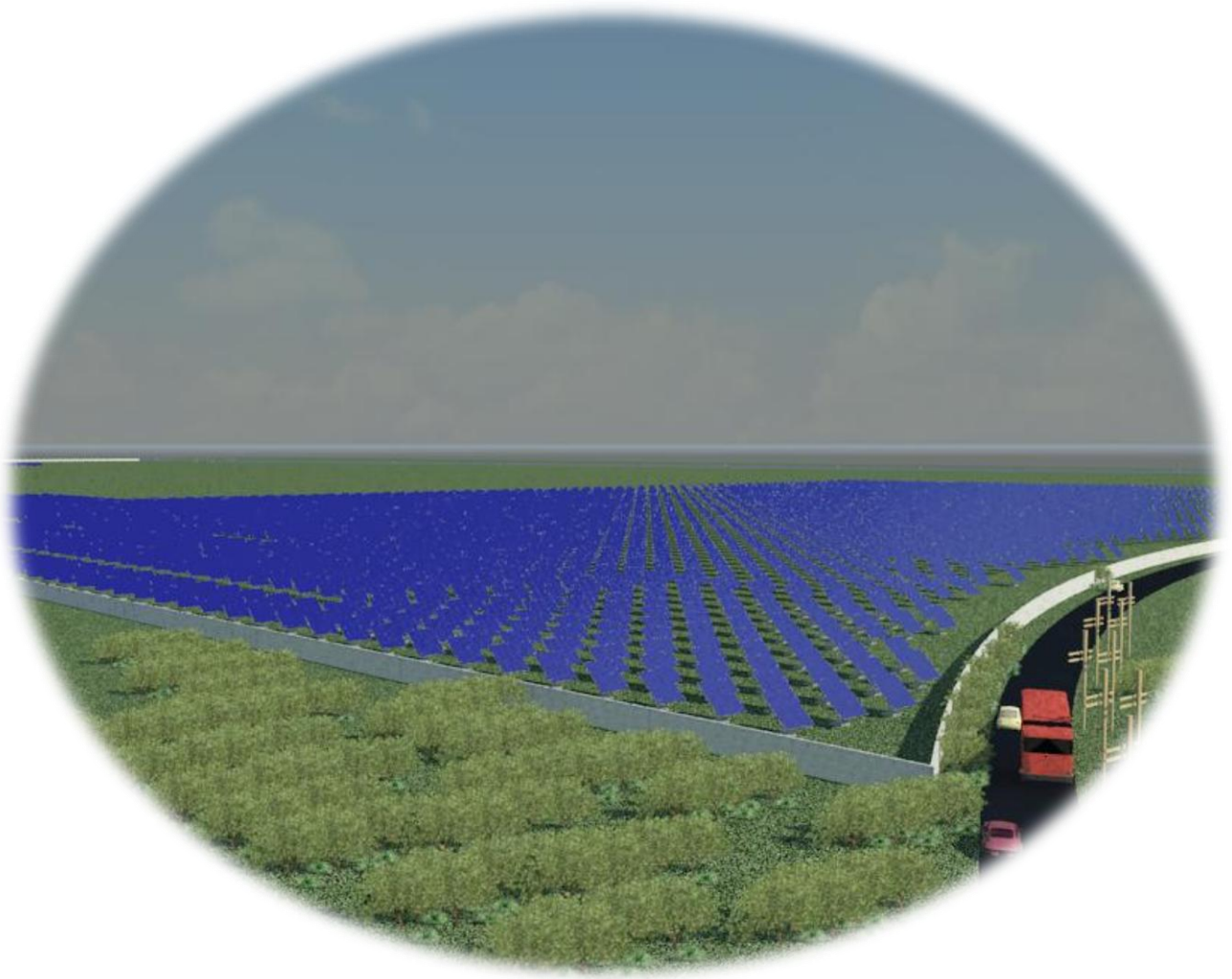


VISUAL IMPACT ASSESSMENT

FOR

**The proposed 50MW Solar Power Farm to be established on portion 15
of the farm Schietfontein 437 JQ, North West Province**



OCTOBER 2011

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1. Introduction

Phaki Phakanani Environmental Consultants (PPEnviro) appointed Mr. Carlo Bakker of World Mobile Plants, a Visual Impact Assessment service provider to undertake a Viewshed Assessment for the proposed 50MW Solar Power Farm to be established on portion 15 of the farm Schietfontein 437 JQ, North West Province.

2. Scope of Work

The scope of the work for the Viewshed Assessment for the proposed development consists of the following elements:

- A viewshed analysis will be conducted to determine the visibility of the proposed development along the R566 road to Brits and from surrounding view points.
- Existing developments and operations, infrastructure and railway facilities in the area will be taken into account in the above-mentioned analyses.
- The above-mentioned analyses will be represented spatially on a series of maps.
- A series of 3D visualizations of the development will be generated for each of the identified viewpoints. The purpose of this is to provide a realistic representation of the impact the proposed development will have on the surrounding landscape.
- A report will be compiled summarizing the findings of the above analyses (this report).

2.1 Methodology

The methodology followed in conducting the scope of work is as follows:

- ✓ Source elevation/relief data and associated spatial information for the study area.
- ✓ Build a Digital Elevation Model.
- ✓ Select and capture observation points.
- ✓ Conduct analysis, including viewshed, and hill-shade analysis.
- ✓ Produce dimensional representations of the likely views from selected viewpoints (viewpoints from which the proposed development on portion 15 of farm Schietfontein, De Wildt, North West has shown to be visible).
- ✓ Interpret the results of the analysis.
- ✓ Map production.
- ✓ Compilation of report.

2.2 Assumptions and Limitations

The assessment presented is purely quantitative in nature and partially address qualitative criteria such as aesthetic value or sense of place. The analysis focused on the visibility of the proposed development from the surrounding area.

The assessment represents the results of a desktop assessment based on industry standard computer aided digital elevation modeling techniques and analysis.

3. Proposed Development

3.1 Locality

The development site is situated to the south of the town of De Wildt and De Wildt train station, south of the R566 to Brits and west of the M21 road to Ga-Rankuwa (Figure 1). Surrounding land uses include residential, businesses, railway and roads (Figure 1).

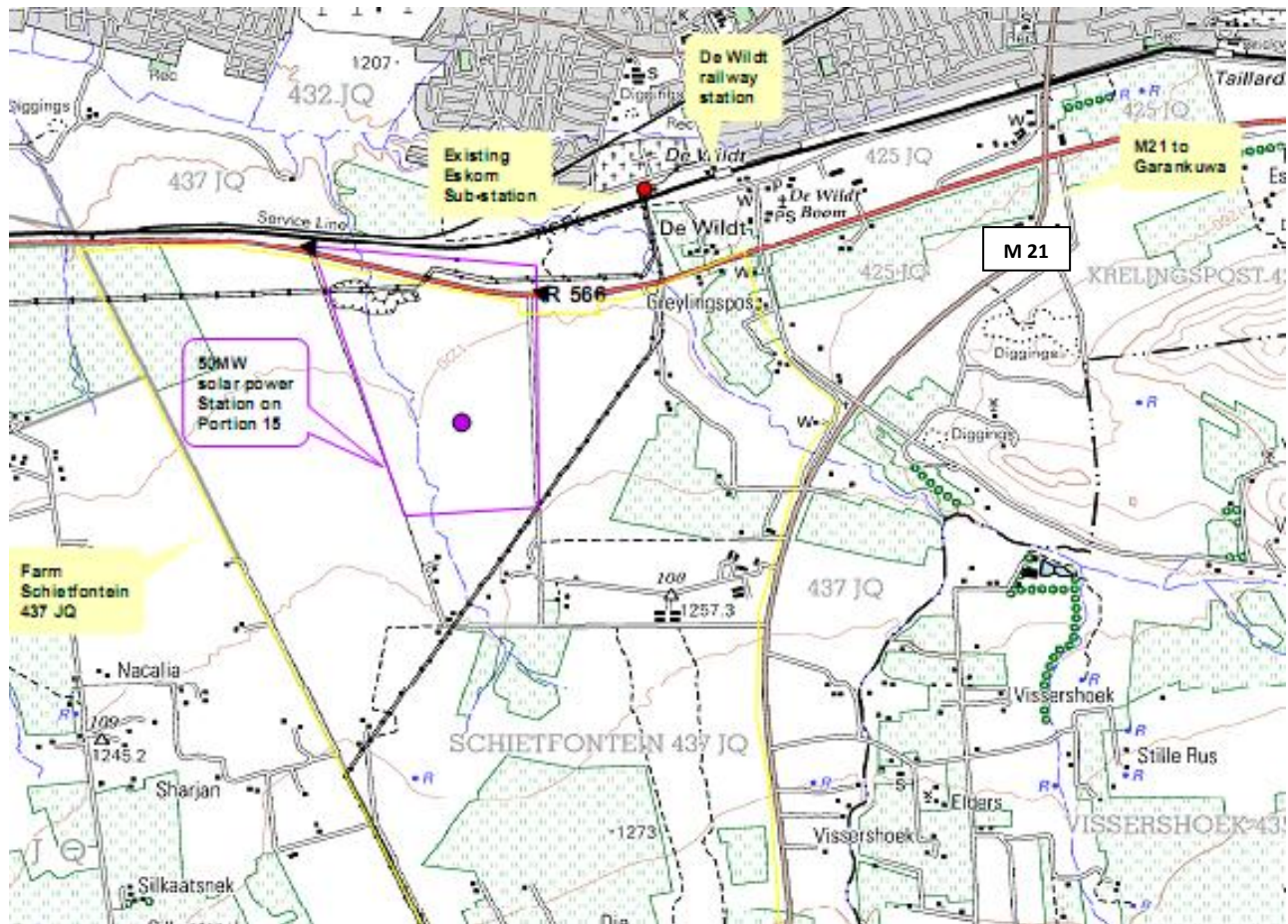


Figure 1: An extract from a 1:50 000 topographical map showing the location of the property (indicated in blue).



Figure 2: An aerial photograph showing the location of the property (indicated in orange) with the area proposed for the solar farm.

3.2 The Concept

A preliminary development plan of the proposed solar farm development on portion of the Farm Schietfontein 437 JQ, De Wildt, North West Province is shown in Figure 3. The solar panel height is described as being 3 meters at its highest point (Figure 4)

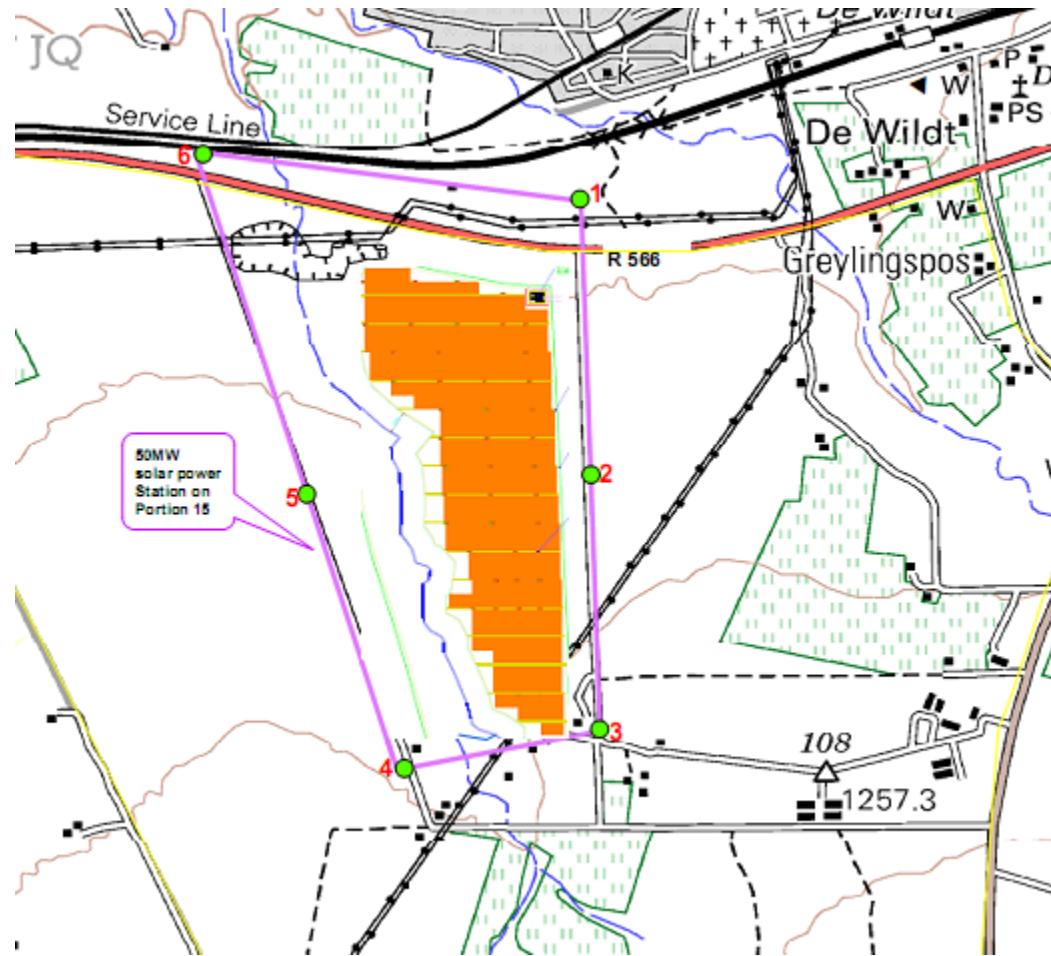


Figure 3: The preliminary development plan of the proposed solar farm development on the Farm Schietfontein 427 JQ, De Wildt, North West.



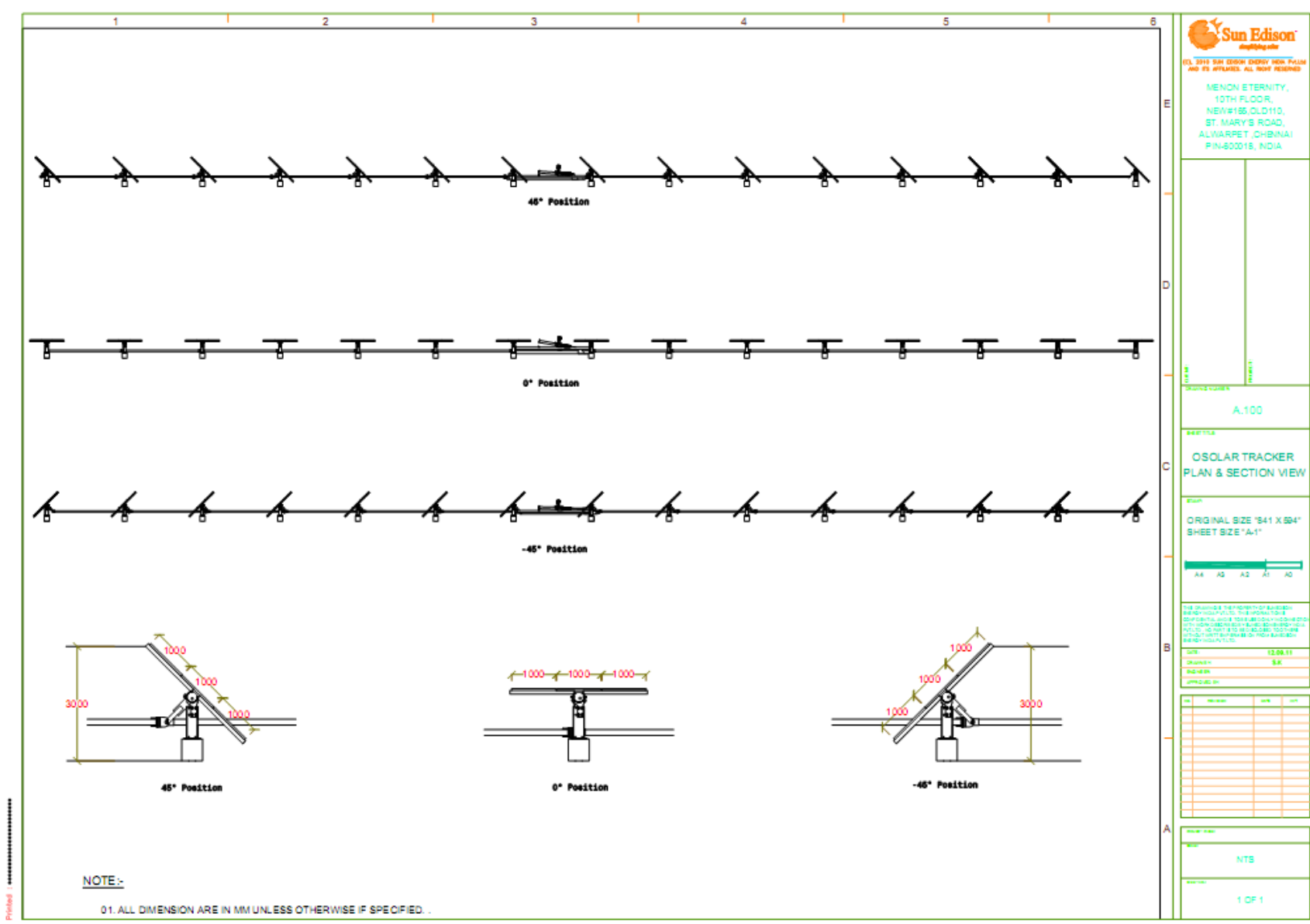


Figure 4: Details and specifications of the solar panels that will be placed



Figure 5: The view from the eastern side of the proposed development area.



Figure 6: The view from the west of the proposed development site.



Figure 7: The view from the north of the proposed development site



Figure 8: The view from the south of the proposed development site

4. Assessment

4.1 Assessment Parameters

Observation points number: 9 points

Observation point height value (OFFSETA):

- ✓ 1.6 m (average height of an observer) at ground level,
- ✓ 1.2 m (road users)



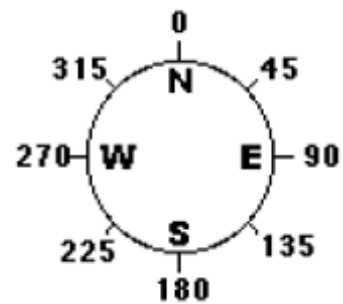
Horizontal angle start (AZIMUTH1): 0°

Horizontal angle end (AZIMUTH2): 360°

Vertical angle – top (VERT1): 90°

Vertical angle – bottom (VERT2): -90°

DEM input: 20 m contours.



4.2 View Points

A viewpoint is defined as a selected point in the landscape from which views of a particular project or other feature(s) can be obtained.

Viewpoints considered in this viewshed assessment (Figure 9 below) included the following:

- Northern areas, railway line, from the R566 secondary road to Brits (Viewpoints 1)
- Western areas, from the neighbouring farm and Extrata Alloys Mine (Viewpoint 2)
- Southern areas, from neighbouring farm and National road N4 (Viewpoint 3)
- Eastern areas, from neighboring farm (Viewpoint 4)
- Helicopter/ Birds Eye-View, all mountainous from south and northern sites (Viewpoint 5)
- Surrounding roads:
R566 to Brits, N4, M21 to Garankuwa



Figure 9: Aerial photograph showing the selected viewpoints

4.3 Visibility Analysis

The visibility of the proposed development on portion 15 of Farm Schietfontein 437 JQ, De Wildt and train station area, surrounding farms and roads was assessed from each of the viewpoints listed above. A viewshed map was produced for each viewpoint and is discussed in more detail below.

Three dimensional representations of the current view, the view with the proposed solar farm development with and without mitigation measures (2.1m high hedge) were generated. These representations were generated to scale and provide a simulation of the views that would be visible from the various viewpoints. The existing surrounding roads and infrastructure around the development area as well as on surrounding farms were also incorporated into the 3D models of the area.

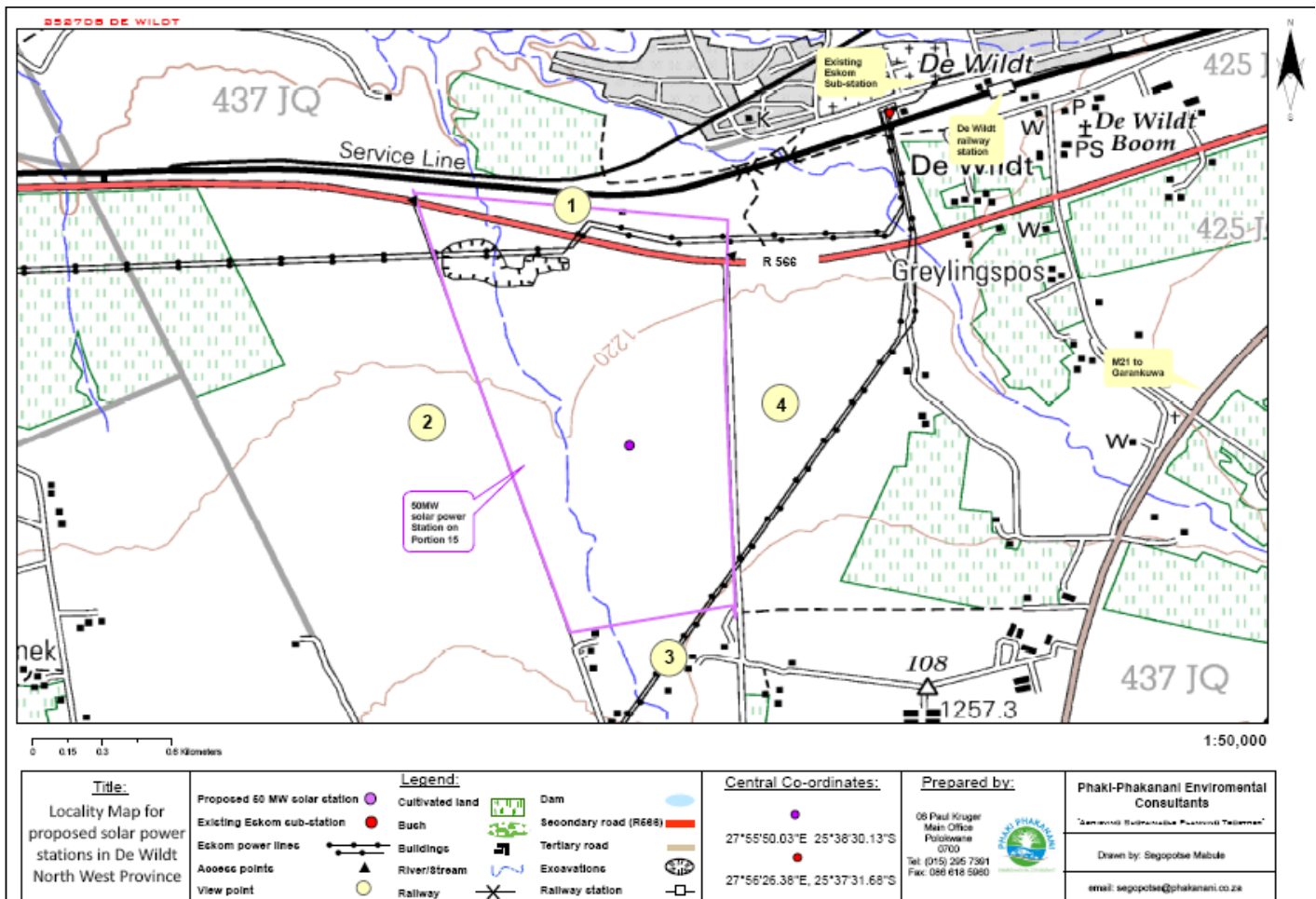


Figure 10: Map of the De Wildt area indicating the various Viewpoints used in the viewshed analyses.

Viewpoints 1 - (De Wildt – Northern Areas)

- The whole of the solar farm development will be visible from the viewpoints in the northern parts of the town of De Wildt (Figure 11).
- The solar farm development takes up a considerable portion of the view when viewed from the northern section from R566 road and Dewildt Train Station and railway line (Figure 12).
- Mitigation measures (the 2.1 m high hedging) softens the fence line surrounding the boundary of the development, however the proposed development still remains prominent (Figure 14).



Figure 11: Viewpoint 1 (Northern Areas, R566 road) – existing view



Figure 12: Viewpoint 1 (Northern Areas, R566 road) – existing Google view



Figure 13: Viewshed of Viewpoint 1 (Northern Areas) view of proposed solar farm development along the R566 road without mitigation measures in place

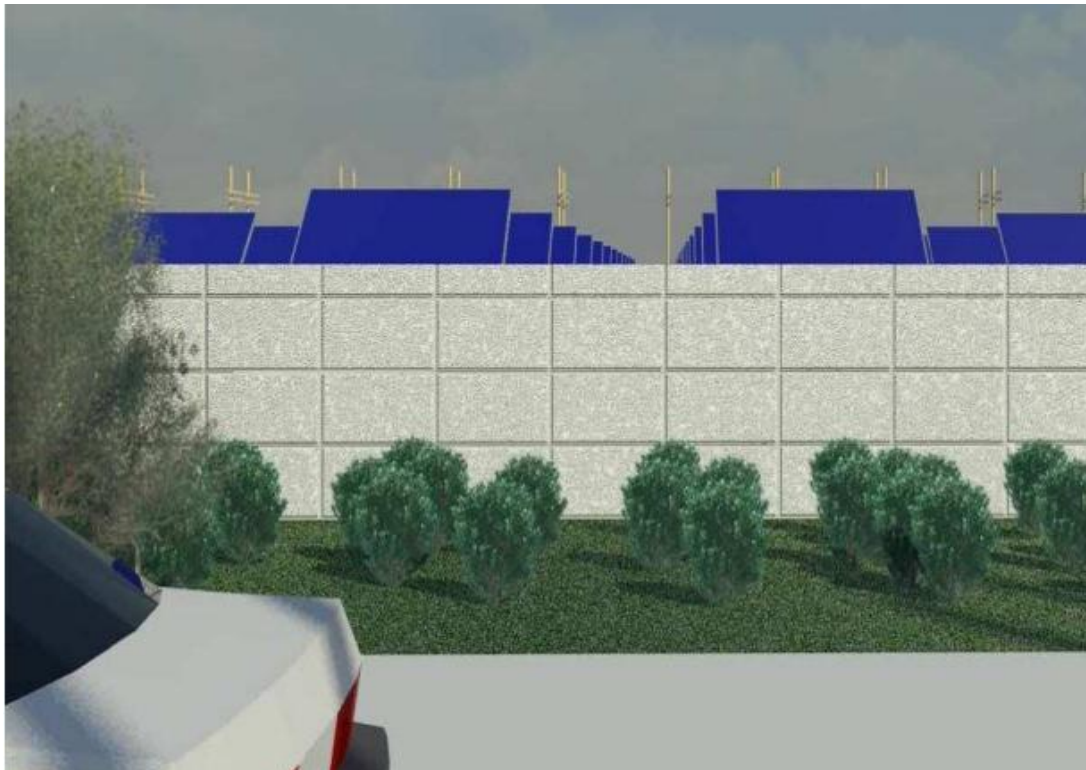


Figure 14: Viewpoint 1 (Northern Areas) – view of proposed solar farm development along the R566 road with mitigation measures in place.

Viewpoint 2 - (DeWildt –Western areas)

- The whole of the solar farm development will be visible from the viewpoints in the western parts of neighbouring farms. Considering the distance of the solar panels from the boundary of the farm (development area the impact from this section should be minimal. (Figure 15).
- The solar farm development takes up a considerable portion of the view when viewed from the western section from neighbouring farms (Figure 16).
- Mitigation measures (the 2.1 m high hedging) softens the fence line surrounding the boundary of the development. (Figure 17).



Figure 15: Viewpoint 2 (Western Areas) – existing view.

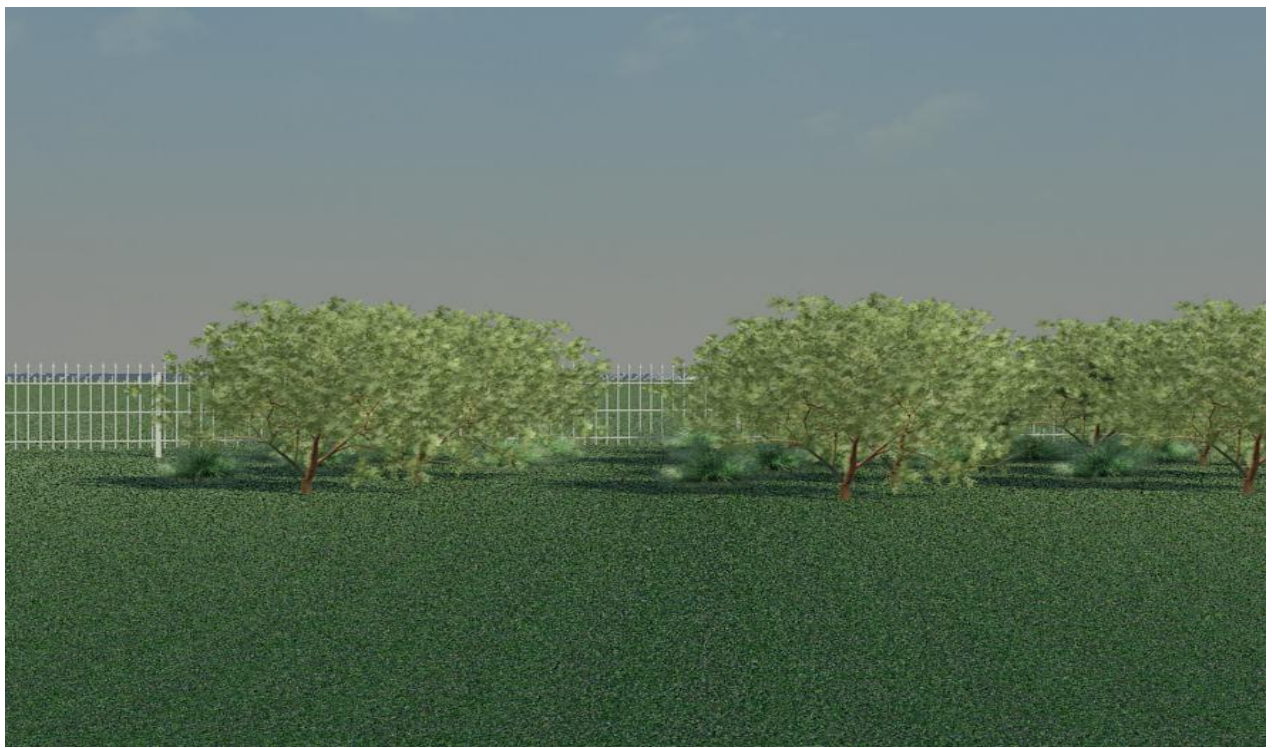


Figure 16: Viewpoint 2 (Western Areas) – view of proposed solar farm development without mitigation measures in place.



Figure 17: Viewpoint 2 (Western Areas) – view of proposed solar farm development with mitigation measures in place.

Viewpoints 3 - (De Wildt – Southern Areas)

- Due to the design layout of the solar power farm, part of the proposed solar farm development will be visible from Viewpoint 3, the southern areas (Figure 18).
- The solar farm development takes up a considerable portion of the view when viewed from the southern areas (Figure 19).
- Mitigation measures (the 2.1 m high hedging) softens the fence line surrounding the boundary of the development. (Figure 20).



Figure 18: Viewpoint 3 (Southern areas) – existing view.



Figure 19: Viewpoint 3 (Southern areas) – view of proposed solar farm development without mitigation measures.



Figure 20: Viewpoint 3 (Southern areas) – view of proposed solar farm development with mitigation measures.

Viewpoints 4 - (De Wildt – Eastern Areas)

- The solar farm development takes up a considerable portion of the view when viewed from Viewpoint 4 (Figure 21).
- Mitigation measures (the 2.1 m high hedging) softens the fence line surrounding the boundary of the development, however the proposed development still remains prominent (Figure 22).



Figure 21: Viewshed of Viewpoint 4 (From eastern section of the farm).

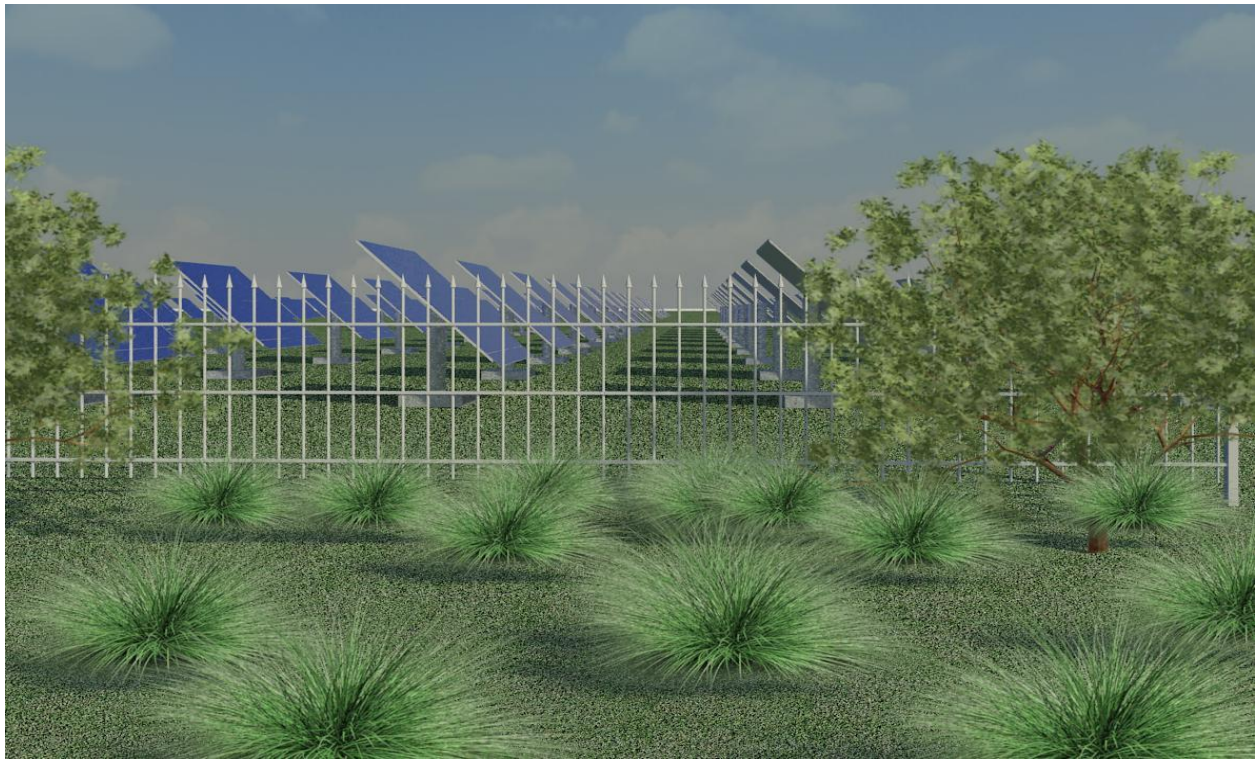


Figure 22: Viewpoint (From eastern section of the farm) – view of proposed solar farm development without mitigation measures in place.



Figure 23: Viewpoint 4 (From eastern section of the farm) – view of proposed solar farm development with mitigation measures in place.

Viewpoint 5 - Helicopter/ Birds Eye-View

- The whole of the solar farm development will be visible from the helicopter / birds eye-view viewpoints (Figure 24).
- The solar farm development takes up a considerable portion of the view when viewed from the helicopter / birds eye – view (Figure 24).
- Residence of the township residing on the mountain north of the development area will have a bird’s eye-view of the farm. However due to the distance away from the development area and the color of the solar panels (grey in color) the visual impact will be minimal.
- It should be noted that the residents of De Wildt are surrounded by buildings and developments associated with a rural town.



Figure 24: Viewshed of Viewpoint 5 (Helicopter / Birds-eye view from the north east).

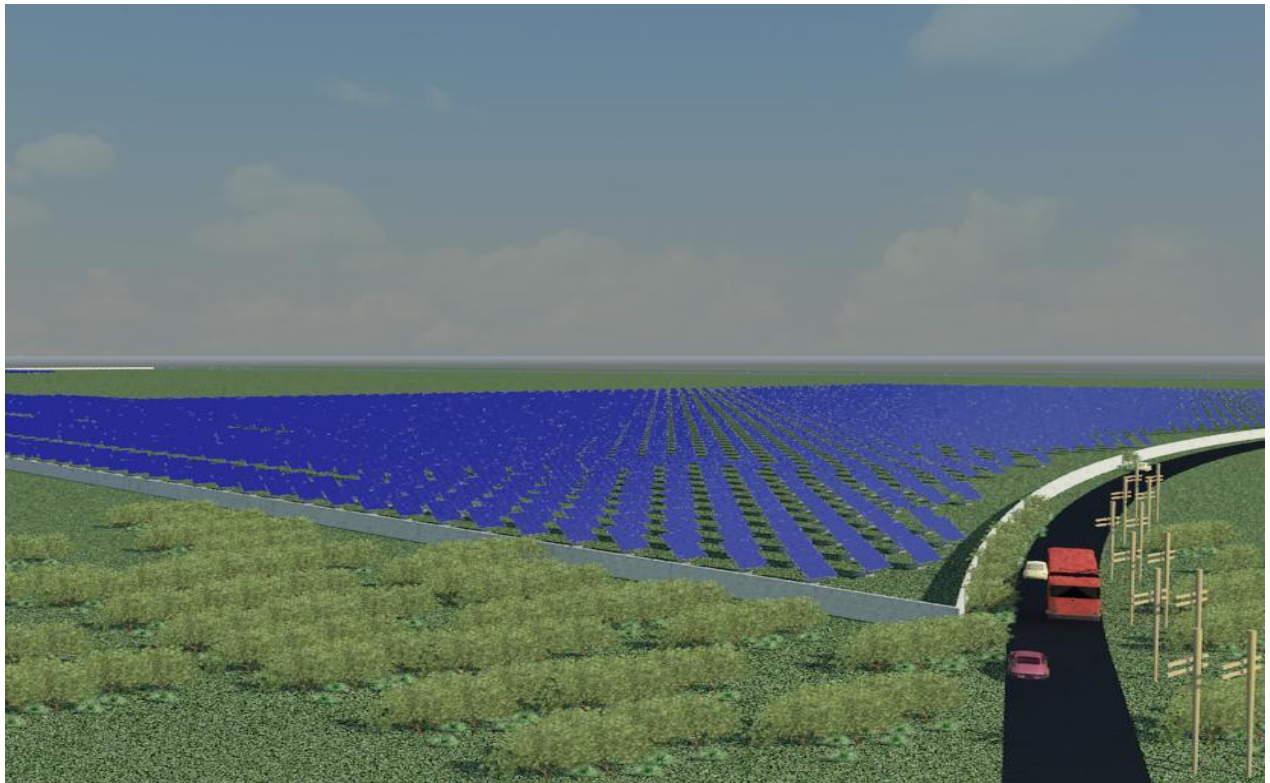


Figure 25: Viewshed of Viewpoint 5 (Helicopter / Birds-eye view from the north east showing the R566 road).

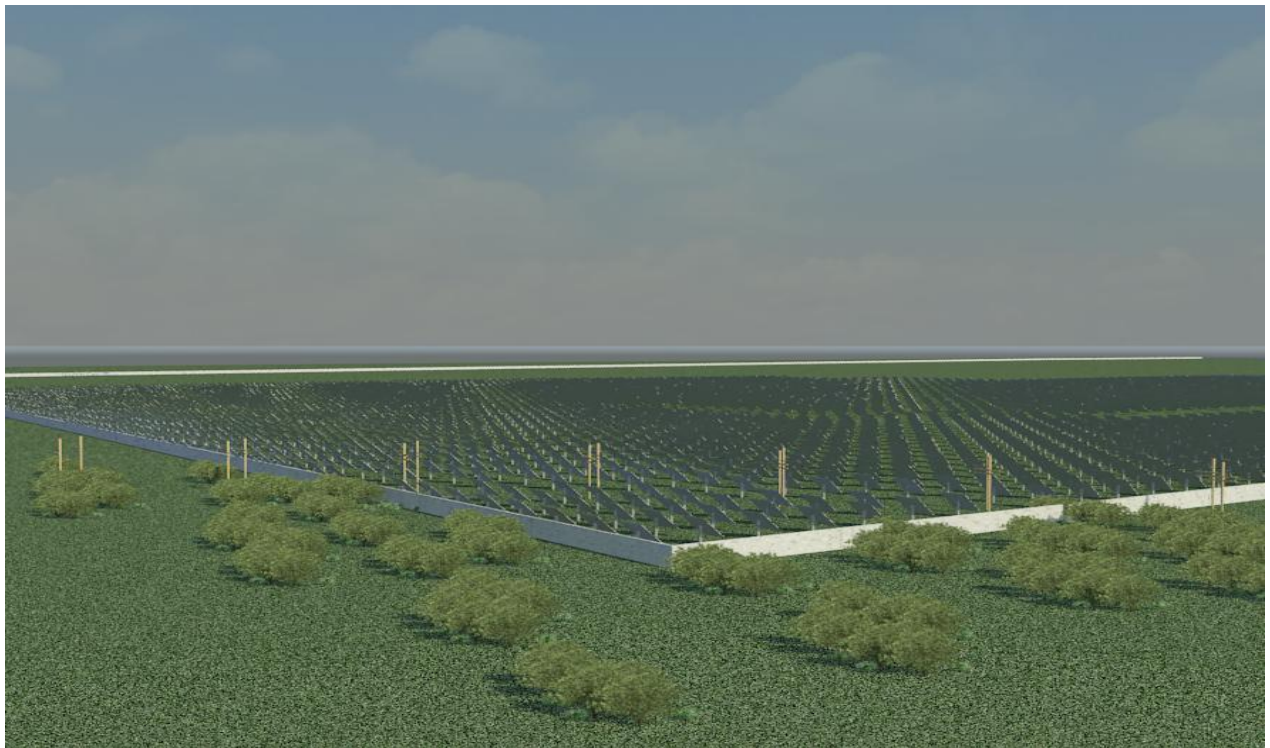


Figure 26: Viewshed of viewpoint 5 (Helicopter / Birds-eye view from the South East)

5. Conclusion

The viewshed analyses and 3 dimensional visualizations have shown that the proposed solar farm development will be visible from certain viewpoints within the surrounding landscape. These include the R566 road users, residents of the township of De Wildt, railway line and station (northern sections, viewpoints 1); M21 road and areas to the east of the development site (Viewpoint 4), developments and farms west of the development area (viewpoint 2); helicopter / birds eye-view and surrounding mountainous-top views; as well as the road users along the N4 as well as developments and areas south of the development area.

The 3 dimensional visualizations have also shown that distance from the observer to the development is an important consideration when assessing impact. Visual distance/observer proximity is an important factor to consider when determining the impact that the proposed development would have on the surrounding viewpoints. It is generally accepted that visual impact of a structure is reduced as the distance from that structure increases. It is generally assumed that an object will be predominantly visible from an equal distance. The proximity impact decreases exponentially with distance (MetroGIS 2007).

It should be noted that the residents of De Wildt's current view can be described as being impacted upon, as their view is currently consists of neighbouring farm houses, railway line, Eskom power lines, train station, Eskom sub-station, Xstrata Alloys Mine, as well as buildings utilized for industry, business and retail. As such even though they will see the development, they currently already see the developments described above.

The other viewpoints listed above as being able to see the development, all can see the developments described above. As such their views have already been impacted on to a degree and one cannot rate the visual impact the solar farm development would have on the area as high.

In conclusion, even though this proposed development is visible from different surrounding locations of the site, its relative close proximity to the township of De Wildt and the R566 and N4 national road has resulted in the visual quality in this area being impacted upon. As such the visual impact that this development will have on surrounding areas can be rated as medium and be mitigated to low significance.

5.1 Possible Mitigation Measures

To reduce the potential visual impact of the proposed development, the following mitigation measures are suggested:

- Trees and shrubs should be planted especially along the boundaries so as to reduce the visual impact on surrounding neighbours.
- The landscaping must be a combination of indigenous plants consisting of low ground covers, shrubs and lawn.
- The development proposal has indicated that a 2.1m high hedge will be placed around the boundary of the proposed development.
- The 3-dimensional visualisations have shown that this will soften the outer boundary of the development. This will also form an obstruction to the viewers possibly seeing the solar farm development.
- However, at certain parts of the landscape, especially the viewpoints on higher ground to the north and north-east of the site, the development will be visible.
- External lighting must be minimized. No spot lights should be allowed.
- Choice of colour, lighting and positioning should be properly planned.
- The outward features of the solar power farm should be taken into consideration as they need to blend in with the surrounding environment in order to minimise visual impacts.

6. References

MetroGIS March 2007. Visual Impact Assessment. Project Lima – Steelpoort.

Oberholzer, B. 2005. Guideline for involving visual and aesthetic specialists in EIA processes, Department of Environmental Affairs & Development Planning, Western Cape.