VISUAL IMPACT ASSESSMENT

10MW PHOTOVOLTAIC ELECTRICITY GENERATION FACILITY
ON THE FARM ROOIPAD 15/9
AUGRABIES
NORTHERN CAPE PROVINCE

SUPPLEMENTARY INFORMATION: THE POTENTIAL FOR REFLECTIVE FLASHES FROM THE PV INSTALLATION IN THE AUGRABIES FALLS NATIONAL PARK

Prepared for

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1 INTRODUCTION

The author was approached by Rosenthal Environmental Consultants on behalf of Mulilo Renewable Energy Pty Ltd to supplement the visual impact assessment dated March 2012 with further comments on the potential visual impacts resulting from sunlight reflected from the arrays into the Augrabies Falls National Park.

2 STATEMENT OF INDEPENDENCE

I hereby declare that I have no conflicts of interest related to the work of this report. Specifically, I declare that I have no personal financial interests in the property and/or development being assessed in this report, and that I have no personal or financial connections to the relevant property owners, developers, planners, financiers or consultants of the development other than the fees obtained for compiling this report.

I declare that the opinions expressed in this report are my own and a true reflection of my professional expertise.

3 COPYRIGHT

4 ASSUMPTIONS AND LIMITATIONS

This supplementary report is restricted to comments on the potential visual influence of reflected sunlight from the PV facility into the park and the potential visual impact on users of the park as a result of this.

Only Site 1 is assessed. Site 2 was excluded from further consideration as a result of the findings of the visual impact assessment and other specialist reports.

The visual analysis was made using the 3D computer model that was generated for the full visual impact assessment and no site visit was undertaken.

The accuracy of the visual analysis is dependent on the accuracy of the contour information obtained from the Directorate National Geospatial Information.

5 METHODOLOGY

It is beyond the scope of the visual specialist to state where and when specific occasions of reflection of sunlight from the solar panels will potentially occur in the park. This would require the calculation for as many points in the park as are considered appropriate for each minute of sunlight over the entire year.

An alternative approach has been taken in this document in which the general principles governing reflection of sunlight have been documented and then extrapolated to park. This has resulted in most of the park being excluded from this particular visual impact.

Potential problem areas have then been defined and comments made on the potential visual impacts to these areas.

6 FINDINGS

The general principles of determining where reflections can take place are shown in Diagram 1 below:

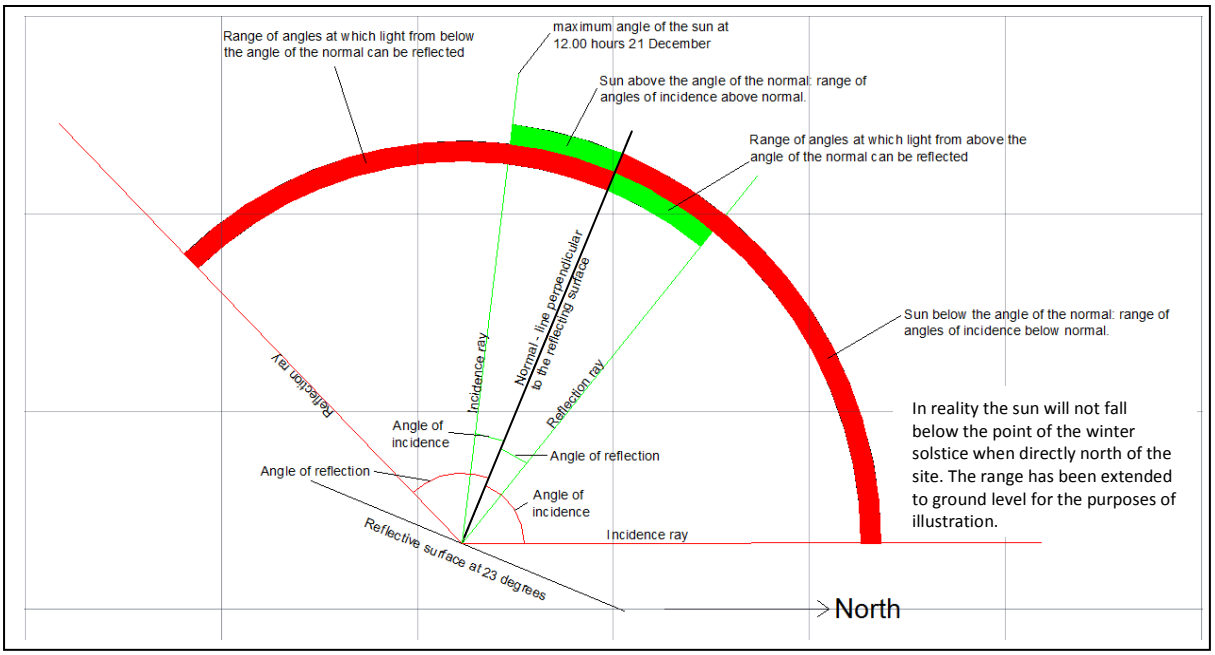

Diagram 1

The angle of reflection is calculated using the 'normal' which is an imaginary line perpendicular to the reflecting surface. The angle between the incoming light or incidence ray and the normal, (known as the angle of incidence,) is always equal to the angle between the normal and the reflection ray, (known as angle of reflection,) but on the opposite side of the normal.

In the diagram above the range of angles possible for the sun above the angle of the normal, (green section in the outer band,) gives us the range of angles of reflections shown in the green section in the inner band.

Likewise the range of angles of incidence below the normal, (shown red in the outer band,) gives rise to the range of angles of reflection shown in red in the inner band.

As the sun will always be north of the reflecting panels as a consequence of their being in the southern hemisphere, (the entire potential range is shown in the entire outer band,) the potential angles of reflection shown in the inner band will not be visible from any viewpoints in the surrounding terrain as all rays will be reflected skyward.

The above diagram and text refers only to views directly to the north of the reflecting surface.

When extended into the 3rd dimension to include movement of the sun from east to west the situation changes somewhat. The range of reflection angles gradually rotates clockwise when moving eastwards or westwards, thus bringing the area of reflection closer to the level of the ground and the potential viewer.

In a relatively flat terrain, such as the one surrounding the park, visible reflections will only be possible when the sun is very close to the horizon at either sunrise or sunset and will be towards the

north-west at sunrise, and to the north-east at sunset. Reflections at any other time of day will be above the plane of the landscape in proportion to the height of the sun above the landscape.

As the areas of the park, including the park structures and camping sites, to the north-east of Site 1 do not fall within the viewshed, (See figure 7 in the VIA) no reflective flashes will be visible from this area.

Limited reflective flashes could, however, be possible just after sunrise along the stretch of road from the Orange River to the Blouputs substation. This road lies outside the park but flashes may also be experienced in a very limited area on either side of the road within the park boundaries and along a short section of the park road that connects the park on either side of the road via an underpass. (A subset of the red tinted areas adjacent to the road in Figure 7 in the VIA)

For all other areas of the park reflective flashes are excluded as a result of the sun being significantly above the horizon resulting in the reflection being at a complimentary angle above the landscape.

It is concluded therefore that, with the exception of the small area around the road from the Blouputs substation to the river, reflective flashes will not affect visitors to the park at any time during the year. This specifically includes all of the existing view sites and the roads within the visitor areas that are generally accessed.