessments for solar developments in the context of safety and amenity. These assessments have included the potential for glint and glare effects on road safety, residential amenity, aviation safety, and railway operations and infrastructure. I have participated in field surveys pertaining to glint and glare effects and television, radio, and mobile phone quality. I have undertaken aviation impact assessments for wind farms and building developments in the UK and internationally. This includes the impacts on primary and secondary surveillance radar. I have assessed impacts upon meteorological radar internationally. I have evaluated proposed developments against operational and training safety constraints in consultation with a UK aviation safeguarding team.

1.5 Pager Power has undertaken over 950 glint and glare assessments in the UK, Europe, and internationally. The company's own glint and glare guidance[1] is based on industry experience and extensive consultation with industry stakeholders including airports and aviation regulators.

1.6 Pager Power is a dedicated consultancy company based in the UK. The company has undertaken projects in 55 countries within Europe, Africa, America, Asia and Australasia.

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[1] Pager Power Glint and Glare Guidance, Fourth Edition, September 2022. Originally published in 2017.

1.7 Pager Power has developed its own bespoke glint and glare software. This software was developed in 2015 and has been used in most of the assessments completed by Pager Power.

1.8 Subsequently, in early 2017 Pager Power produced its own glint and glare guidance document. The guidance document was written to fill the knowledge gap within this area and to provide a standardised methodology for assessing glint and glare. The guidance is based on industry experience and extensive consultation with industry stakeholders, including airports, aviation regulators, highways agencies, railway operators, and feedback from planners. The document provides a literature review of existing UK planning guidance and presents a methodology for assessing glint and glare with respect to road safety, residential amenity, aviation safety, and railway operations and infrastructure. The fourth edition of the guidance document was published in September 2022 and has been used as a point of reference by many stakeholders and assessors.

1.9 There is no known existing planning guidance within New Zealand for the quantification of impacts associated with solar reflections from solar panels towards roads, dwellings, or aviation activity.

1.10 I was engaged by KeaX Limited in July 2022 to undertake a glint and glare assessment of a proposed solar array on Buckleys Road, Brookside. Specifically, my assessment has involved:

(a) Preparation of the Glint and Glare Assessment dated the 9th of August 2022.

1.11 In preparing this evidence, I have reviewed the following:

(a) The resource consent applications for the Proposal (including the AEE);

(b) The evidence of Campbell McMath (applicant);

(c) Glint and Glare issues on page 4 of Casey&Casey&Kewish&Williams submissions.

(d) The Section 42A report for Selwyn District Council;

(e) Selwyn District Council -Brookside Solar Farm Glare Report Review - Version 2 -Latest;

(f) Consent conditions.

1.12 I acknowledge that I have read and agree to comply with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2014. I confirm that the issues addressed in this statement of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

2 EXECUTIVE SUMMARY

2.1 The proposed solar development is to be located approximately 10km north of Leeston, Canterbury, New Zealand.

2.2 A landscape strategy plan has been proposed by the developer specifically with the purpose of ameliorating potential visual impacts, including glint and glare effects. Proposed planting surrounding the site will be maintained at 4m above ground level. The proposed landscape strategy includes a combination of newly proposed planting, gap filling, and existing planting to be retained.

2.3 The Applicant has confirmed that planting along Buckleys and Branch Drain Road will be 2m in height before the solar panels are established (the details of this are set out in the Landscape and Visual evidence of Ms Anthony).

2.4 The Applicant has confirmed that some existing vegetation within the site will be removed to allow for the placement of solar panels and to the south of the site (to allow for new plantings) will be removed. This existing vegetation to be removed is not of significance to the glint and glare assessment.

2.5 Methodology

2.6 The glint and glare assessment methodology has been informed by information provided to Pager Power through consultation with stakeholders and by reviewing the available guidance and studies.

2.7 The methodology for this glint and glare assessment is as follows:

- Identify receptors in the area surrounding the solar development.
- Consider direct solar reflections from the proposed development towards the identified receptors by undertaking geometric calculations.
- Consider the visibility of the panels from the receptor's location. If the panels are not visible from the receptor, then no reflection can occur.
- Based on the results of the geometric calculations, determine whether a reflection can occur and, if so, at what time it will occur.
- Consider both the solar reflection from the proposed development and the location of the direct sunlight with respect to the receptor's position.
- Consider the solar reflection with respect to the published studies and guidance.
- Determine whether a significant detrimental effect is expected in line with the process presented in Appendix D of the Glint and Glare Report.

2.8 Within the technical model, the proposed development area is defined, as well as the relevant receptor locations. The result is a chart that states whether a reflection can occur, the duration and the panels that can produce the solar reflection towards the receptor.

2.9 Further details of the Glint and Glare methodology are contained within the Glint and Glare Report.

2.10 Following an initial review of available imagery, it was determined that the assessment needed to consider the potential for glint and glare effects upon road users and dwellings within the assessment area and a high-level aviation assessment for Christchurch Airport.

2.11 **Overall Conclusions**

2.12 Following a review of the most recent landscape plans, which include some areas of 2m planting (to meet the terms of the condition

proposed by the s42a Reporting Officer) before panels are installed on site, no significant effects of glint and glare upon residential amenity, road safety, or aviation activity associated with Christchurch Airport are predicted.

3 SCOPE OF EVIDENCE

3.1 My evidence addresses:

(a) The proposed solar development and the possible impact of glint and glare upon surrounding road safety, residential amenity, and aviation activity at Christchurch Airport;

(b) The receiving environment with respect to glint and glare effects;

(c) The assessment undertaken of the potential glint and glare impacts of the proposal;

(d) The proposed landscape mitigation;

(e) Matters raised by submitters;

(f) The s42A ECan Officer's Report in relation to Glint and Glare; and

(g) The proposed conditions of consent.

4 THE RECEIVING ENVIRONMENT

4.1 The assessed 1km area surrounding the proposed development is rural, with dwellings and local roads.

4.2 Christchurch Airport is a licensed aerodrome located approximately 30.8km northeast of the proposed development.

4.3 The main source of irradiance is the Sun, which is deemed to be a more significant source of irradiance than solar reflections. Road users are already made aware of safety when driving when the Sun is out on a clear day. Dwellings will experience the most significant source of irradiance at sunset and sunrise.

5 POTENTIAL GLINT AND GLARE EFFECTS OF THE PROPOSAL

5.1 Following a review of the most recent landscape plans, which propose 2m plantings (to meet the terms of the condition), no significant effects upon residential amenity, road safety, or aviation activity associated with Christchurch Airport are predicted.

6 PROPOSED MITIGATION

6.1 The developer has proposed further mitigation in the form of 2m plantings to be installed to the north and northwest of the site. No further mitigation is recommended.

7 SUBMISSIONS

7.1 A total of 6 submissions have been received in relation to the application. All oppose the application and all wish to be heard.

7.2 One joint submission by Casey&Casey&Kewish&Williams raised Glint and Glare queries. The submission contended the conclusions of the Glint and Glare Assessment and methodology.

Effects on roads

7.3 The submitters expressed concern that the glint and glare report categorised the surrounding roads as local roads and that the effects upon road users on these roads would not be significant.

7.4 I advise that solar reflections have the potential to affect road safety if not considered appropriately. In the case of the proposed solar development the scope of work included the consideration of effects on road users. This determination is based on distance, past project experience, and the sensitivity of potential receptors.

7.5 The first stage of a glint and glare assessment is typically the identification of receptors to be included within the defined assessment area. Within the defined assessment area an initial review of the available imagery is undertaken to determine the specific roads to be included within the assessment. For example, road receptors may not be taken forward for technical modelling on the basis of the initial review of the identified screening e.g. existing/proposed vegetation, buildings, and/or terrain. Furthermore, for road receptors the purpose of the initial review is to identify those roads with categorisations that should be taken forward for technical modelling. Local roads have low traffic densities and are not taken forward for technical modelling because the risk to road safety is considered to be low in the worst case. This is a determination that has been made following consultation with various stakeholders internationally and experience

in over a significant number of glint and glare assessments including in New Zealand.

7.6 Similarly, industry experience over a significant number of glint and glare assessments undertaken, shows that a 1km assessment area from the proposed development is considered appropriate for glint and glare effects on road users and dwellings. As a result, solar reflections upon road users and dwellings outside of the 1km assessment area is considered to not be significant in the worst case.

7.7 Internationally Pager Power refers to road categories as Major national, national, regional, and local. Major national, national, and regional roads are typically taken forward for technical modelling. Local roads, typically being roads and lanes with the lowest traffic densities, often narrow in width, with no or few road markings and varying speed limits. Local roads are not typically taken forward for technical modelling.

7.8 Following the review of the available imagery it was determined that the roads within the 1km assessment area of the Proposal are local roads.

7.9 The determination made by Pager Power is that any solar reflections from the proposed development experienced by a road user along a local road would be considered low impact in the worst case due to the lower traffic densities i.e. the potential effect on safety and/or operation of the roads is low. This is in accordance with the guidance presented in Appendix D of the glint and glare assessment. This determination is based on past project experience.

7.10 Overall, the determinations made for the proposed development are in line with the associated guidance, typical for a glint and glare assessment, and in line with industry best practice.

7.11 Furthermore, the developer has confirmed that landscaping along Buckley Road and in proximity to Branch Drain Road will be 2m in height before the solar panels are installed. This further reduces the risk upon road safety.

7.12 No significant impacts are predicted upon road safety.

Interim effects

7.13 The proposed development is surrounded by existing vegetation such that for most dwellings, views of the areas in which the reflecting panels would be situated will not be possible based on the baseline conditions.

7.14 Where views may be possible, the landscape strategy sufficiently mitigates the potential effects of the glint and glare from the proposed development.

7.15 Whilst short-term or temporary effects can be considered, this is typically relevant to effects upon safety rather than amenity. In particular, the effects upon aviation activity or significant road infrastructure (in particular, a highway where each direction of travel is on a separate carriageway). The proposals indicate that the proposed screening will take 4/5 years to reach the 4m height and the plants will be maintained at that height. Whilst there is no fixed timeframe in which temporary effects upon amenity are acceptable upon dwellings, this timeframe is typical for solar development.

7.16 However, I understand that the Applicant has agreed that all planting along Buckleys Road and in proximity to Branch Drain Road will be 2m in height at the time the solar panels are installed.

7.17 There will be minimal, if any, temporary effects resulting from glint and glare upon dwellings.

Methodology

7.18 For dwelling receptors, the key considerations are:

- Whether a reflection is predicted to be experienced in practice.
- The duration of the predicted effects, relative to thresholds of:
    - 3 months per year.
    - 60 minutes per day.

7.19 The reason why the duration of effects is a key determination is because effects upon amenity are most significantly determined by how long the effects occur throughout a year.

7.20 Overall, the determinations made for the proposed development are in line with the associated guidance, typical for a glint and glare assessment, and in line with industry best practice, and for this Proposal, in my opinion, effects will not occur for longer than the periods set out above.

8 SECTION 42A OFFICER'S REPORT

8.1 Mr Jesse Aimer prepared the section 42a report for Selwyn District Council (SDC) in relation to KeaX Limited's land use consent application.

8.2 He raises concerns in his report that there is a risk that the health and safety of road users on Dunsandel and Brookside Road and Buckleys Road will be adversely affected by the establishment of stages 1 and 2 of the solar prior to the proposed vegetation reaching 2 metres in height. He bases this on the peer review by Mr Van der Velden who does not agree with the Power Pager conclusion that the traffic movements of the roads means that no mitigation is required and considers that a glare analysis is required regardless of the traffic density of the road. Mr Aimer recommends a condition of consent requiring that no construction of the solar panels begin until the planting on the northern boundary reaches 2 metres in height, and that this be planted in accordance with a landscape plan approved by SDC prior to construction beginning.

8.3 I understand that the Applicant is proposing to ensure that all planting along Buckleys Road and Branch Drain Road will be 2m in height at the time the solar panels are established. This further reduces the risk upon road safety.

8.4 No significant impacts upon road safety are predicted.

8.5 Mr Aimer at Paragraphs 97 and 98 of his report addresses potential glint and glare effects on adjoining dwelling and concludes that with regard to effects on:

- The dwellings to the north of the proposal, no further mitigation is required subject due to the imposition of conditions regarding the planting along Buckley's Road.

- The dwellings in the vicinity of Branch Drain Road and Hanmer Road will be primarily affected by glare from Stage 3 of the development. He considers that the combination of existing vegetation between those dwellings and the subject site, the proposed landscaping (which will be established by Stage 3 of the development) and duration of the glare means that the effects of the glare will be satisfactorily addressed on those properties through the staging and planting proposed.

8.6 I agree with respect to effects upon residential amenity in that no further mitigation is required.

9 CONSENT CONDITIONS

9.1 I have reviewed the draft proposed consent conditions to be attached to the planning evidence of Ms Claire Kelly and confirm that they exceed my recommendations.

10 CONCLUSION

10.1 My key conclusions are as follows:

10.1.1 I understand that the Applicant has confirmed that planting along Buckleys and Branch Drain Road will be 2m in height before the solar panels are established (the details of this are set out in the Landscape and Visual evidence of Ms Anthony). This further reduces the risk upon road safety. No significant effects resulting from glint and glare on the surrounding road network is predicted.

10.1.2 I agree with the s42a report with respect to effects upon residential amenity in that no further mitigation is required.

10.1.3 Overall, no significant impacts are predicted upon road users, dwellings, or aviation activity upon Christchurch Airport.

Aaron Williams

February 2023