

**Appendix D4: Updated Visual Impact Assessment/Addendum
(2017 revision)**

KAKAMAS, PORTION ERF 1654: SOLAR ENERGY FACILITY

VISUAL ASSESSMENT ADDENDUM A

For consideration in the Basic Assessment

For

EnviroAfrica

PO Box 5367

Helderberg

7135

info@enviroafrica.co.za

Addendum A (March 2017) to original Report (2012)

Compiled by:

S.C. Lategan



PO Box 1082

Strand

7139

Report history:

Version	Date	Amendments
Version 1	26 March 2012	
Version 1.1	31 March 2012	Par 2.1.3, 7, 8 Editing
Final	11 May 2012	
Addendum	18 March 2017	

CONTENT

1	OBJECTIVE	1
2	CHANGES IN PROPOSAL	1
2.1	Site Boundary.....	1
2.2	Extend of solar facility and power line connection	2
2.3	Proposed Technology.....	3
3	CHANGES IN RECEIVING ENVIRONMENT	3
4	CUMULATIVE IMPACTS.....	4
4.1	Methodology.....	4
4.2	Assessment of cumulative impacts.....	4
4.2.1	Time Crowding	4
4.2.2	Time Lags.....	4
4.2.3	Space crowding.....	4
4.2.4	Cross Boundary	5
4.2.5	Fragmentation	5
4.2.6	Compounding Effects	5
4.2.7	Indirect Effects	5
4.2.8	Triggers and Thresholds	5
5	FINDINGS AND CONCLUSIONS	8
5.1	Construction Impacts	8
5.2	Operational Impacts.....	8
6	MITIGATION MEASURES.....	8

Tables

Table 1: Assessment of powerline N14 receptor	2
Table 2: Types and characteristics of cumulative impacts.....	4

Figures:

Figure 1: Site boundary.....	1
Figure 2: Typical 22kV Powerlines to connect to Taabos Substation.....	2
Figure 3: N14 from Augrabies as potential receptor for powerline	2
Figure 4: Single axis mounting system.....	3
Figure 5: View catchment and site elements.....	6
Figure 6: 30km radius	7

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 Erf 1654, Kakamas and in ownership of the Kai Garib local municipality.

An environmental authorization was obtained but has since expired. A new application will now be submitted for which the original VIA needs to be re-assessed to accommodate any changes that may have occurred since the original assessment as well as include an assessment of cumulative impacts. This report serves as an addendum to the original VIA for this purpose and should be read with the original report.

At the time of the original assessment a final decision was not yet been taken on the exact technology or mix of technology to be used in the development and therefore the worst case scenario was followed by assessing the technology most probably going to have the highest visual impact in terms of size of structures. For the purposes of the original study thus, tracking CPV units of dimensions 15,64m in height and 17m wide has been assessed. The technology currently proposed comprise single axis tracking system with a max tilt of 50°. This setup results in infrastructure to be significantly lower than the units assessed in the original VIA and therefore has a significant lower visual impact. The alignment of the powerlines have not be determined and is also included in this addendum.

The overall conclusion in the original assessment was that the visual impact is within acceptable levels and could thus be recommended. Due to the nature of the type of technology, little mitigation measures can be implemented to further reduces any potential visual impacts. With the technology now proposed the visual impact is even further reduced.

With regard to cumulative impacts it is concluded in this addendum that no significant cumulative visual impacts will arise from the development and it is thus within the acceptable level of change.

It can thus be concluded that the overall visual impact of the new application is similar and even slightly less than the original proposal and from a visual perspective can be considered for approval. No additional mitigation measures are required.

1 OBJECTIVE

In 2012, 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 Erf 1654, Kakamas and in ownership of the Kai Garib local municipality.

An environmental authorization was obtained but has since expired. A new application will now be submitted for which the original VIA needs to be re-assessed to accommodate any changes that may have occurred since the original assessment as well as include an assessment of cumulative impacts. This report serves as an addendum to the original VIA for this purpose and should be read with the original report.

The objective of this addendum is to assess changes that occurred since the original VIA and the subsequent impact thereof on the recommendations. It will further more also assess the cumulative impacts of the proposal.

The changes that may have occurred includes the following:

1. Changes in the proposal namely -
 - a. Site boundary
 - b. Extent of solar production
 - c. Technology
2. Changes in the receiving environment

Cumulative impact holds two components namely the visual catchment area of assessment and the criteria as defined by the DEA guideline on cumulative impacts.

It is important to note that the original VIA did assess impacts within the normal visual sphere of observation namely 30km.

2 CHANGES IN PROPOSAL

2.1 Site Boundary

The site boundary remained similar to the effect that it will change the assessment of the receptors as per the original report. Therefore the previous assessment of receptors remains unchanged. Added to the assessment is the alignment of the powerline to connect to the Taaibos substation.



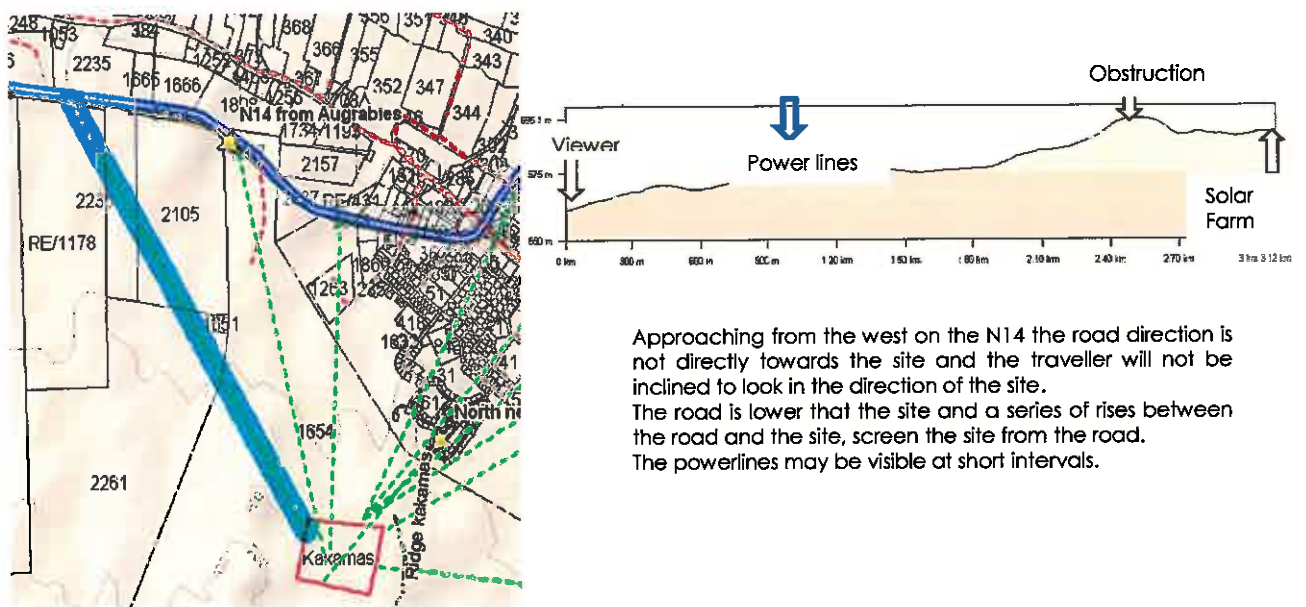
Figure 1: Site boundary

2.2 Extend of solar facility and power line connection

The proposal has been changed from the assessed extent of 10MW to a final proposal of 5MW. The footprint area however remains the same. The visual impact is thus similar to the original proposal.



Figure 2: Typical 22kV Powerlines to connect to Taaibos Substation



Approaching from the west on the N14 the road direction is not directly towards the site and the traveller will not be inclined to look in the direction of the site. The road is lower than the site and a series of rises between the road and the site, screen the site from the road. The powerlines may be visible at short intervals.

Figure 3: N14 from Augrabies as potential receptor for powerline

Table 1: Assessment of powerline N14 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

Label	Lat	Lon	Comment	Exposure	Sensitvity	Introsion	Finding
N14 from Augrabies	-28.7647	20.59846	Approaching from west screened by low ridge. Possible brief glimpse of the powerline	Approaching Kakamas from Augrabies, the travelers view is not directed towards the site. The topography is also such that the traveler is screened from the site. Rate: Low	The N14 and especially entrances to towns along this road has been identified of tourism importance. Rate: High	The indulating landscape provide screening at intervals . Rate: Low	No significant impact

The proposed 22kV powerline is similar to telephone line in extent and thus acceptable within a rural and urban environment. No receptors have been identified which will be affected by the powerline. The impact of the line is thus low.

2.3 Proposed Technology

At the time of the original assessment a final decision was not yet been taken on the exact technology or mix of technology to be used in the development and therefore the worst case scenario was followed by assessing the technology most probably going to have the highest visual impact in terms of size of structures. For the purposes of the original study thus, tracking CPV units of dimensions 15,64m in height and 17m wide has been assessed.

The technology currently proposed, comprise is a crystalline PV single axis plant. It has 18540 solar modules connected to 7 central inverters, and makes use of Exosun single axis trackers. The facility will be connected to Eskom's Ouplaas Substation.

This proposal result in significant downscale in the size of infrastructure being less intrusive. The original proposal comprise units of up to 6m in height where the PV single axis system is approximately 2m.

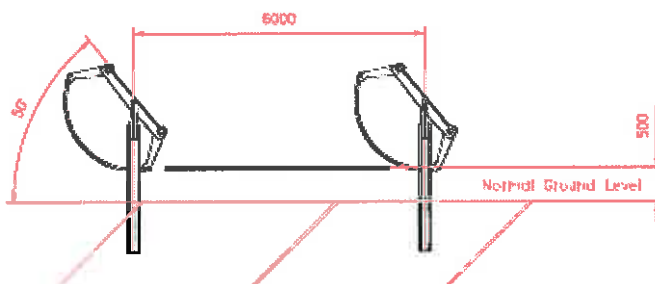


Figure 4: Single axis mounting system

No changes has been made to site parameter fencing and type of access roads.

The new proposed technology therefor reduce the visual impact with regard to the production technology.

3 CHANGES IN RECEIVING ENVIRONMENT

No changes occurred in the receiving environment which impact on the original assessment.

4 CUMULATIVE IMPACTS

4.1 Methodology

Cumulative effects occur when:

- Impacts on the environment take place so frequently in time or so densely in space that the effects of individual impacts cannot be assimilated; or
- The impacts of one activity combine with those of another in a synergistic manner

DEAT has issued a guideline which identify types and characteristics of different cumulative effects.¹ Table 1 below summarise these criteria and these have been used to assess the cumulative visual impact.

Table 2: Types and characteristics of cumulative impacts

TYPE	CHARACTERISTIC
Time Crowding	Frequent and repetitive effects.
Time Lags	Delayed effects.
Space Crowding	High spatial density of effects.
Cross-boundary	Effects occur away from the source.
Fragmentation	Change in landscape pattern.
Compounding Effects	Effects arising from multiple sources or pathways.
Indirect Effects	Secondary effects.
Triggers and Thresholds	Fundamental changes in system functioning and structure.

DEAT also require that cumulative impacts of all energy projects within a 30km radius be assessed.

4.2 Assessment of cumulative impacts

4.2.1 Time Crowding

With regard to construction, should the other proposed projects in the area be undertaken at the same time the construction activities can cause increased level of such activities. However this is only temporary. There are only 2 other proposed PV sites within a 30km radius and thus the impacts will be limited. It is unclear what the construction of a proposed hydro facility will entail but the construction extent of the application PV site will be far less than that of the hydro facility. These sites are directly off the N14 and only the application site will gain access via the street of Kakamas during construction.

With regard to operational visual impact of a static land use change as proposed, this aspect is not relevant.

4.2.2 Time Lags

The facility does not change in its visual appeal over time and therefore there are no visual time lag effects.

4.2.3 Space crowding

The landscape consists of a valley with a hinterland to the north and south of this valley. The immediate hinterland to the south consist of hills and almost rocky/mountainous appearance. The hinterland to the north is more flat, but with interspersed hills, 'spitskoppe' and dunes. In general the area display a surprisingly variety in slope, hills, gradients and landform.

¹ DEAT (2004) Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7, Department of Environmental Affairs and Tourism (DEAT), Pretoria

These variations in landform reduce the visual reach and the view catchment of the area (**Error! eference source not found.**). The catchment area is thus restricted in the south, but due to the up slope to the north and northwest the catchment area extent to the hills north of the valley. Along the N14 towards Upington the catchment area extent intermittently to about 7km from the site however to the north it is restricted to about 5km and to the west, east and south it is less than 1km. (Refer Figure 3 below)

This thus concluded that the catchment area does not extent to the 30km radius. (Refer Figure 4 below) However a traveller through the landscape may experience the other two energy facilities within this radius and generally within a timeframe of 30min. A traveller will thus experience a number of solar sites on his journey through the landscape but since they are spaces apart with the urban area provididing a flow in variation. The topography of the landscape also absorb the sites and prevent crowding within the space.

4.2.4 Cross Boundary

From a visual perspective the site has no cross boundary impacts.

4.2.5 Fragmentation

The site is adjacent to commanage with wastewater and refuse infrastructure as well as abutted by a neighbour and production landscape. The proposal may result in a low level of fragmentation but due to the size and locality within the urban parameter this is not significant.

4.2.6 Compounding Effects

From a visual perspective the site has no compounding impacts.

4.2.7 Indirect Effects

The development is on the edge of the urban development and does has the potential to attract further development. The support services anticipated should however be of low impact such as general maintenance services as the facility does not require large scale industrial maintenance systems of equipment. The anticipated indirect visual effects are thus insignificant.

4.2.8 Triggers and Thresholds

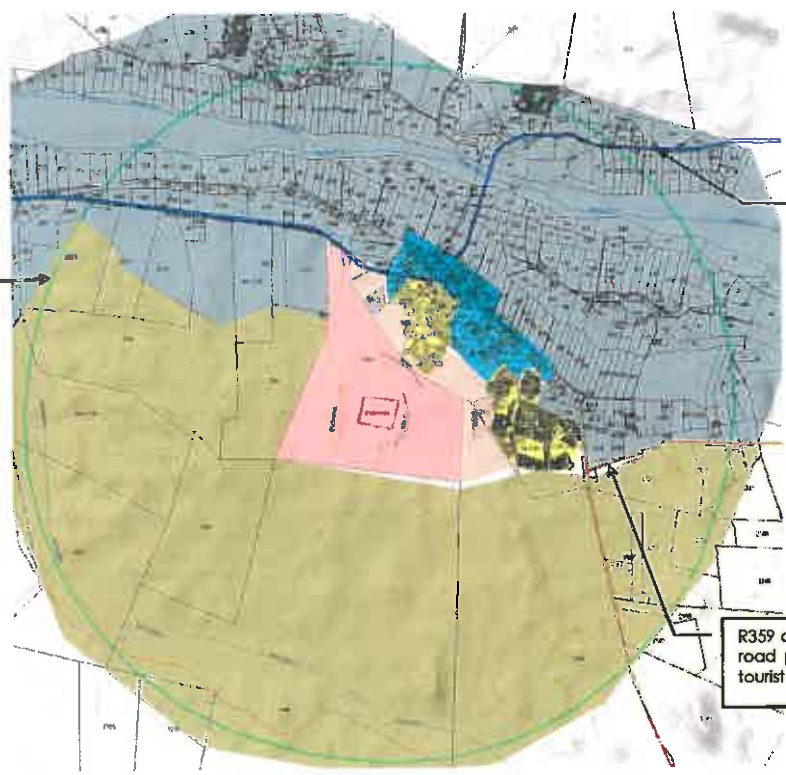
From a visual perspective the site has no impacts on Triggers and Thresholds.

VIA- Addendum: Kakamas

Kakamas Receiving Environment

- Commonage
- Industrial
- Low intensity farming
- Production landscape
- Residential
- Urban
- Vacant

5km view catchment area.
 The landscape consists of a valley with a hinterland to the north and south of this valley. The immediate hinterland to the south consist of hills and almost rocky/mountainous appearance. The hinterland to the north is more flat, but with interspersed hills, 'spitskoppe' and dunes. In general the area display a surprisingly variety in slope, hills, gradients and landform. This variation in landform reduces the visual reach and the view catchment of the area.



N14 : National road which is the main transport route through the area. This route has also been identified as an important tourist route and proposals were made that the entrances to towns along this route should be improved.

R359 also known as the rocky road presents an alternative tourist route

Figure 5: View catchment and site elements

Prepared by: SC Lategan
 March 2017

© Geostatics

VIA- Addendum: Kakamas

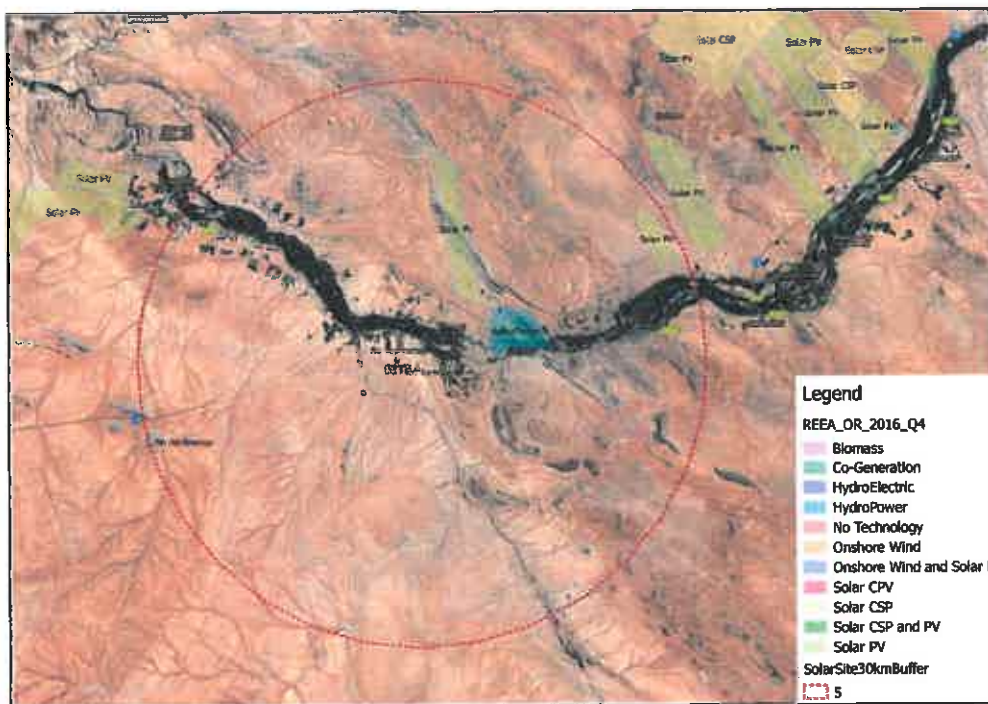


Figure 4: 30km radius

5 FINDINGS AND CONCLUSIONS

5.1 Construction Impacts

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

5.2 Operational Impacts

The site is situated in an area of little coherence and ad hoc position of a range of industrial and utility land uses. The site has a high absorption capacity due to the presence of existing land use and topographical variation.

The sensitive receptors namely the N14, R359 and residential areas are situated such that the exposure to the site and the intrusion is low.

The scale of the powerline is such that the overall visual intrusion is low and thus of low visual significance.

The proposal does not present an unacceptable level of change to the visual environment and therefore the development can be recommended.

Statement 1: The property on which the development is proposed, is currently used for a range of utility type of land use and therefore the proposed solar farm seems to be in character with these elements.

Statement 2: Due to the medium to high absorption capacity of the landscape, the development will easily be absorbed into the existing visual structure.

Statement 3: The proposal does not pose any significant cumulative visual impacts which would deem the proposal unacceptable.

6 MITIGATION MEASURES

The level of visual impact is of such level that no mitigation to the proposed on-site development elements is recommended.

The level of visual impact of the power lines are low and no mitigation is required.

**Appendix D4: Visual Impact Assessment
(Original report)**

KAKAMAS, PORTION ERF 1654: SOLAR ENERGY FACILITY

VISUAL ASSESSMENT

For consideration in the Basic Assessment

For
EnviroAfrica
PO Box 5367
Helderberg
7135
info@enviroafrica.co.za

Final Report
11 May 2012

Compiled by:
S.C. Lategan

GeoStratics

PO Box 1082
Strand
7139

Report history:

Version	Date	Amendments
Version 1	26 March 2012	
Version 1.1	31 March 2012	Par 2.1.3, 7, 8 Editing
Final	11 May 2012	

CONTENT

1	BACKGROUND	1
2	TERMS OF REFERENCE	2
3	Methodology and principles	3
3.1	Methodology	3
3.1.1	Principles	4
3.1.2	Fatal flaw statement	4
3.1.3	Gaps and limitations	4
3.1.4	Gaps, limitations and assumptions	4
3.1.5	Assessment explained	5
3.2	Legal Framework, Guidelines and policies	5
3.2.1	National Environmental Management Act, 107, 1998 and relevant Guidelines:.....	5
3.2.2	Northern Cape PSDF	5
3.2.3	Green Kalahari tourism	5
3.2.4	Syiana Environmental Management Framework.....	5
4	DEVELOPMENT PROPOSAL	7
4.1	General Description	7
4.2	Project Elements	8
4.2.1	Extent and layout	8
4.2.2	Tracking CPV Units.....	9
4.2.3	Project perimeter.....	10
4.2.4	Supportive Infrastructure	10
4.2.5	Operational elements	11
4.3	Construction elements	11
5	RECEIVING VISUAL ENVIRONMENT	11
5.1	Description	11
5.1.1	Catchment area	11
5.1.2	Sense of Place:	11
5.2	Findings	12
6	VISUAL RECEPTORS	17
6.1	Potential Receptors	17
6.2	Assessment of Receptors.....	17
7	CONSTRUCTION	26
8	FINDINGS	26
9	MITIGATION MEASURES.....	26

Tables:

Table 1: Requirements for visual assessment.....	3
Table 2: Nature of intended development.....	3
Table 3: N14 approaching from Keimoes assessed as receptor.....	20
Table 4: N14 Approaching from Augrabies view assessed	21
Table 5: Neighbourhood to the north assessed as receptor	22
Table 6: Neighbourhood to the east assessed as receptor	23
Table 7: R359 assessed as receptor	24
Table 8: Summary of Visual Receptor assessment	25

Figures:

Figure 1: Locality	1
Figure 2: Site boundary.....	2
Figure 1: Typical Solar Farm layout	7
Figure 2: Typical CPV Unit	7
Figure 3: Typical Layout configuration	8
Figure 4: Storm Stow position.....	9
Figure 5: Typical Operational position.....	9
Figure 6: Night stow position.....	9

Figure 10: Transformer Pads and typical transformer	10
Figure 7: Typical electrical fence	10
Figure 8: Typical galvanized palisade fence	10
Figure 9: Typical 22KV single Powerline	10
Figure 14: Kakamas View catchment	13
Figure 15: Kakamas Receiving Environment Components	14
Figure 16: Land use continuum.....	15
Figure 17: Immediate land use elements	15
Figure 18: Topographical features	15
Figure 19: Site elements.....	16
Figure 20: Potential visual receptors identified	19
Figure 21: N14 approaching from Keimoes as receptor.....	20
Figure 22: N14 from Augrabies as possible view receptor.....	21
Figure 23: Neighbourhood to the north as receptor	22
Figure 24: Neighbourhood to the east as receptor.....	23
Figure 25: N14 direction Upington.....	23
Figure 26: R359 as visual receptor	24

Relevant Qualifications & Experience of the Author

Ms Sarien Lategan holds an 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, undertaken EnviroAfrica. The development of the solar farm is proposed by Keren Energy Keimoes (Pty) Ltd. The site on which the facility is planned comprises a portion of Erf 1654, Kakamas and in ownership of the Kai Garib local municipality.

The site is situated on the southern outskirts of Kakamas. The solar farm is located south of the town in close proximity to the landfill site and an ESKOM substation. The land is currently zoned Agriculture.

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, i.e. an area of approximately 500ha 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 a mix of land uses often associated with commonages on the edge of towns with little sense of place or urban coherence. The southern town extensions include a large commonage with ad hoc land use allocation ranging from industrial facilities and quarry to infrastructure/utilities such as landfill, sewage etc. From this perspective the proposed solar farm will not have a negative impact on the sense of place or urban context. The site is surrounding by watersheds, which provide a high level of screening. These altitude variations creates an area capable of absorbing a certain level of structures. With careful planning of the exact site these topographical variations can be utilized to reduce the exposure level of the facility.

The sensitive receptors identified include the N14 as a tourist route and nearby residential areas. It was however determined that the exact positioning of the facility behind existing infrastructure and taking into account the screening properties of the topographical features, the exposure level and intrusion factor reduce the impact to within the acceptable levels 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. Due to the nature of the type of technology, little mitigation measures can be implemented to further reduces any potential visual impacts. It is however recommended to use the development to further benefit the community, a visitors' information and interpretation facility be considered.

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 Keimoes (Pty) Ltd. The site on which the facility is planned comprises a portion of Erf 1654, Kakamas and in ownership of the Kai Garib local municipality.

The site is situated on the southern outskirts of Kakamas. The solar farm is located south of the town in close proximity to the landfill site and an ESKOM substation. The land is currently zoned Agriculture.

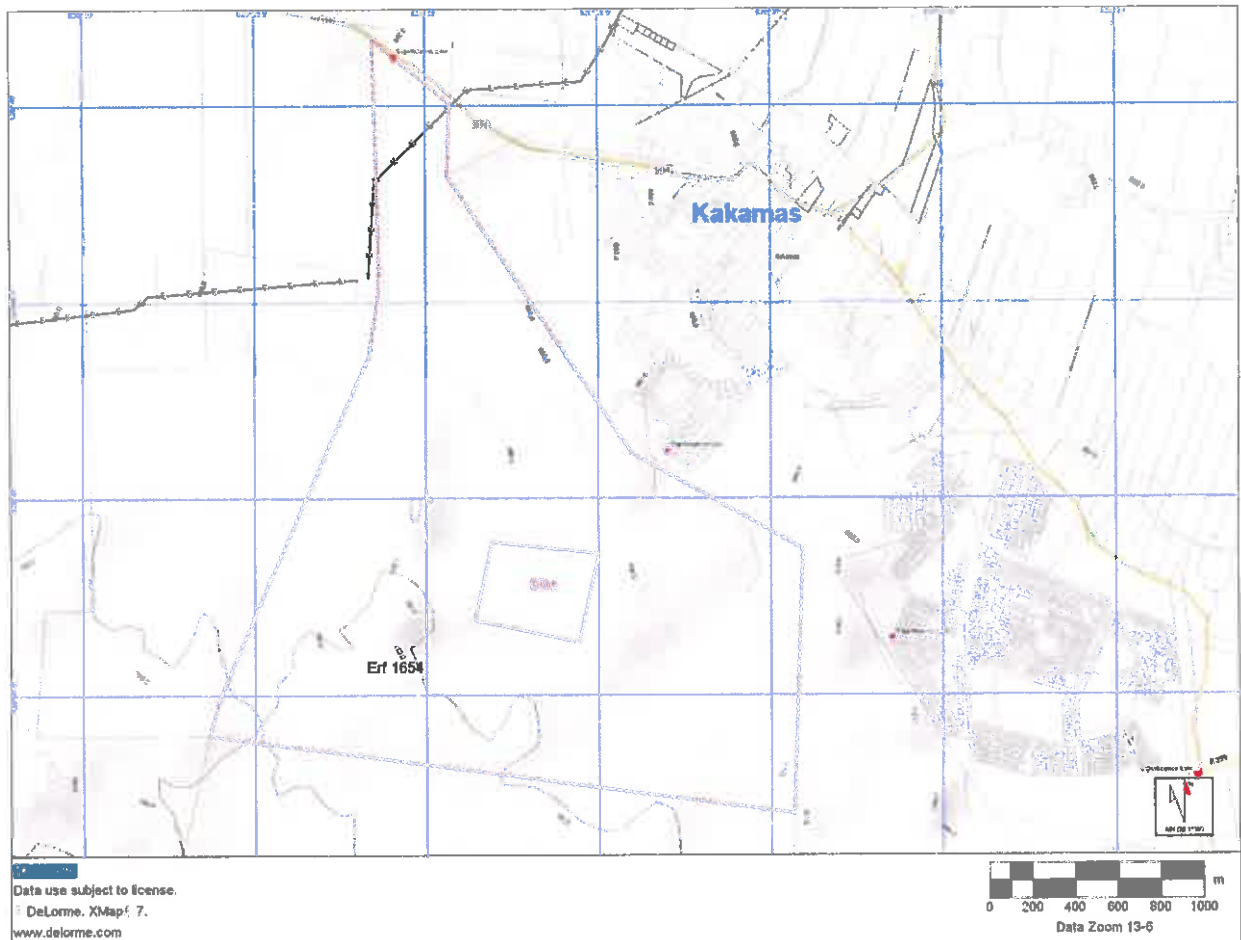


Figure 1: Locality

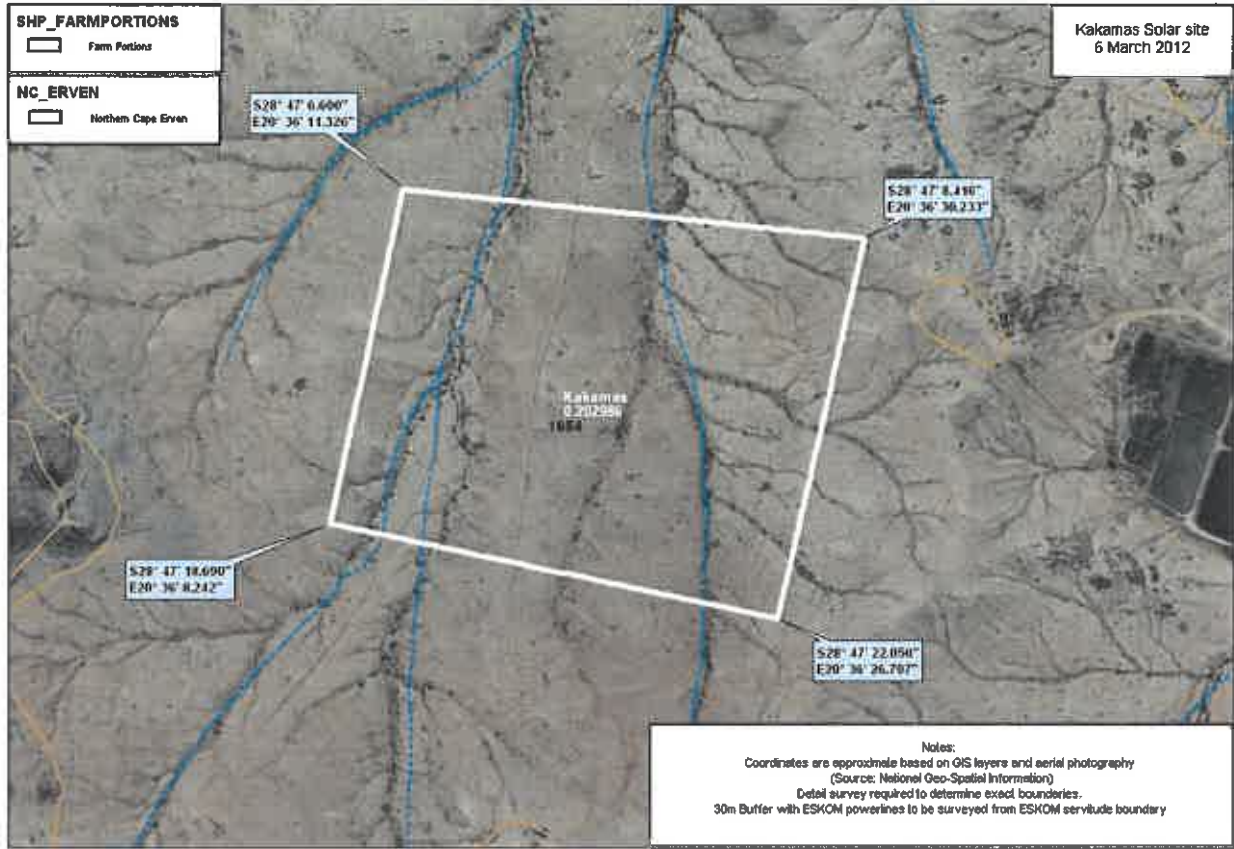


Figure 2: Site boundary

2 TERMS OF REFERENCE

The applicant intends the development of a solar farm on a portion of Erf 1654, commonage in Kakamas. The site gain access off the N14 just west of the town.

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	None.
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

VIA: Kakamas

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
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, from vacant to utility/infrastructure
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	Potentially
A significant change to the townscape or streetscape	Potentially
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 is 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 and limitations

3.1.4 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 and therefore the impact of these cannot be assessed at this stage.
2. An access road need to be constructed to provide particularly access for large construction equipment. No information is available on the alignment or design of such road. The impact thereof has therefore not been assessed.

3.1.5 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. Of importance to this specific application is the identification of the N14 as an important route and thus proposals that the entrances to town along the route be improved. The R359 has also been identified as an alternative tourist route. The protection of cultural and heritage resources as well as the active involvement and empowerment of local communities through tourism are a core theme through the tourism plan.

3.2.4 Syianda Environmental Management Framework

The EMF indicates that the improvement of energy delivery to communities is important and makes the following statements in paragraph 2.3.6

"(b) Opportunities: Due to the climate of the area there is huge potential to utilise solar energy more widely, especially in the remote areas of the district.

(c) Constraints: The small communities in sparsely populated areas make effective distribution of electricity very difficult in some areas.

VIA: Kakamas

(d) *Desired state. The desired actions relating to energy supply in the area:*

- *Electricity provision should be extended to all areas in order to reduce the dependency on candles and wood as the main energy sources (the strong reliance on wood is not sustainable over the long term and can lead to the overexploitation of especially Camel Thorn trees in the area); and*
- *the excellent potential for the utilisation of alternative energy sources should be optimised by a sponsored programme to introduce alternative energy on a large scale to remote communities."*

The EMF however only refers to visual impacts related to mining and made a broad statement that mines should be rehabilitated to reduce visual impact on the environment. No further guidelines or principles related to visual environment is provided in the EMF.

VIA: Kakamas

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 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.



Figure 3: Typical Solar Farm layout

VIA: Kakamas

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.

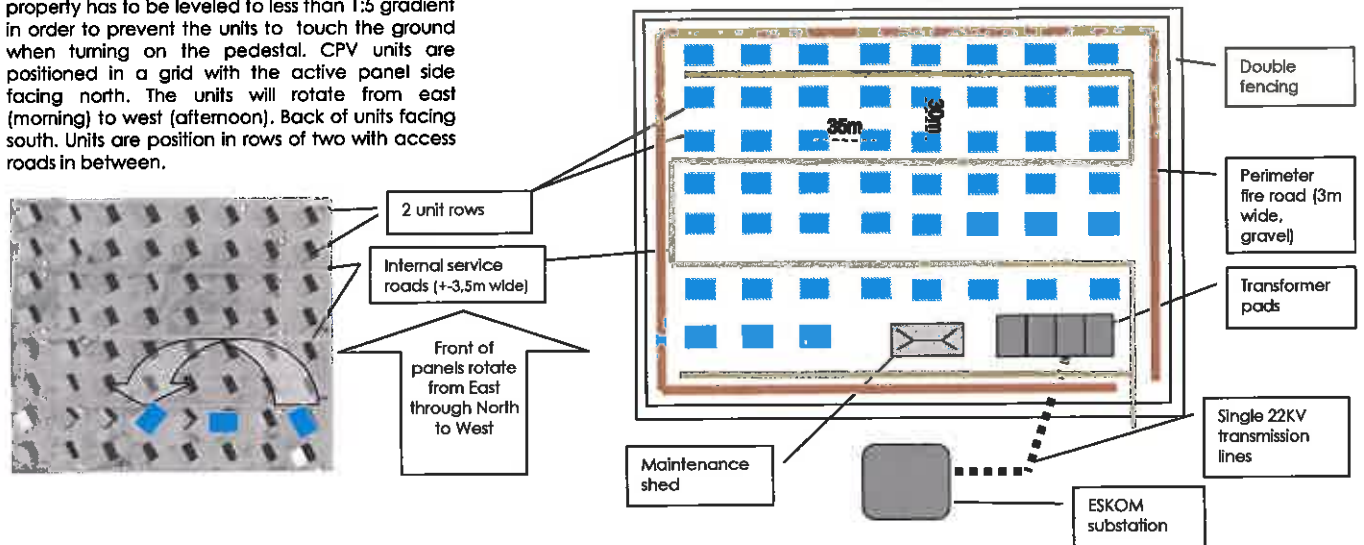


Figure 5: Typical Layout configuration

VIA: Kakamas

4.2.2 Tracking CPV Units

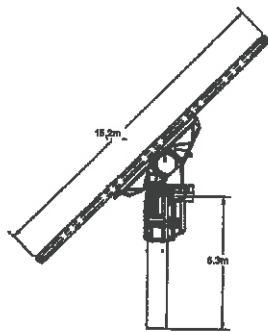
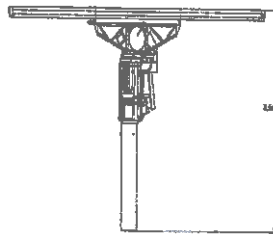
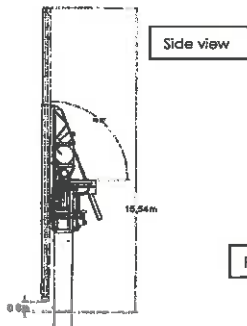


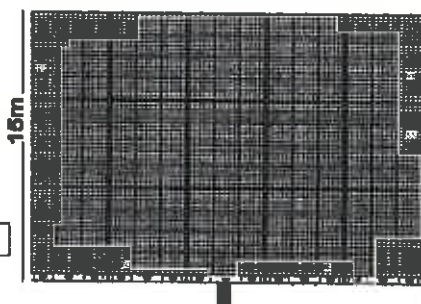
Figure 7: Typical Operational position



In stow: >28 mph, > 10 sec. Out of stow: <26 mph, >300 sec.
Figure 6: Storm Stow position



Side view



Front view

17m

In the night stow position it equals the facade of a 5 to 6 storey building



Figure 8: Night stow position

VIA: Kakamas

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 substation



4.2.5 Operational elements

Depending on the exact technology the operational activities can vary. For 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 a valley with a hinterland to the north and south of this valley. The immediate hinterland to the south consist of hills and almost rocky/mountainous appearance. The hinterland to the north is more flat, but with interspersed hills, 'spitskoppe' and dunes. In general the area display a surprisingly variety in slope, hills, gradients and landform.

These variations in landform reduce the visual reach and the view catchment of the area (Figure 13). The catchment area is thus restricted in the south, but due to the up slope to the north and northwest the catchment area extent to the hills north of the valley. Along the N14 towards Upington the catchment area extent intermittently to about 7km from the site however to the north it is restricted to about 5km and to the west, east and south it is less than 1km.

5.1.2 Sense of Place:

The site is situated on the southern outskirts of the town on commonage. Land uses in the immediate vicinity include High voltage power lines, electrical substation, sewage works, landfill, (Figure 16). Residential neighbourhoods are located to the north and east of the site.

The area does not display a well defined character and reflects a lack in sense of place.

5.2 Findings

The proposed site is situated within the urban edge zone of Kakamas in an area characterized by little urban coherence nor rural, agricultural or wilderness sentiments. The larger area reflects the characteristics of a rural to urban landscape and the site is situated within this land use continuum.

The valley area, with its higher range of elements, has a high visual absorption rate. The valley wall to the south is not as steep as the northern valley wall. More development had thus occurred towards the south with subsequent occurrence of urban and infrastructure in this southern area. Due to the gradient the area reflects a high rate of visual absorption. Moving out of the valley area above the valley walls into the deep hinterland, the absorption rate reduces where the landscape is flat, but in areas with more gradient variation the absorption rate is still medium. The southern hinterland still displays a high level of gradient variation and therefore a high visual absorption rate. Due to this topographical character the view catchment is no more than 5km in radius on average.

Statement 1: The property on which the development is proposed, is currently used for a range of utility type of land use and therefore the proposed solar farm seems to be in character with these elements.

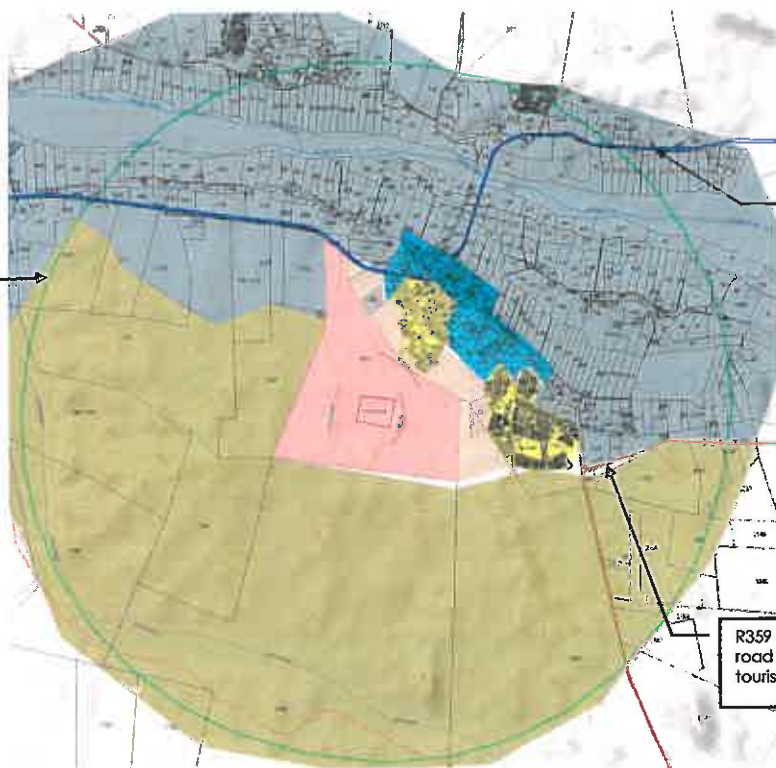
Statement 2: Due to the medium to high absorption capacity of the landscape, the development will easily be absorbed into the existing visual structure.

VIA: Kakamas

Kakamas Receiving Environment

- Commonage
- Industrial
- Low intensity farming
- Production landscape
- Residential
- Urban
- Vacant

5km view catchment area. The landscape consists of a valley with a hinterland to the north and south of this valley. The immediate hinterland to the south consist of hills and almost rocky/mountainous appearance. The hinterland to the north is more flat, but with interspersed hills, 'spitskoppe' and dunes. In general the area display a surprisingly variety in slope, hills, gradients and landform. This variation in landform reduces the visual reach and the view catchment of the area.



N14 : National road which is the main transport route through the area. This route has also been identified as an important tourist route and proposals were made that the entrances to towns along this route should be improved.

R359 also known as the rocky road presents an alternative tourist route

Figure 13: Kakamas View catchment

VIA: Kakamas

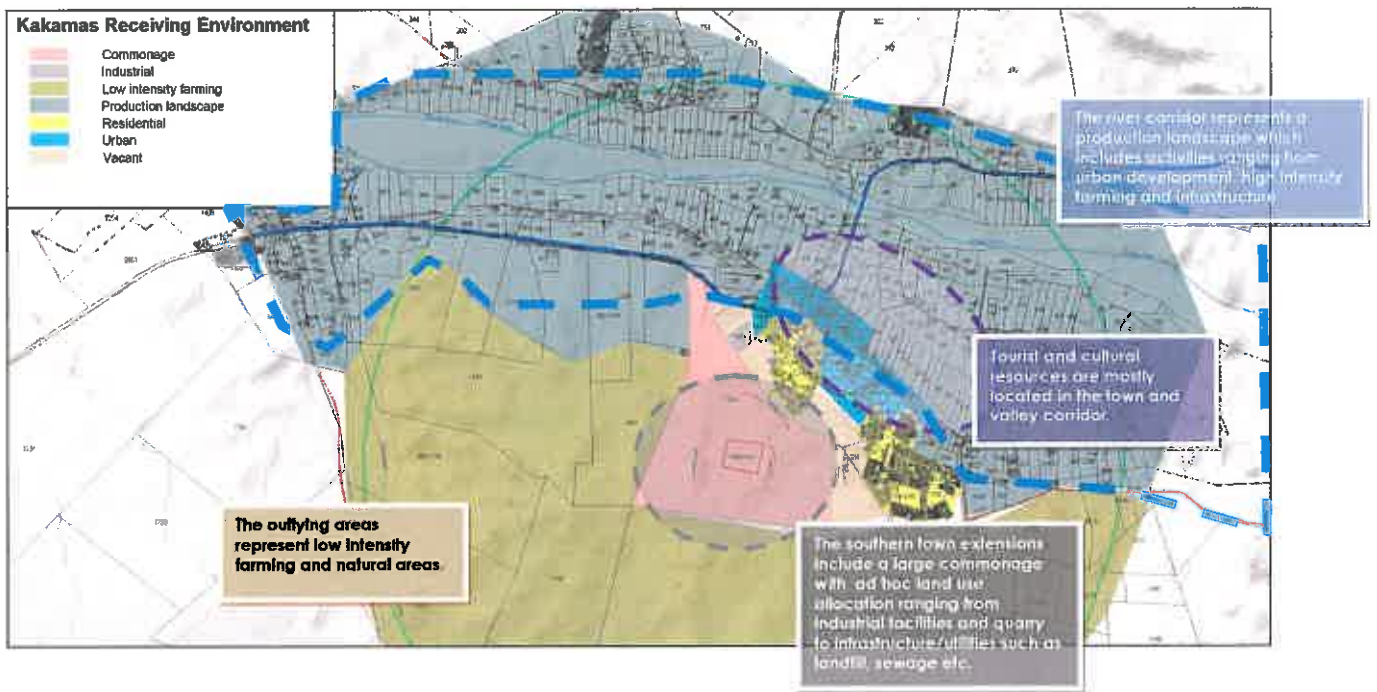


Figure 14: Kakamas Receiving Environment Components

VIA: Kakamas



Figure 15: Land use continuum

The site is situated in the southern extension of the town on commonage. It is surrounded by infrastructure which includes High voltage power lines, electrical substations, sewage works, landfill and quarry.

Other uses in the area include industrial buildings, small holding type of residential-industrial mix and large vacant land. Residential neighbourhoods are located north and east of this area. The area thus does not have a well defined character and reflects a lack a sense of place.

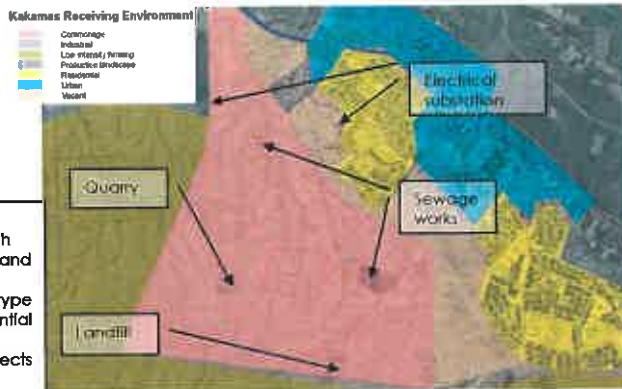
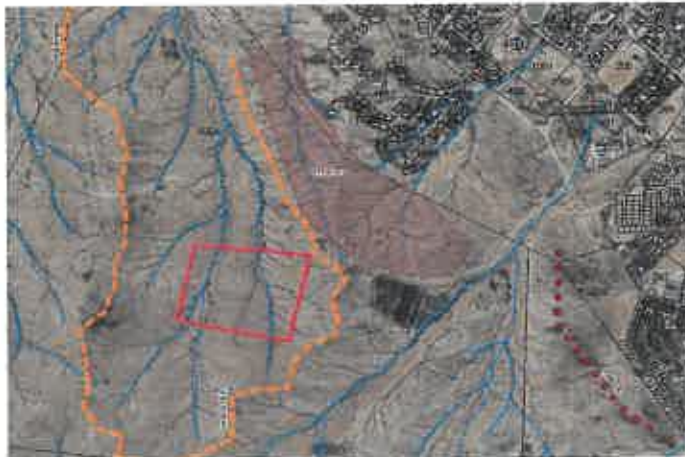


Figure 16: Immediate land use elements



Topographical features

Watersheds: The site is situated within a local drainage basin with the watersheds sheltering the site.

Terraced landscape: The area between the residential area to the north of the site and the north-eastern watershed display subtle terraces sloping from the residential area upward towards the site. These terraces create a view buffer just behind the residential area.

Hillocks: To the east the residential area is located east of a 'range' of hillocks. These hillocks shelter the property from the residential area.



View from first "terrace" towards town.

Figure 17: Topographical features

Prepared by: SC Lategan
May 2012

© Geostratics

VIA: Kakamas



Figure 18: Site elements

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 following potential receptors were identified (Figure 19):

1. N14 from Keimoes
2. N14 from Augrabies
3. Neighbourhood to the north
4. Neighbourhood to the south
5. R359 from Keimoes

6.2 Assessment of Receptors

1. N14 from Keimoes. At various positions along the N14 approaching from Keimoes, glimpses of the site is visible. The N14 is regarded as a tourist route as it provides the link between tourist destinations in the region. It does hold certain scenic qualities along the route as well. It is however a national road with the main objective of providing transport access not only for the region but on a national level. For this reason the road has a high speed limit ranging from 120km to 80km outside towns. The speed at which a person thus moves reduces the observation level and objects in view.

Travelling from Keimoes towards Kakamas on the N14, the traveller will observe the solar farm in the distance for the first time at "View 1". (Figure 20). The traveller then move through the pass and the view to the site is obscured by a hill. At view2 the traveller again has a view towards the site. This view is partially obscured by landscape elements until it totally disappear at "view2 stop". The traveller has a view over the valley and due to the distance i.e. approx. 8km from the site, the view is reduced by the distance. The speed limit on the N14 is 120km/h and the traveller move through this view window within a few minutes. At the point where the N14 turn south down into the valley the view is already obstructed by landscape elements and only a brief glimpse of the site may be possible.

The overall visual impact is thus of low significance.

2. N14 from Augrabies: The N14 is regarded as a tourist route as it provides the link between tourist destinations in the region. It does hold certain scenic qualities along the route as well. It is however a national road with the main objective of providing transport access not only for the region but on a national level. For this reason the road has a high speed limit ranging from 120km to 80km outside towns. The speed at which a person thus moves reduces the observation level and objects in view.

Travelling from Augrabies towards Kakamas, the traveler approach from a rural landscape towards an urban landscape (Figure 21). However the production landscape observed along the river create a higher acceptability level for infrastructure in the view and the traveler thus expect to observe a certain level of infrastructure. Approaching the site it will first come into view at the access point to the commonage just west of the town. It is however screened by the watersheds. The speed limit at this point is reduced to 80km/h and shortly after 60km/h. As the traveler enters the town, the orientation is such that the site is in his side view and soon obstructed by landscape elements. This means that the site is not obstructing the travelers view nor intruding on the traveler.

The overall visual impact travelling from Augrabies towards Kakamas on the N14 is thus of low significance.

Travelling out of Kakamas the site is screened behind existing buildings and infrastructure and by the time the traveler reaches the western entrance road, the site is already behind him.

The overall visual impact travelling out of Kakamas on the N14 is thus of low significance.

3. Residential area to the north (Figure 22). Houses directly adjacent the commonage are set below the "ridge" /terrace and the solar farm will not be visible to them. Houses set further away may have a view of the top of the units. A viewer however further away would be within the neighbourhood and landscape elements will block the view to the site. Brief glimpses may however be possible mostly of the top of units along streets.

The overall visual impact from the residential area just north of the site is of low significance.

4. Residential area to the east (Figure 23). The residential area is totally screened off from the site by the topography and therefore no further assessment of this receptor is necessary.
5. R359 south of the Orange River, to the east of the site. The R359 between Keimoes and Kakamas to the south of the river, has been identified as an alternative tourist route and is known as the "rockery" road. The road is however screened off from the site by the topography and eastern parts of the town. (Figure 25).

The overall visual impact on the R359 is of no significance.

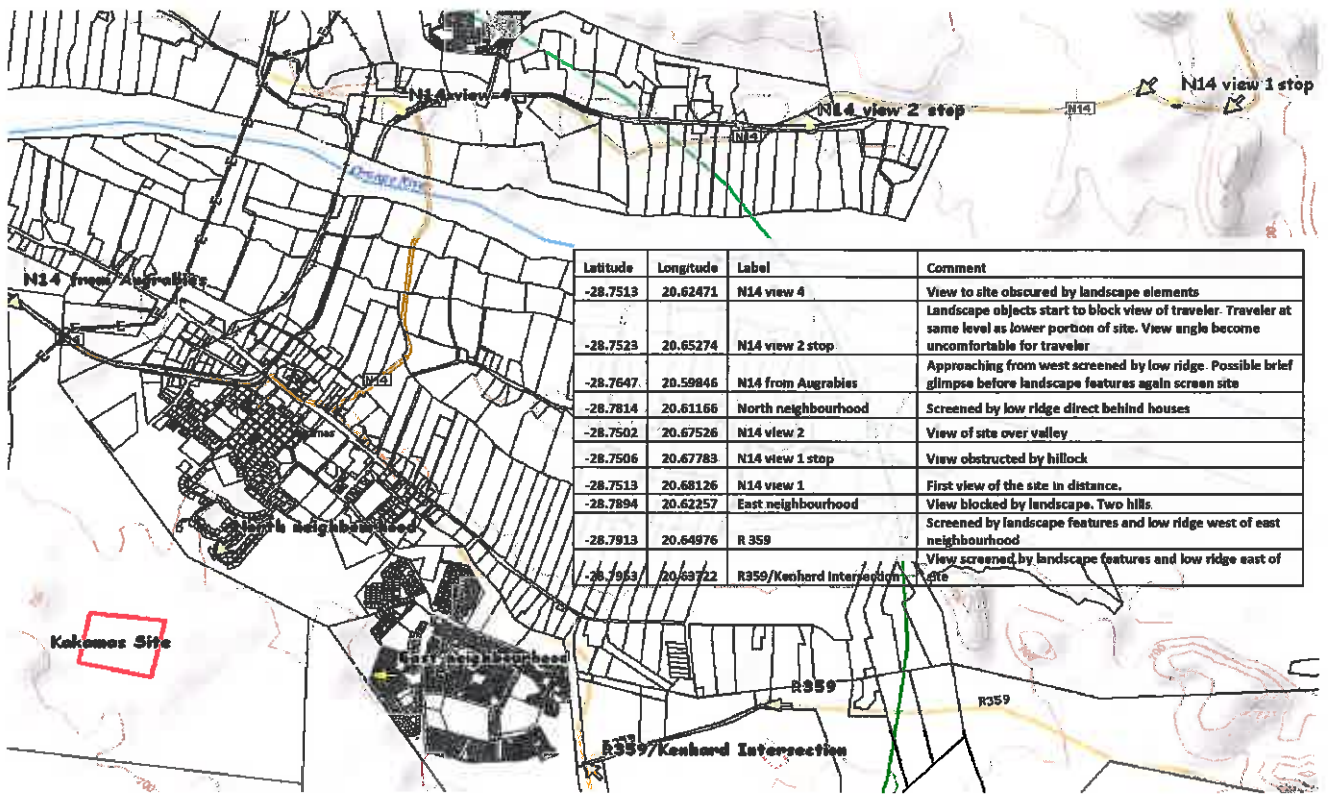
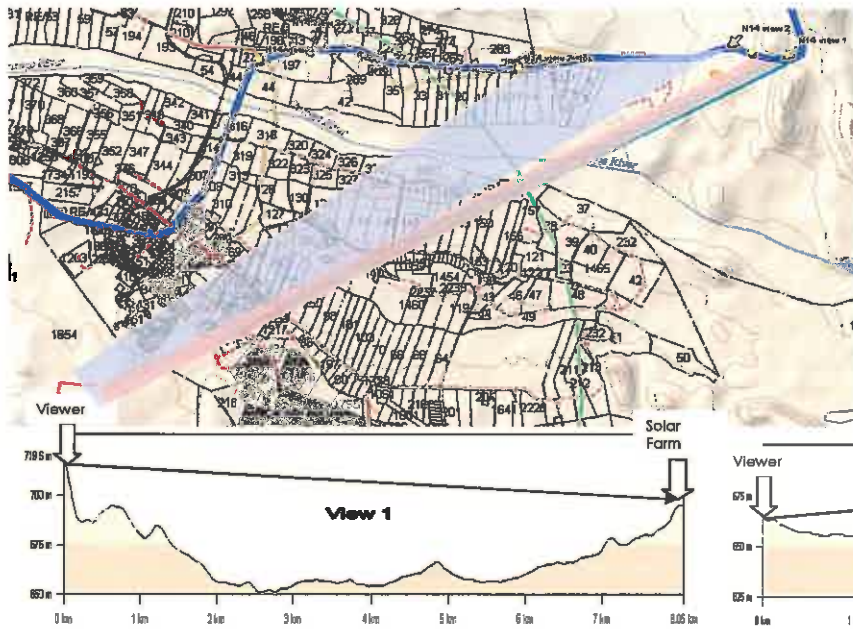


Figure 19: Potential visual receptors identified

Prepared by: SC Lafegan
May 2012

© Geostratics

VIA: Kakamas



View window 1: Travelling from Kelmoes towards Kakamas on the N14, the traveller will observe the solar farm in the distance for the first time at "View 1". The traveller then move through the pass and the view to the site is obscured by a hill.

View window 2: At view2 the traveller again has a view towards the site. This view is partially obscured by landscape elements until it totally disappear at "view2 stop". The traveller has a view over the valley and due to the distance i.e. approx. 8km from the site, the view is reduced by the distance. The speed limit on the N14 is 120km/h and the traveller move through this view window within a few minutes.

At the point where the N14 turn south down into the valley the view is already obstructed by landscape elements and only a brief glimpse of the site may be possible.

Figure 20: N14 approaching from Kelmoes as receptor

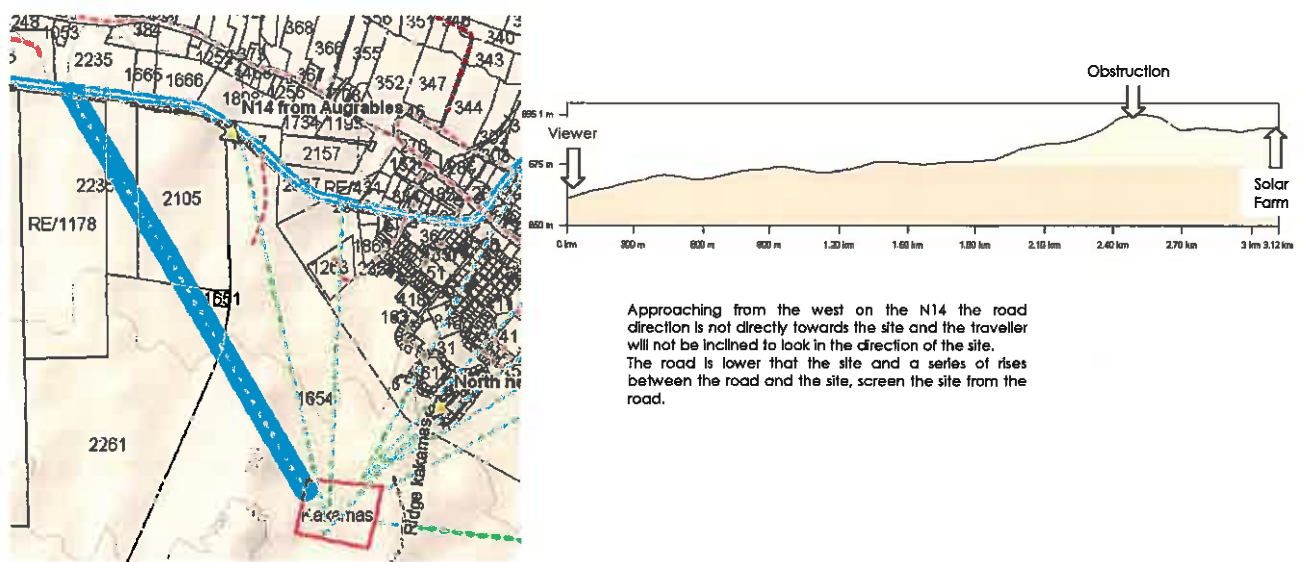
Criteria	High	Moderate	Low
Exposure	dominant, clearly visible	recognizable to the viewer	not particularly noticeable to the viewer
Sensitivity	residential, nature reserves, scenic route	sporting, recreational, places of work	industrial, mining, degraded areas
Intrusion/Obstructive	noticeable change,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

Table 3: N14 approaching from Kelmoes assessed as receptor

Prepared by: SC Lafegan
May 2012

© Geostatics

VIA: Kakamas



Approaching from the west on the N14 the road direction is not directly towards the site and the traveller will not be inclined to look in the direction of the site. The road is lower than the site and a series of rises between the road and the site, screen the site from the road.

Figure 21: N14 from Augrabies as possible view receptor

Criteria	High	Moderate	Low
Exposure	dominant, clearly visible	recognizable to the viewer	not particularly noticeable to the viewer
Sensitivity	residential, school, hospital, etc. other sensitive	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: N14 Approaching from Augrabies view assessed

VIA: Kakamas

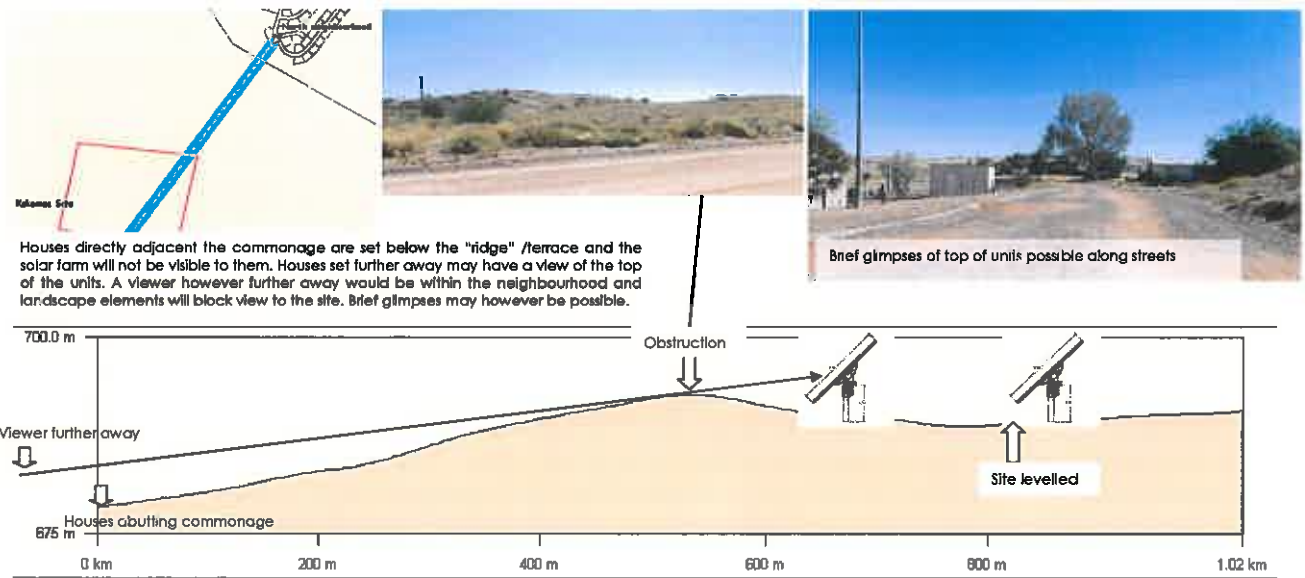


Figure 22: Neighbourhood to the north as receptor

Criteria	High	Moderate	Low
Exposure	dominant, clearly visible	recognizable to the viewer	not particularly noticeable to the viewer
Sensitivity	residential, sensitive areas	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 5: Neighbourhood to the north assessed as receptor

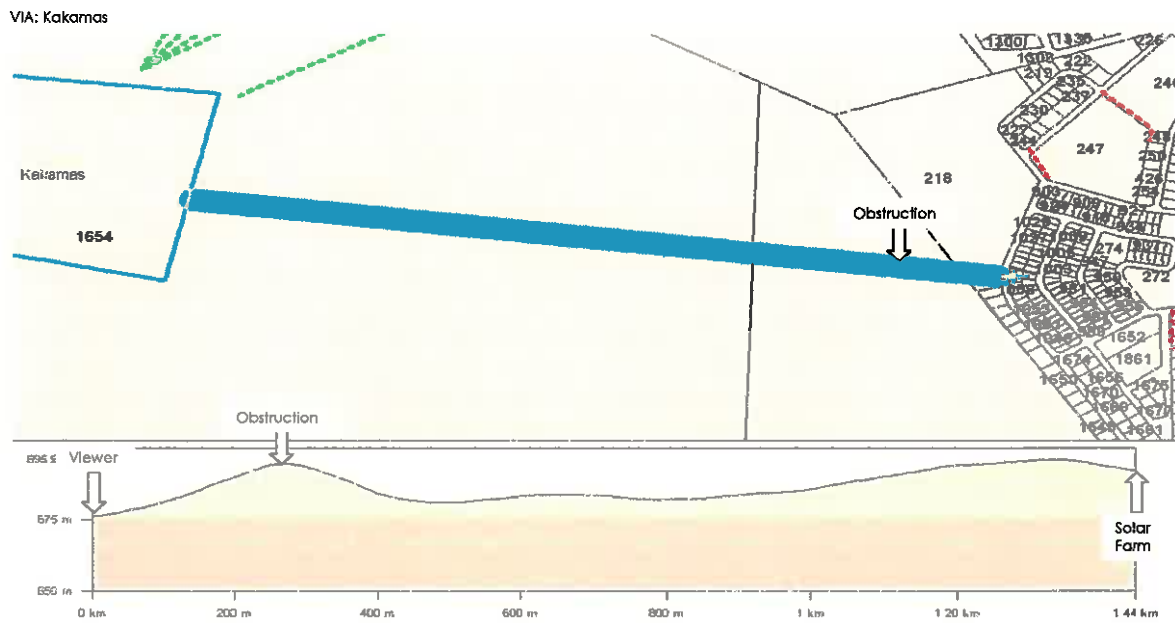
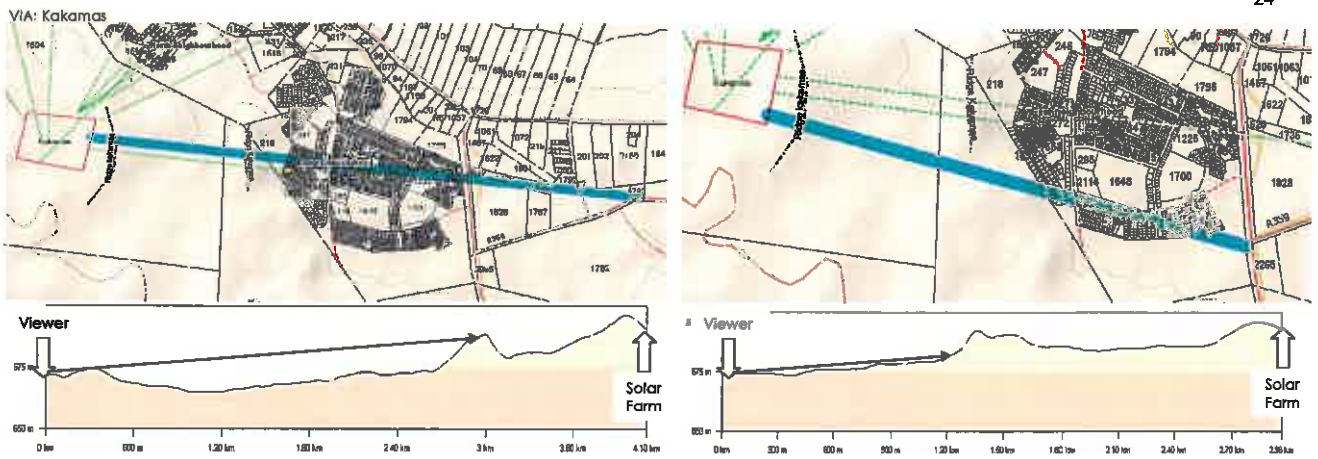


Figure 23: Neighbourhood to the east as receptor

Criteria	High	Moderate	Low
Exposure	dominant, clearly visible	recognizable to the viewer	not particularly noticeable to the viewer
Sensitivity	dominant or clearly visible, discordant with surroundings	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 6: Neighbourhood to the east assessed as receptor



The R359 between Keimoes and Kakamas to the south of the river, has been identified as an alternative tourist route and is known as the "rockery" road. The profiles indicate the topography of the landscape is such that the site will not be visible to the traveller travelling from Keimoes to Kakamas on the R359.

Figure 25: R359 as visual receptor

Criteria	High	Moderate	Low
Exposure	dominant, clearly visible	recognizable to the viewer	not particularly noticeable to the viewer
Sensitivity	highly sensitive, change is noticeable	sporting, recreational, places of work	industrial, mining, degraded areas
Intrusion/Obstructive	noticeable change, discordant with surroundings	Partially fits but clearly visible	minima: change or blends with surroundings

Table 7: R359 assessed as receptor

VIA: Kakamas

Table 8: Summary of Visual Receptor assessment

Label	Latitude	Longitude	Comment	Exposure	Sensitivity of receptor	Intrusion	Finding
N14 view 4	-28.7513	20.62471	View to site obscured by landscape elements	Approaching Kakamas from Kelmoes the traveler's view will be drawn to the valley below and the opposite valley wall will be visible at certain points. The view would however be brief. Rate: Moderate	The N14 and especially entrances to towns along this road has been identified of tourism importance. Rate: High	The distance of the site from the road and the brief glimpses which will be observed, significantly reduce the visibility of the site Rate: Low	No significant impact
N14 view 2 stop	-28.7523	20.65274	Landscape objects start to block view of traveler. Traveler at same level as lower portion of site. View angle become uncomfortable for traveler				
N14 view 2	-28.7502	20.67526	View of site over valley				
N14 view 1 stop	-28.7506	20.67783	View obstructed by hillock				
N14 view 1	-28.7513	20.68126	First view of the site in distance.				
N14 from Augrabies	-28.7647	20.59846	Approaching from west screened by low ridge. Possible brief glimpse before landscape features again screen site	Approaching Kakamas from Augrabies, the travelers view is not directed towards the site. The topography is also such that the traveler is screened from the site. Rate: Low	The N14 and especially entrances to towns along this road has been identified of tourism importance. Rate: High	The site is not visible from this approach. Rate: Low	No significant impact
North neighbourhood	-28.7814	20.61166	Screened by low ridge direct behind houses	The topography is such that the low ridge or terraced landscape between the residential area and the site, screen the site from view. Rate: Moderate	Residential area to the north of the site regarded as of high sensitivity Rate: High	Only glimpses of the top of units will be visible from a limited number of street intersections Rate: Low	No significant impact
East neighbourhood	-28.7894	20.62257	View blocked by landscape. Two hills.	The hillocks between the site and the residential area screen the site from view. Rate: Low	Residential area to the east of the site regarded as of high sensitivity Rate: High	The site will not be visible Rate: Low	No significant impact
R 359	-28.7913	20.64976	Screened by landscape features and low ridge west of east neighbourhood	The topography is such that the site is not visible from the R359 approaching Kakamas. Rate: Low	The R359 has been identified as a tourism route and thus of high sensitivity Rate: High	The site will not be visible from the R359 approaching Kakamas. Rate: Low	No significant impact
R359/Kenhard Intersection	-28.7953	20.63722	View screened by landscape features and low ridge east of site				

Prepared by: SC Lategan
May 2012

© Geostratics

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 findings have to be read in conjunction with the gaps and limitations as stated in paragraph 2.1.3.

The site is situated in an area of little coherence and ad hoc position of a range of industrial and utility land uses. The site has a high absorption capacity due to the presence of existing land use and topographical variation.

The sensitive receptors namely the N14, R359 and residential areas are situated such that the exposure to the site and the intrusion is low.

The alignment of transmission lines from the site to either of the two substations is not yet known. The type of lines are however of low impact.

The proposal does not present an unacceptable level of change to the visual environment and therefore the development can be recommended.

9 MITIGATION MEASURES

The level of visual impact is of such level that no mitigation to the proposed on-site development elements is recommended.

Once the alignment of power lines have been determined the impact should be assessed and if of significance.

Once detail on the road alignment and design is available, the impact should be assessed and if of significance mitigation measures proposed.