MT ROPER, PORTION FARM 321: SOLAR ENERGY FACILITY

VISUAL ASSESSMENT

For consideration in the Basic Assessment
For
EnviroAfrica
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Final Report
11 May 2012

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Report history:

Version	Date	Amendments
Draft Report: Version 1	26 March 2012	
Final Report	11 May 2012	

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Relevant Qualifications & Experience of the Author

Ms Sarien Lategan holds a Honours Degree in Geography as well as a Masters Degree in Town and Regional Planning from the University of Stellenbosch. She has 7 years experience as Town planner at a local government, 3 years with South African national Parks as planner and project manager of various GEF and World Bank managed, tourist facilities in the Table Mountain National Park and since 2004 as private practitioner involved in inter alia Site Analysis and Visual Impact assessments for various types of developments ranging from housing, tourism to infrastructure developments.

Ms Lategan is registered as a professional Town and Regional Planner as well as Environmental Assessment Practitioner.

Declaration of Independence

I, Sarah C. Lategan, fully authorized by Geostratics CC, declare that I am an independent consultant to EnviroAfrica and neither myself nor Geostratics, has any business, financial, personal or other interest in the proposed project or application in respect of which I was appointed, other than fair remuneration for work performed in connection with the application. There are furthermore no circumstances which compromise my objectivity in executing the task appointed for.

SC Lategan

EXECUTIVE SUMMARY

Sarien Lategan of Geostratics was appointed to undertake the visual impact assessment of a maximum 10Megawatt solar facility, as input to the Basic Assessment in terms of the national Environmental management Act, 1998 (Act no. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010 by undertaken EnviroAfrica. The development of the solar farm is proposed by Keren Energy (Pty) Ltd. The site on which the facility is planned comprises a portion of Farm 321, Mt Roper in the Kuruman district.

The site is situated on the R31 approximate 30km northwest of Kuruman.

The aim of the assessment is to identify view receptors and assess the impact of the development on these receptors. In this regard the larger site was screened and based on this findings as well as inputs by other specialists, a most suitable area of 20ha was identified on which the final assessment focus.

At the time of assessment a final decision has not yet been taken on the exact technology or mix of technology to be used in the development. In this regard the worst case scenario has been followed by assessing the technology most probably going to have the most visual impact in terms of size of structures. Should a different technology thus been decided on which involve smaller units, the visual impacts will certainly be less than what is assessed in this report. For the purposes of this study thus, tracking CPV units of dimensions 15,64m in height and 17m wide has been assessed.

The assessment established that the receiving environment comprise an area dominated by low intensity agriculture and game farming. The site is in close proximity to an ESKOM substation and HV power lines. The development will change the character of the area but the assessment establishes that due to the scale and absorption capacity of the environment, the change is within acceptable levels.

The only sensitive receptor identified is the R 31. It was however determined that the positioning of the facility a distance away from the road reduce the intrusion level. The R31 southbound however may experience an issue with glare off the panels, which may require mitigation measures to ensure road safety. Given the screening properties of the topographical features, the exposure level and intrusion factor reduce the impact to within the acceptable levels and with the necessary mitigation measures in place it does not to have a significant visual impact on the identified sensitive receptors.

The overall conclusion is that the visual impact is within acceptable levels and could thus be recommended.

1 BACKGROUND

Sarien Lategan of Geostratics was appointed to undertake the visual impact assessment of a maximum 10Megawatt solar facility, as input to the Basic Assessment in terms of the national Environmental management Act, 1998 (Act no. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010 by undertaken EnviroAfrica. The development of the solar farm is proposed by Keren Energy (Pty) Ltd. The site on which the facility is planned comprises a portion of Farm 321, Mt Roper in the Kuruman district.

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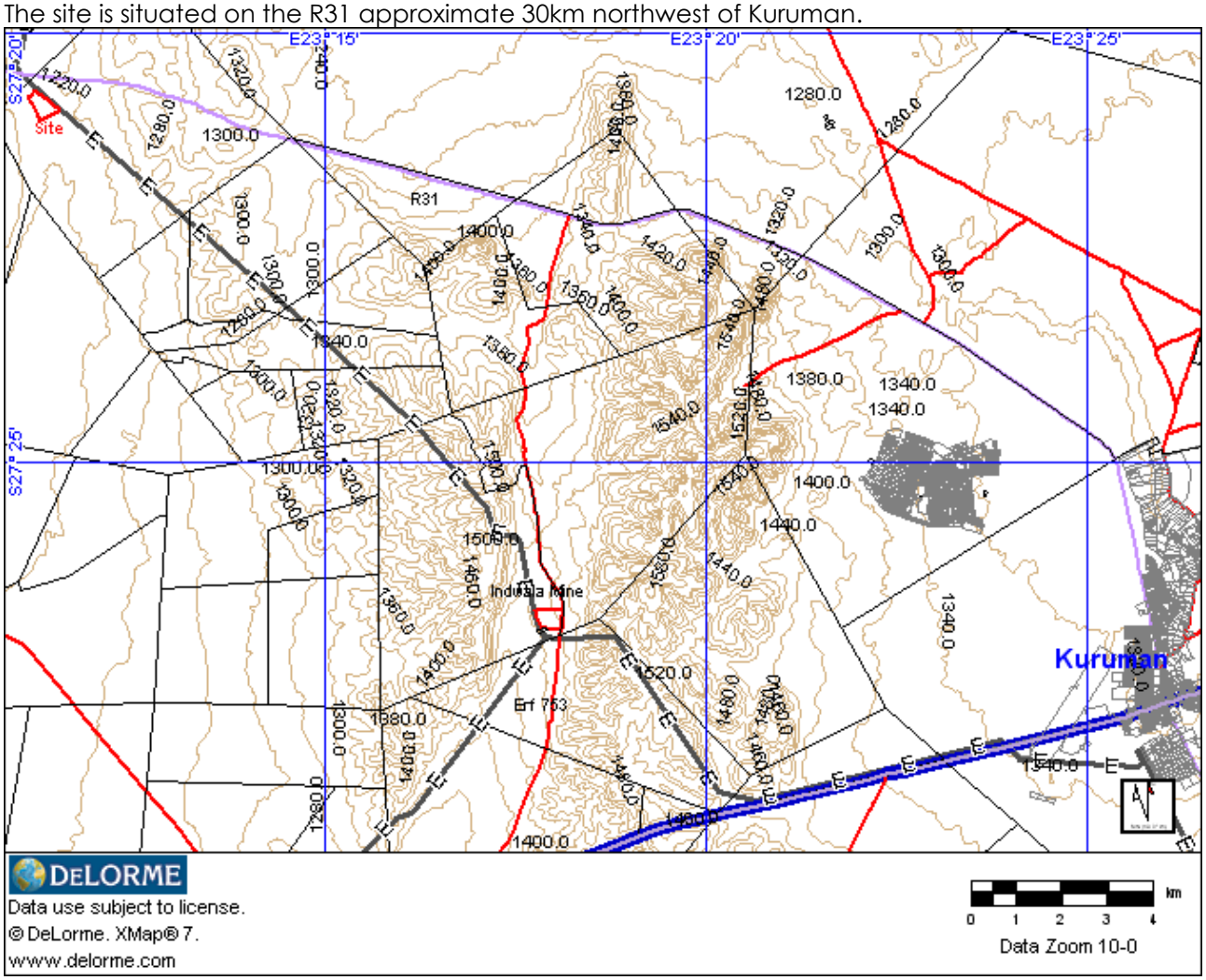

Figure 1: Locality

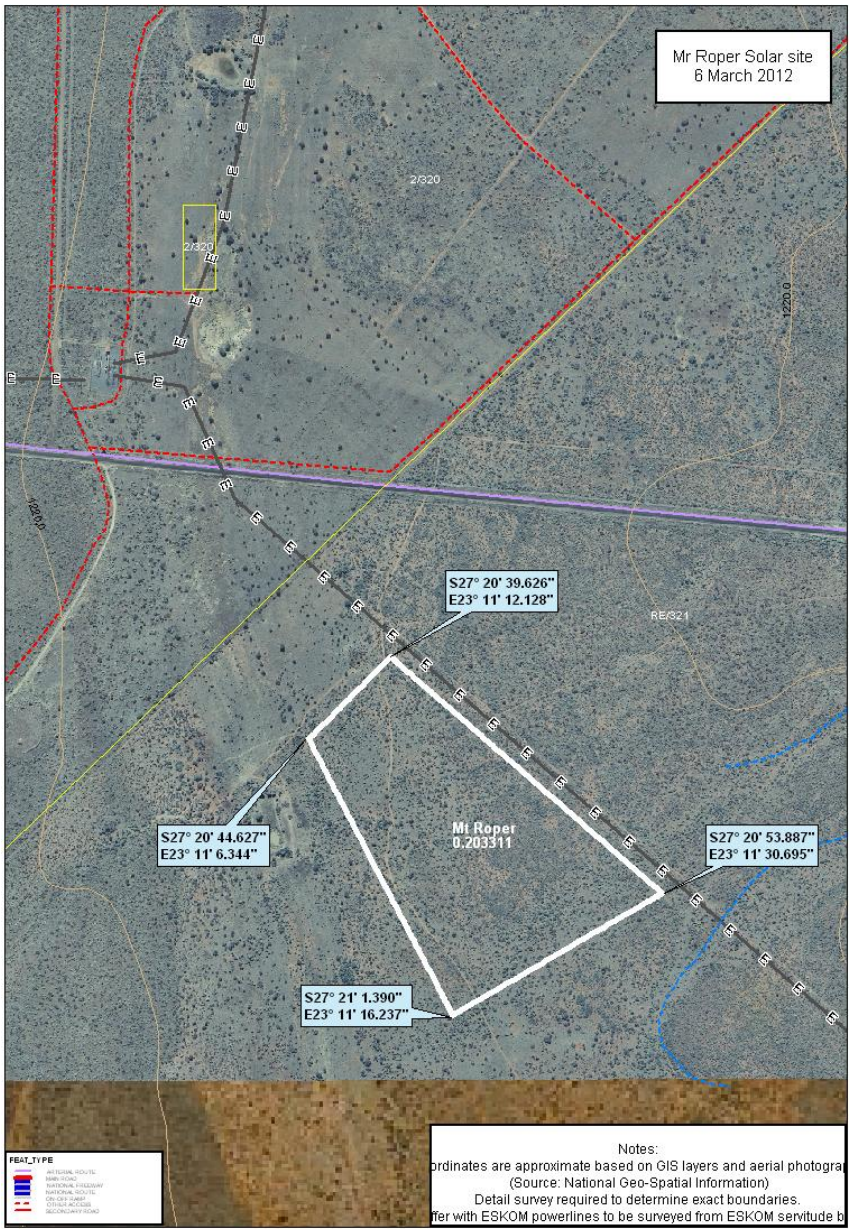

Figure 2: Site boundary

2 TERMS OF REFERENCE

The applicant intends the development of a solar farm on a portion of Farm 321, Mt Roper, Kuruman district. The site gain access off the R31 between Kuruman and Hotazel, approximately 30km from Kuruman.

The objective of the Visual Impact assessment is to determine the significance of any visual impact. This assessment will indicate whether from a visual perspective the development constitute and acceptable level of change and if so what potential mitigation measures can reduce any visual impact as to limit

To determine the potential extent of the VIA required the following broad criteria are considered.

Areas with protection status, e.g. nature reserves	None

Areas with proclaimed heritage sites or scenic routes	None.
Areas with intact wilderness qualities, or pristine ecosystems	Natural areas, low intensity agriculture and game farming.
Areas with intact or outstanding rural or townscape qualities	None
Areas with a recognized special character or sense of place	None
Areas with sites of cultural or religious significance	None
Areas of important tourism or recreation value	The site is in a region where such elements exists and are important in the Green Kalahari tourist route, although the specific route, namely R31 has not been identified as a scenic drive or tourist route, it is an alternative route from Kuruman to the Kgalagadi Transfrontier Park.
Areas with important vistas or scenic corridors	To assess.
Areas with visually prominent ridgelines or skylines.	None

Table 1: Requirements for visual assessment

High intensity type projects including large-scale infrastructure	yes
A change in land use from the prevailing use	Yes
A use that is in conflict with an adopted plan or vision for the area	No
A significant change to the fabric and character of the area	Yes
A significant change to the townscape or streetscape	No
Possible visual intrusion in the landscape	Potentially
Obstruction of views of others in the area	Potentially

Table 2: Nature of intended development

From the above it is clear that the receiving environment holds certain visual elements which may be impacted upon by development of the site.

It is thus clear that the potential exist that development of the site may have a visual impact. In order to assist authorities thus to make an informed decision, the input of a specialist is required to assist in the project design and assess the visual impact of the preferred project proposal.

The term visual and aesthetic is defined to cover the broad range of visual, scenic, cultural, and spiritual aspects of the landscape. The terms of reference for the specialist are to:

- Provide the visual context of the site with regard to the broader landscape context and site specific characteristics.
- Provide input in compiling layout alternatives.

- To describe the affected environment and set the visual baseline for assessment
- Identify the legal, policy and planning context
- Identifying visual receptors
- Predicting and assessing impacts
- Recommending management and monitoring actions

3 Methodology and principles

3.1 Methodology

Table 4: Summary of methodology

Task undertaken	Purpose	Resources used
A screening of the site and environment	To obtain an understanding of the site and area characteristics and potential visual elements	Photographs Site visits
Identify visual receptors	To assess visual impact from specific view points	Photographs, profiles
Contextualize the site within the visual resources	To present an easy to understand context of the site within the visual resource baseline	Specialist: S Lategan Graphic presentation Superimposed photo's Model in case of high significance
Propose possible mitigation measures	To present practical guidelines to reduce any potential negative impacts.	Specialist: S. Lategan

Throughout the evaluation the following fundamental criteria applied:

- Awareness that "visual' implies the full range of visual, aesthetic, cultural and spiritual aspects of the environment that contribute to the area's sense of place.
- Consideration of both the natural and cultural (urban) landscape, and their inter-connectivity.
- The identification of all scenic resources, protected areas and sites of special interest, as well as their relative importance in the region.
- Understanding of the landscape processes, including geological, vegetation and settlements patterns which give the landscape its particular character or scenic attributes.
- The inclusion of both quantitative criteria, such as visibility and qualitative criteria, such as aesthetic value or sense of place.
- The incorporation of visual input as an integral part of the project planning and design process, so that the findings and recommended mitigation measures can inform the final design and quality of the project.
- To test the value of visual/aesthetic resources through public involvement.

3.1.1 Principles

The following principles to apply throughout the project:

- The need to maintain the integrity of the landscape within a changing land use process
- To preserve the special character or 'sense of place' of the area
- To minimize visual intrusion or obstruction of views
- To recognize the regional or local idiom of the landscape.

3.1.2 Fatal flaw statement

A potential fatal flaw is defined as an impact that could have a "no-go" implication for the project. A "no-go" situation could arise if the proposed project were to lead to (Oberholzer, 2005):

1. Non-compliance with Acts, Ordinance, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites.
2. Non-compliance with conditions of existing Records of Decision.

3. Impacts that may be evaluated to be of high significance and that are considered by the majority of stakeholders and decision-makers to be unacceptable.

The screening of the site and initial project intentions did not reveal any of the above issues which may result in a fatal flaw.

3.1.3 Gaps, limitations and assumptions

The assessment has to be read with the following in mind:

1. No information is available on the alignment of transmission lines linking the solar facility with the ESKOM substation. The site is on the opposite side of the R31 than the ESKOM substation and transmission lines will have to be constructed. This assessment could however not assess the impact thereof due to a lack of information.
2. Access is obtained via existing roads and no road upgrades or new roads will be constructed.

3.1.4 Assessment explained

The assessment of visual impact is done on two levels namely the absorption rate of the receiving environment and the individual view receptors. The absorption rate of the receiving environment is determined by various elements e.g. topography, land use etc and the assessment will focus on the acceptable level of change of the area.
Visual receptors are assessed individually based on the sensitivity of the receptor, exposure to the development and intrusion rate.
The following framework is used in order to assess view receptors:

Criteria	High	Moderate	Low
Exposure	Dominant, clearly visible	Recognizable to the viewer	Not particularly noticeable to the viewer
Sensitivity	Residential, nature reserves, scenic routes	Sporting, recreational, places of work	Industrial, mining, degraded areas
Intrusion/Obstructive	Noticeable change, discordant with surroundings	Partially fits but clearly visible	Minimal change or blends with surroundings

A sensitive receptor with a low exposure and/or low intrusion rate can be regarded as a low significance rating. A receptor of low sensitivity but with high exposure can be of high significance if the intrusion rate is also high but is reduced if the intrusion rate is medium or low.
The overall significance therefore depends not only on the sensitivity of the receptor but also on the exposure and intrusion rate and thus a combination of the criteria.

3.2 Legal Framework, Guidelines and policies

3.2.1 National Environmental Management Act, 107, 1998 and relevant Guidelines:

An assessment in terms of any activity that required an EIA or Basic Assessment may be subjected to a specialist visual assessment in order to determine the significance of the potential impacts to result from a proposed activity.

The National Dept has subsequently determined that all applications for solar farms are subject to a visual impact assessment.

3.2.2 Northern Cape PSDF

The PSDF provides guidance to ensure that

- development is of a quality that promotes environmental integrity.
- based upon the principles of 'critical regionalism" which promotes a return to the development of high-quality settlements.
- remised upon "The Big Five" principles that guide the planning, design and management of development namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.

3.2.3 Green Kalahari tourism

The Green Kalahari tourist plan is an initiative to promote tourism in the region. The protection of cultural and heritage resources as well as the active involvement and empowerment of local communities through tourism is a core theme through the tourism plan. The R31 from Kuruman northward provide an alternative access to the Kgalagadi Transfrontier Park.

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4 DEVELOPMENT PROPOSAL

4.1 General Description

Construction of Solar energy production facility ("Solar Farm") with a maximum capacity of 10Megawatt, consisting of approximately 140 tracking CPV units, on approximately 20ha. The exact technology to be used has not been determined and this assessment is based on the following typical parameters. Units are typically positioned in rows with access roads between every second row. Unit spacing typically varies between 43x37 and 33x30m.

Figure 3: Typical Solar Farm layout

Figure 4: Typical CPV Unit

The Solar Farm includes supportive infrastructure which consists of 2 -4 concrete transformer pads approximately 20x15m respectively, a fenced construction staging area, maintenance shed and a switch panel for connection to the grid and transmission lines from the transformers to the closest ESKOM substation.

4.2 Project Elements

4.2.1 Extent and layout

The Solar farm will occupy approximately 20ha. The nature of the tracking CPV units are such that the property has to be leveled to less than 1:5 gradient in order to prevent the units to touch the ground when turning on the pedestal. CPV units are positioned in a grid with the active panel side facing north. The units will rotate from east (morning) to west (afternoon). Back of units facing south. Units are position in rows of two with access roads in between.

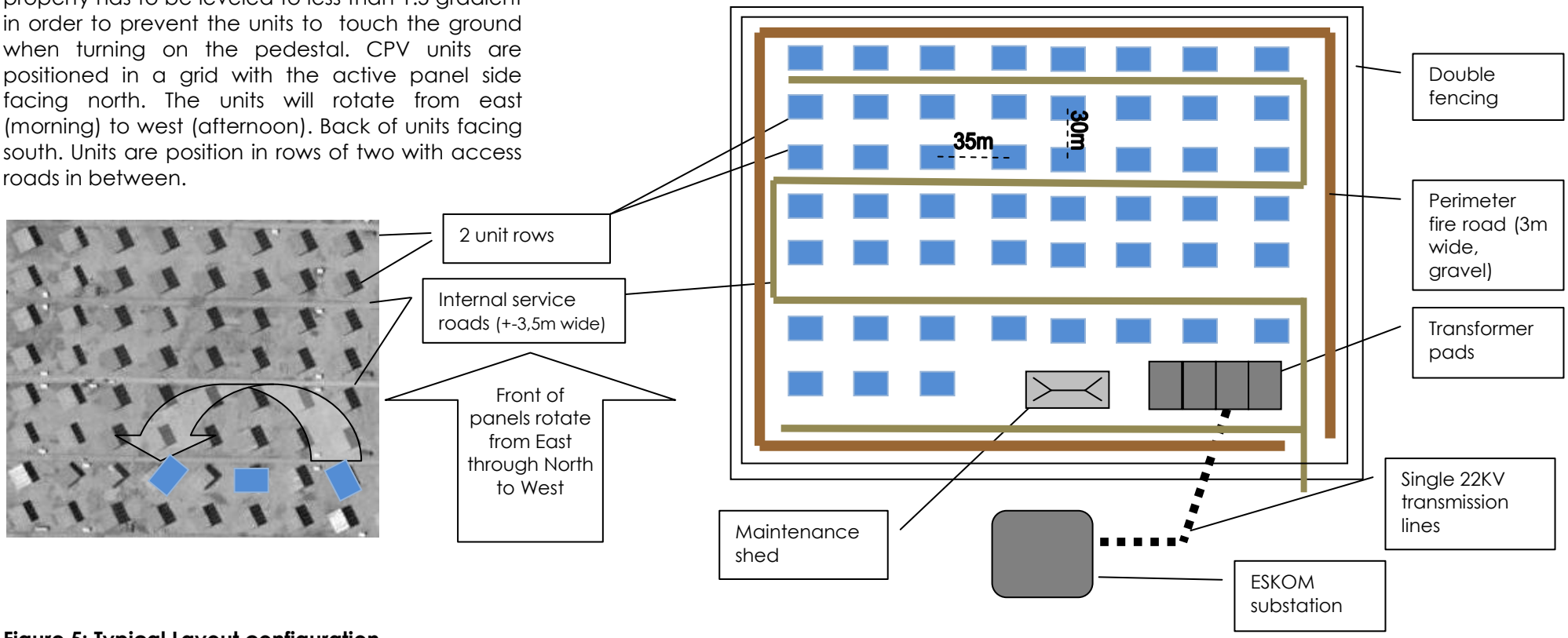


Figure 5: Typical Layout configuration

4.2.2 Tracking CPV Units

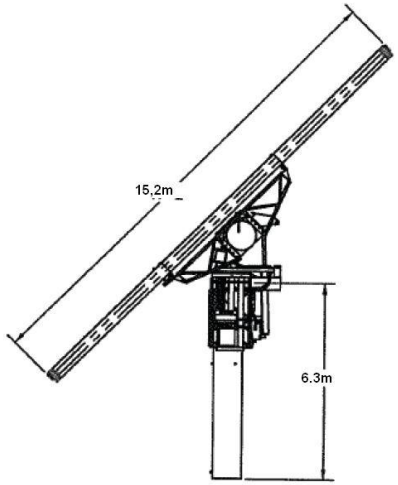


Figure 7: Typical Operational position

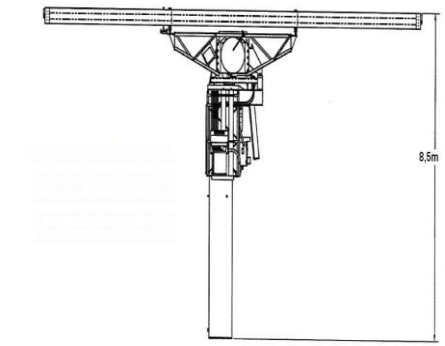


Figure 6: Storm Stow position

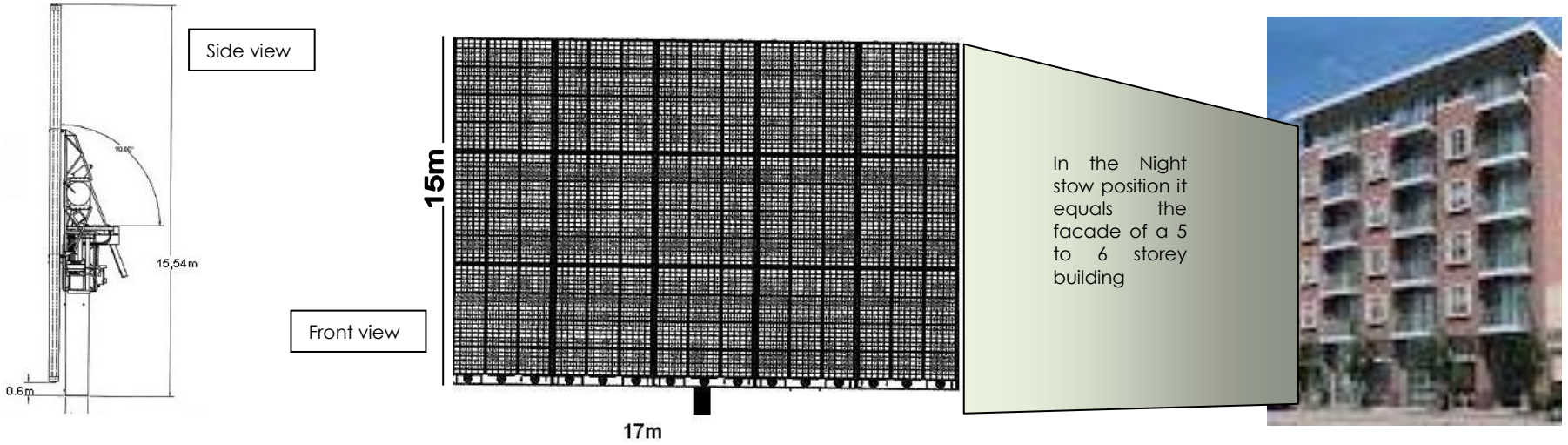


Figure 8: Night stow position

4.2.3 Project perimeter

Double fencing with inner fence consisting of galvanized palisade fence and outer an electrified fence of 2,4m in height.

Figure 9: Typical electrical fence

Figure 10: Typical galvanized palisade fence

4.2.4 Supportive Infrastructure

Typically 20 x 15m respectively.
Black top surface

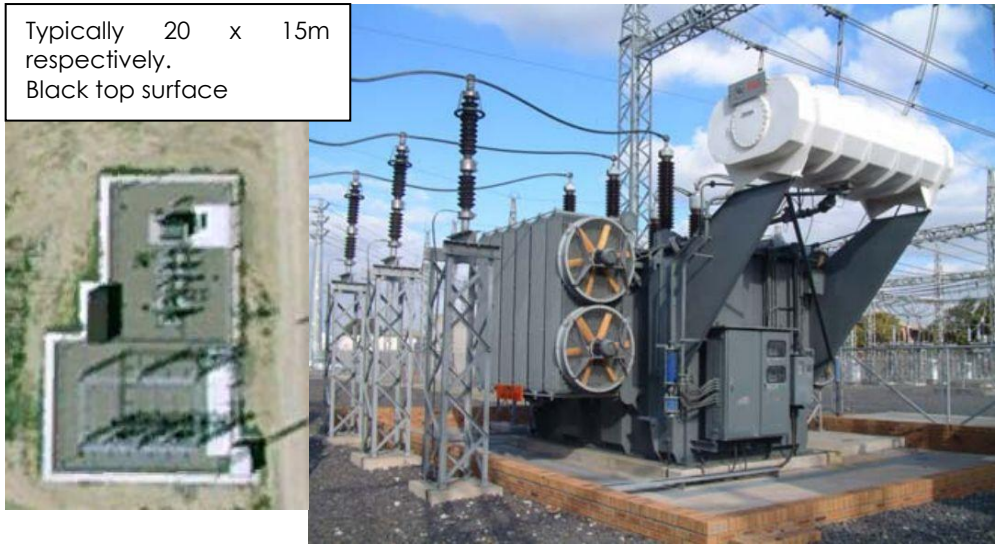


Figure 12: Transformer Pads and typical transformer

Single 22KV Power lines will feed from the transformers to the ESKOM

Figure 11: Typical 22KV single Power line

4.2.5 Operational elements

Depending on the exact technology the operational activities can vary. Tor the typical units described above, teams will access the site and physically clean panels. This is done either by rope access or the use of "cherry pickers". In areas of high dust conditions, cleaning can be more regular.

4.3 Construction elements

For the construction of the typical units describe above, large earth moving equipment will be used as well as high lift equipment and cranes. Large transport trucks for delivery will enter the site during construction. For technology that uses smaller units or static units the scale of equipment required for construction will be less.
Construction process entails:

- clearing and leveling of the site,
- construction of pedestals which involve concrete bases and
- fitting of panels
- construction of internal and access roads
- Fencing and security infrastructure
- Construction of support facilities such as maintenance sheds, etc
- Construction of transmission lines

5 RECEIVING VISUAL ENVIRONMENT

5.1 Description

Understanding the potential impact of a proposed development, an understanding of the receiving environment is important. In this regard the main elements of the receiving environment relates to the character of the current surrounding land use and the absorption capacity of the area. The character of the area entails the sense of place created by the current land use and the scale and type of infrastructure or physical elements within the immediate area. The absorption capacity relate to the density of physical elements and topographical variations of the landscape, which will determine the catchment area. The human eye will observe the horizon on a perfectly flat surface at a distance of 30km. This is however significantly reduced by landscape elements which obstruct the view.

5.1.1 Catchment area

The landscape consists of undulating hills which restrict the catchment area and present a high absorption level. The site slope slightly in a western direction towards the valley. Due to the topographical nature of the landscape the catchment is restricted to approximately 2km in all directions (Figure 13).

5.1.2 Sense of Place:

The site is situated in a rural to natural landscape and although low intensity farming occurs and electrical infrastructure exists, the overall sense of place display a natural character. The traveler on the R31 is halfway between towns and will thus have a lower capacity to accept urban infrastructure than within a town. The region is however known for mining and intermittent observation of mining activities again increase the travelers capacity slightly. The presence of infrastructure is thus not totally foreign to the area, as long as it does not create a high level of intrusion.

5.2 Findings

The proposed site is situated in the rural area with natural vegetation. The area displays a rural character with low intensity farming, game farming and natural areas. An ESKOM substation is in close proximity to the site and HV power lines cross the property and the R31.

The area is characterized by hills and valleys which creates a high absorption capacity. This high absorption rate restricts the catchment area to below 5km radius.

Statement 1: The property, on which the development is proposed, is currently used for low intensity farming but HV power lines do cross the site. The proposed solar farm will change the character of the immediate surrounds.

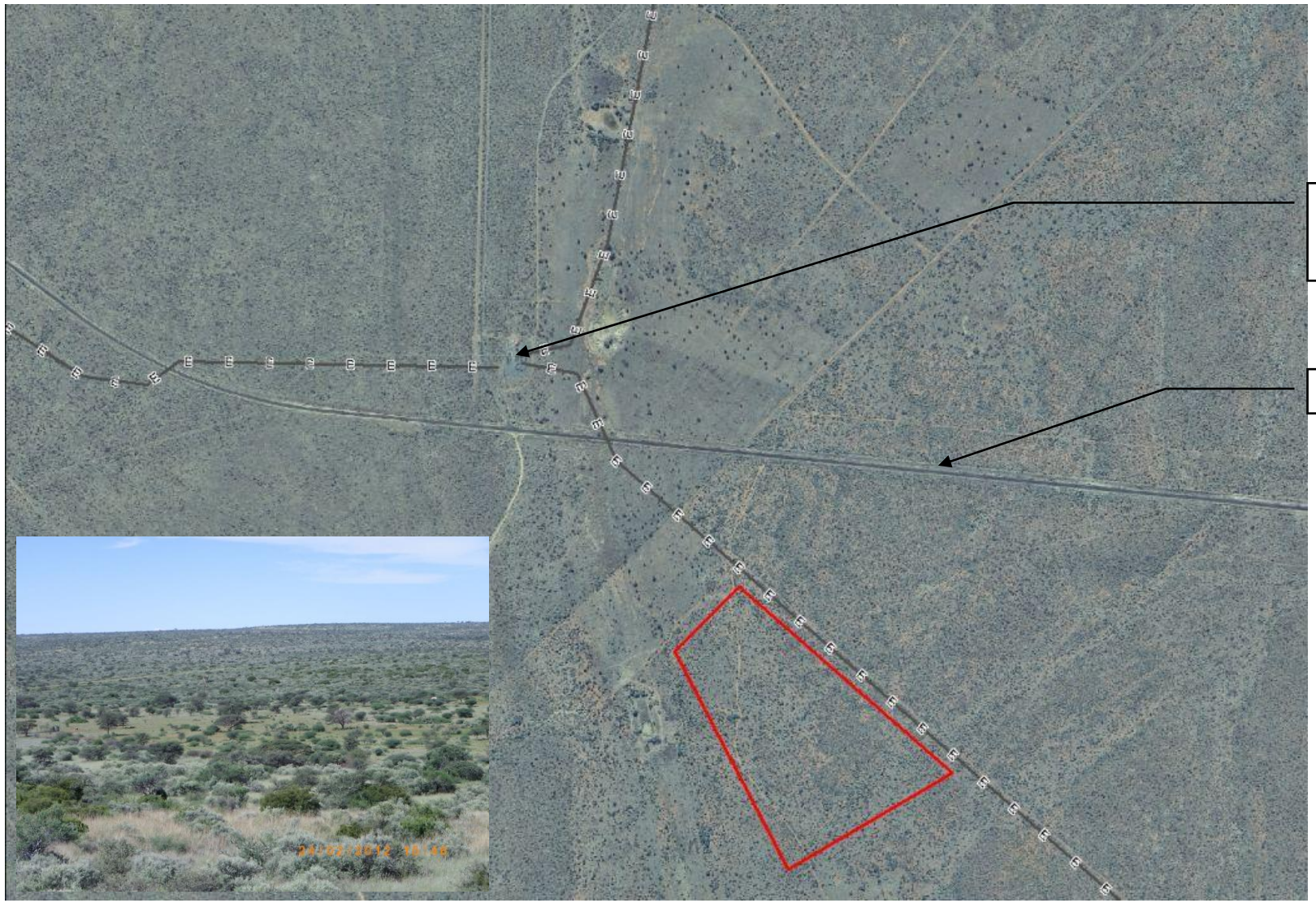


Figure 13: Receiving Environment

6 VISUAL RECEPTORS

Visual receptors are those positions from where the development site is potentially visible. Based on the character of the locality of the receptor its sensitivity can be rated. Generally residential areas and tourism related destinations and routes are sensitive to visual intrusions as they relate to the well-being of residents and the tourism quality of the area.

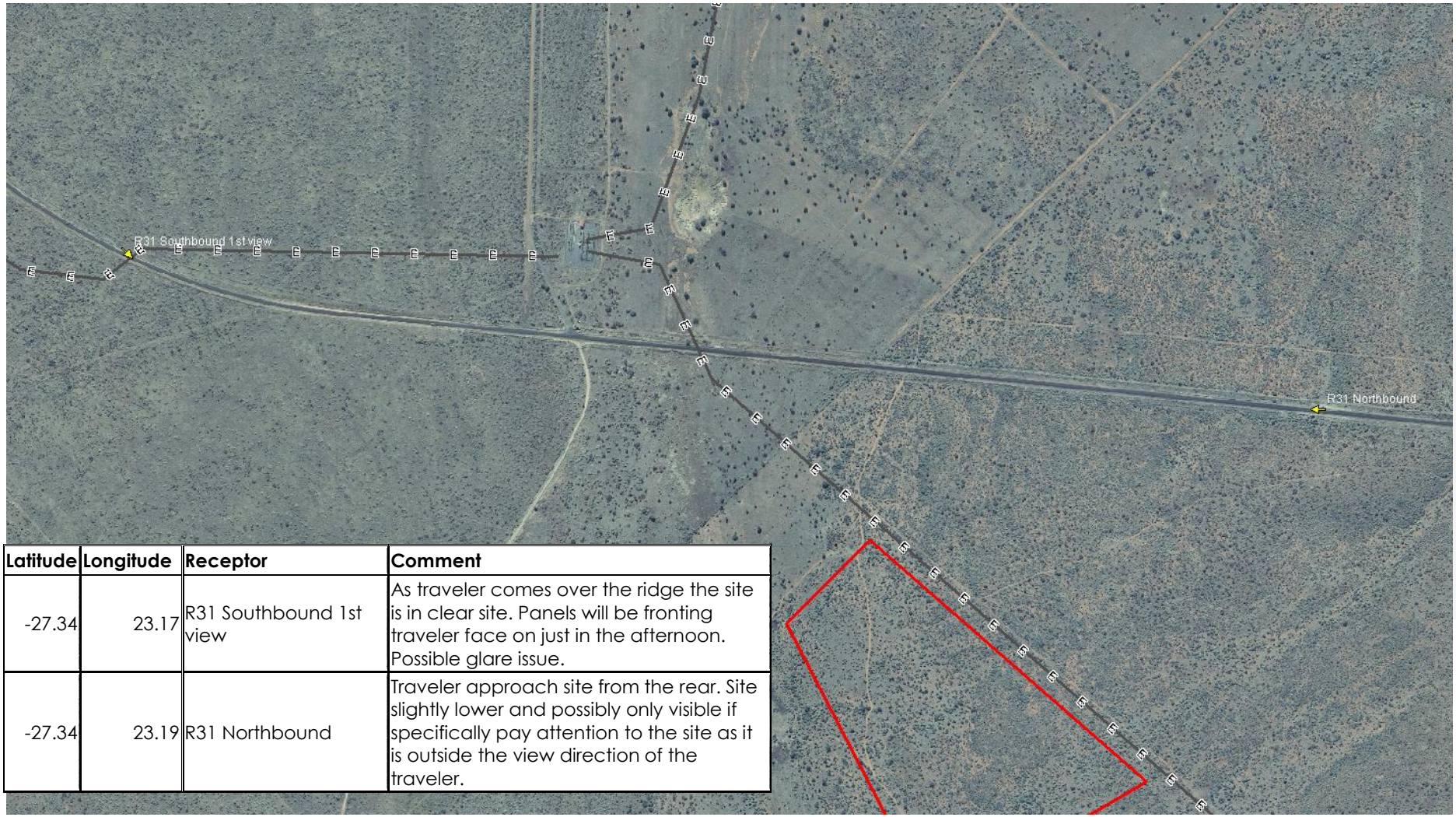
6.1 Potential Receptors

The only identified receptor is the R31 both north and south bound.

6.2 Assessment of Receptors

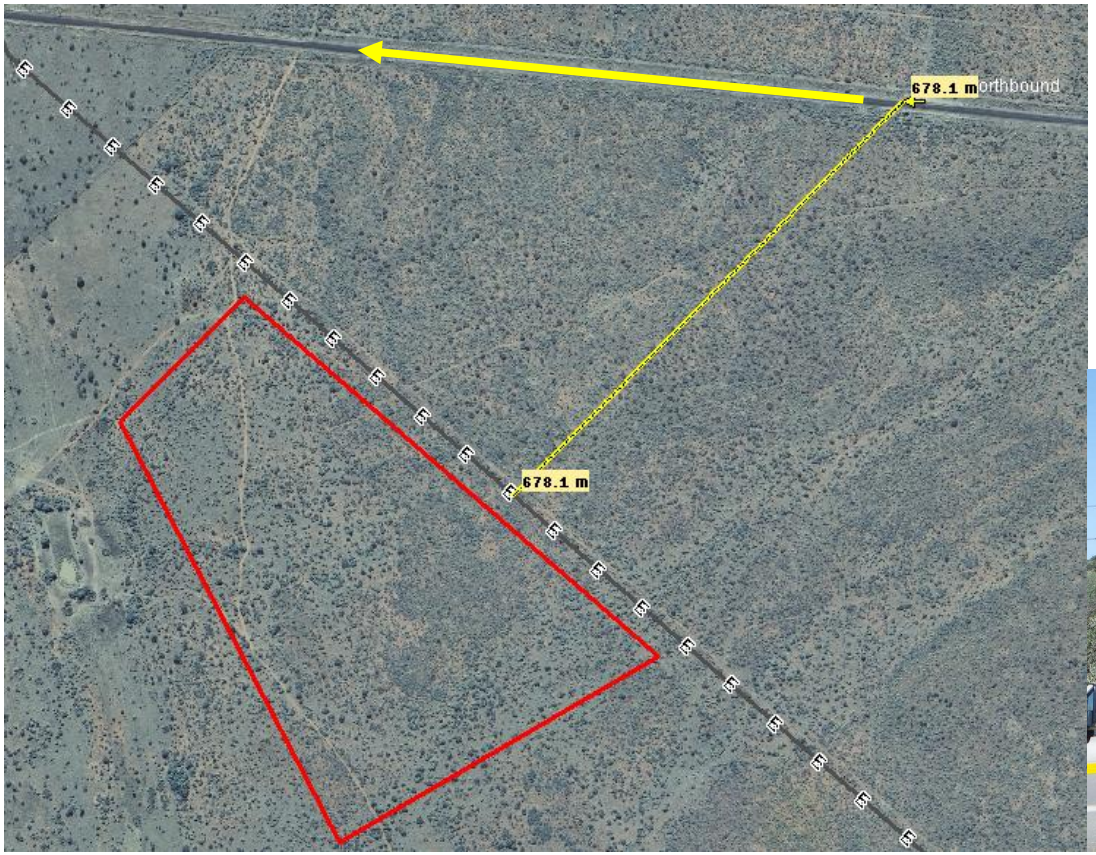
1. R31 southbound (Figure 17): As the traveler approach over the ridge the site is in clear site. Panels will be fronting the traveler face on in the afternoon and this can create a possible glare with potential reduction in road safety. This will only occur in the afternoon and probably more significant during the winter when the sun is low on the horizon and the panels are in a more upright position. This issue can however be mitigated to reduce the glare or even eliminate. The visual significance without mitigation is thus high, but with mitigation it can be reduced to low.

2. R31 northbound (Figure 16): The view direction of the traveler is parallel to the site and not towards the site. The site slope away from the road, diminishing the exposure of the site. The site is more than 600m from the road reducing the intrusion level. The traveler is at a lower level than the site and dense vegetation reduce view in the direction of the site. The visual significance on the northbound traveler is thus low.



Latitude	Longitude	Receptor	Comment
-27.34	23.17	R31 Southbound 1st view	As traveler comes over the ridge the site is in clear site. Panels will be fronting traveler face on just in the afternoon. Possible glare issue.
-27.34	23.19	R31 Northbound	Traveler approach site from the rear. Site slightly lower and possibly only visible if specifically pay attention to the site as it is outside the view direction of the traveler.

Figure 14: Visual receptors



The view direction of the traveler is parallel to the site and not towards the site.
The site slope away from the road, diminishing the exposure of the site.
The site is more than 600m from the road reducing the intrusion level.
The traveler is at a lower level than the site and dense vegetation reduce view in the direction of the site

Figure 15: R31 northbound as receptor

Criteria	High	Moderate	Low
Exposure	dominant, clearly visible	recognizable to the viewer	not particularly noticeable to the viewer
Sensitivity	residential, nature reserves, scenic routes	sporting, recreational, places of work	industrial, mining, degraded areas
Intrusion/Obstructive	noticeable change, discordant with surroundings	Partially fits but clearly visible	minimal change or blends with surroundings

Table 3: R31 northbound receptor assessed

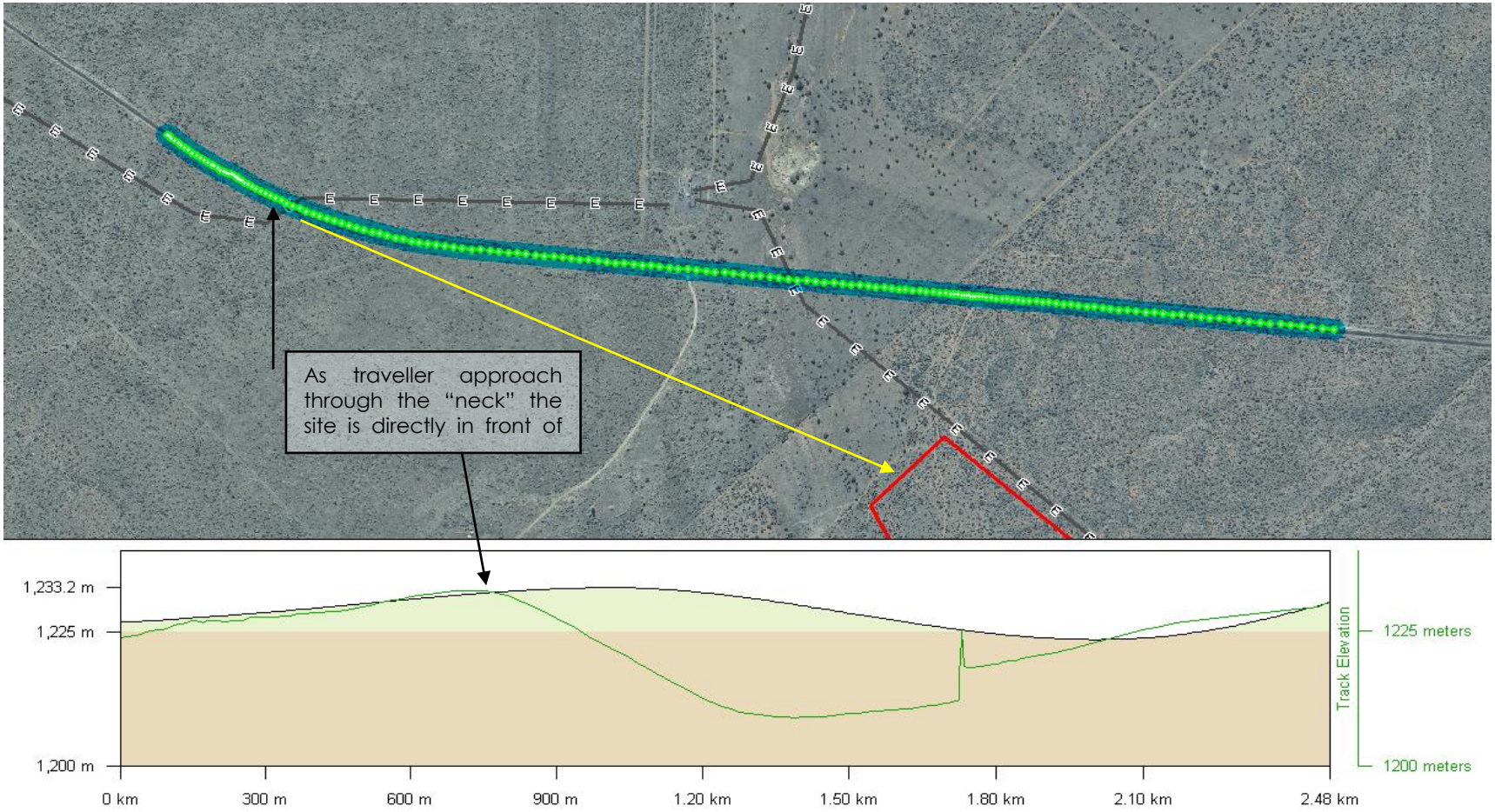


Figure 16: R31 southbound assessed

Criteria	High	Moderate	Low
Exposure	dominant, clearly visible	recognizable to the viewer	not particularly noticeable to the viewer
Sensitivity	residential, nature reserves, scenic routes	sporting, recreational, places of work	industrial, mining, degraded areas
Intrusion/Obstructive	noticeable change, discordant with surroundings	Partially fits but clearly visible	minimal change or blends with surroundings

Table 4: R31 southbound receptor assessed

Table 5: Summary of Visual Receptor assessment

Latitude	Longitude	Receptor	Comment	Exposure	Sensitivity	Intrusion/Obstructive	Finding
-27.34	23.17	R31 Southbound 1st view	As traveler comes over the ridge the site is in clear site. Panels will be fronting traveler face on just in the afternoon. Possible glare issue.	Rating: High	Rating: High	Rating: High	Due to the full exposure when crossing the hill to the north travelling south and the elevation in comparison to the site, possible glare may occur. This will only occur in the afternoon and probably more significant during the winter when the sun is low on the horizon and the panels are in a more upright position. This has potential road safety issue. Significance: high
-27.34	23.19	R31 Northbound	Traveler approach site from the rear. Site slightly lower and possibly only visible if specifically pay attention to the site as it is outside the view direction of the traveler.	Rating: Low	Rating: High	Rating: Low	The position of the site to the traveler is such that the site is almost outside the view line of the traveler. Should the traveler take specific notice of the area the site will be visible. The site is however slightly lower and sloping away from the road. Significance: Low

7 CONSTRUCTION

During construction, various large earth moving equipment and equipment will be transported to the site and work on the site. This will impact on the general experience of viewers. This impact is however temporary and not uncommon during construction of infrastructure. Communities have fairly high tolerance levels for such activities if it contributes to the infrastructure of the area.
Rating: Low

8 FINDINGS

The site is situated in an area with a rural character. The immediate area however does host an electrical substation and HV lines. The solar farm will thus change the character of the immediate environment. The view catchment is however small due to topographical variations. The landscape has a medium absorption rate which reduces the significance of land use change.

The possible glare impact on the southbound traffic may have road safety implication. Therefore the impact from this receptor is high and should either be avoided or mitigated.

As the CPV units are across the road from the substation and therefore additional 22KV power lines will have to cross the R31. As long as these lines are combined with the alignment of the existing lines crossing the road it will have no significant additional visual impact.

Apart from the glare issue from the R31, the proposal does not present an unacceptable level of change to the visual environment and therefore the development can be recommended, subject to the prevention of any road safety issues.

9 MITIGATION MEASURES

The nature of the development is such that very little mitigation measures is possible.
It is however recommended that the transmission lines follow the alignment of the existing power lines as to reduce additional intrusion of infrastructure into the area.
The operational management program should include a monitoring mechanism of potential glare issues and should such issues occur, the positioning of panels during the problematic period should be changed. This may impact slightly on the energy output sufficiency.