ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED SCATEC SOLAR 132KV DCT LINES, UPINGTON (NORTHERN CAPE PROVINCE)

SPECIALIST REPORT
DRAFT VISUAL IMPACT STATEMENT

DATE: 19 AUGUST 2015

Document prepared on behalf of:
Cape Environmental Practitioners (Pty) Ltd
For SCATEC SOLAR 163 (Pty) Ltd

Visual Resource Management Africa cc
P O Box 7233, George, 6531
Tel: +27 (44) 876 0020/ Fax: +27 (86) 653 3738
Cell: +27 (83) 560 9911
E-Mail: steve@vrma.co.za
Web: www.vrma.co.za

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

GLOSSARY

Best Practicable Environmental Option (BPEO)
This is the option that provides the most benefit, or causes the least damage, to the environment as a whole, at a cost acceptable to society, in the long, as well as the short, term.

Cumulative Impact
The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person, undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Impact (visual)
A description of the effect of an aspect of a development on a specified component of the visual, aesthetic or scenic environment, within a defined time and space.

Issue (visual)
Issues are concerns related to the proposed development, generally phrased as questions, taking the form of "what will the impact of some activity be on some element of the visual, aesthetic or scenic environment?"

Key Observation Points (KOPs)
KOPs refer to receptors (people affected by the visual influence of a project) located in the most critical locations surrounding the landscape modification, who make consistent use of the views associated with the site where the landscape modifications are proposed. KOPs can either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a linear view along a roadway, trail or river corridor.

Management Actions
Actions that enhance the benefits of a proposed development, or avoid, mitigate, restore or compensate for, negative impacts.

Receptors
Individuals, groups or communities who would be subject to the visual influence of a particular project.

Sense of Place
The unique quality or character of a place, whether natural, rural or urban.

Scenic Corridor
A linear geographic area that contains scenic resources, usually, but not necessarily, defined by a route.

Scoping
The process of determining the key issues, and the space and time boundaries, to be addressed in an environmental assessment.

Viewshed
The outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed. This reflects the area in which, or the extent to which, the landscape modification is likely to be seen.

Zone of Visual Influence (ZVI)
The ZVI is defined as 'the area within which a proposed development may have an influence or effect on visual amenity.'

LIST OF ACRONYMS

APHP	Association of Professional Heritage Practitioners
BLM	Bureau of Land Management (United States)
BPEO	Best Practicable Environmental Option
CALP	Collaborative for Advanced Landscape Planning
DEA&DP	Department of Environmental Affairs and Development Planning (South Africa)
DEM	Digital Elevation Model
DoC	Degree of Contrast
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographic Information System
I&APs	Interested and Affected Parties
IEMA	Institute of Environmental Management and Assessment (United Kingdom)
IEMP	Integrated Environmental Management Plan
KOP	Key Observation Point
MAMSL	Metres above mean sea level
NELPAG	New England Light Pollution Advisory Group
PSDF	Provincial Spatial Development Framework
ROD	Record of Decision
SAHRA	South African National Heritage Resources Agency
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VRM	Visual Resource Management
ZVI	Zone of Visual Influence

This document was completed by Silver Solutions 887 cc trading as VRM Africa, a Visual Impact Study and Mapping organisation located in George, South Africa. VRM Africa cc was appointed as an independent professional visual impact practitioner to facilitate this VIA.

This document was undertaken by the following team:

Stephen Stead	Director/ Visual Impact	APHP accredited VIA Practitioner
Lisa Schultz	Editing and Contrast Rating	Bachelor of Arts, Fine Art

Stephen Stead
APHP accredited VIA Specialist

1 INTRODUCTION

VRM Africa was appointed by Cape Environmental Assessment Practitioners (Pty) Ltd to undertake a Visual Statement of the proposed SCATEC 132KV power line and substations. The site is situated 18 km southwest of the town of Upington, within the jurisdiction area of the Kai ! Garib Local Municipality in the Siyanda district of the Northern Cape Province. A general site visit was undertaken on 6th August 2014 that informed the understanding of the surrounding landscape context, and a specific site visit is proposed on the 24th of August 2015.

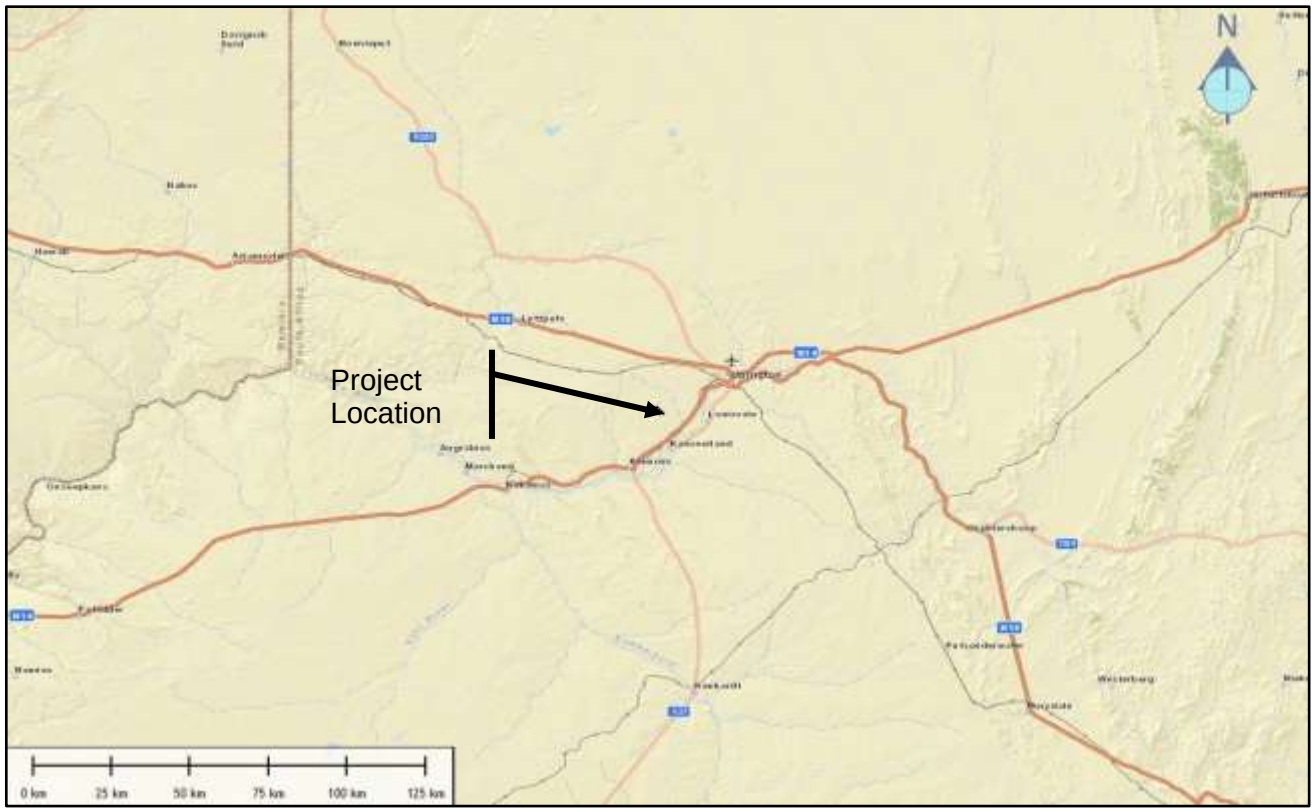


Figure 1: Regional locality map

1.1 Terms of Reference

According to the Bureau of Land Management, U.S. Department of Interior, landscape significance is assessed by differentiating between those landscapes of recognized or potential significance or sensitivity to modification and landscapes that have low sensitivity and scenic value. 'Different levels of scenic values require different degrees of management. For example, management of an area with high scenic value might be focused on preserving the existing character of the landscape, and management of an area with little scenic value might allow for major modifications to the landscape. Assessing scenic values and determining visual impacts can be a subjective process. Objectivity and consistency can be greatly increased by using standard assessment criteria to describe and evaluate landscapes, and to also describe proposed projects.'
(USDI., 2004)

The scope of the study is to cover the entire proposed project area, and the terms of reference for the study are as follows:

- Quantifying and assessing existing scenic resources/visual characteristics on, and around, the proposed site.
- Determining visible extent, view corridors and important viewpoints in order to assess the probable visual impacts of the proposed project.
- Reviewing the legal framework that may have implications for visual/scenic resources.
- Assessing the visual significance of proposed project per phases of operation.
- Preliminary visual impacts and recommendations regarding possible measures to reduce negative visual impacts for inclusion into the proposed project design, including input into the Environmental Management Plan (EMP).

1.2 Assumptions and Limitations

- Information pertaining to the specific heights of activities proposed for the development was limited and, where required, generic heights will be used to define the visibility of the project.
- Although every effort to maintain accuracy was undertaken, as a result of the Digital Elevation Model (DEM) being generated from satellite imagery and not being a true representation of the earth's surface, the viewshed mapping is approximate and may not represent an exact visibility incidence.
- The use of open source satellite imagery was utilised for base maps in the report.
- The viewsheds were generated using ASTER elevation data. (NASA, 2009)
- Some of the mapping in this document was created using Bing Maps (previously *Live Search Maps*, *Windows Live Maps*, *Windows Live Local*, and *MSN Virtual Earth*) and powered by the Enterprise framework.
- Determining visual resources is a subjective process where absolute terms are not achievable. Evaluating a landscape's visual quality is complex, as assessment of the visual landscape applies mainly qualitative standards. Therefore, subjectivity cannot be excluded in the assessment procedure (Lange, 1994). The project deliverables, including electronic copies of reports, maps, data, shape files and photographs are based on the author's professional knowledge, as well as available information. This study is based on assessment techniques and investigations that are limited by time and budgetary constraints applicable to the type and level of assessment undertaken. VRM Africa reserves the right to modify aspects of the project deliverables if and when new/additional information may become available from research or further work in the applicable field of practice, or pertaining to this study.
- ***A field survey is yet to be undertaken, as such the findings in report are preliminary and may be amended once the site has been surveyed in detail.***

1.3 Visual Impact Methodology Summary

The process that VRM Africa follows when undertaking a VIA is based on the United States Bureau of Land Management's (BLM) Visual Resource Management method (USDI., 2004). This mapping and GIS-based method of assessing landscape modifications allows for increased objectivity and consistency by using standard assessment criteria.

The VRM process involves the systematic classification of the broad brush landscape types within the receiving environment into one of four VRM Classes. Each VRM Class is associated with management objectives which serves to guide the degree of modification of the proposed site. The Classes are derived by means of a simple matrix with the three variables being the scenic quality, the expected receptor sensitivity to landscape change, and the distance of the proposed landscape modification from key receptor points. The Classes are not prescriptive and are utilised as a guideline to determine visual carrying capacity, where they represent the relative value of the visual resources of an area. Classes I and II are the most valued, Class III represents a moderate value; and Class IV is of least value.

If impact assessment is required, a Degree of Contrast exercise is undertaken. This is an assessment of the expected change to the receiving environment in terms of the form, line, colour and texture, as seen from the surrounding Key Observation Points. This is to determine if the proposed project meets the visual objectives defined for each of the Classes. If the expected visual contrast is strong, mitigations and recommendations are be made to assist in meeting the visual objectives. To assist in the understanding of the proposed landscape modifications, visual representation, such as photo montages or photos depicting the impacted areas, can be generated. This also serves to inform I&APs and decision-making authorities of the nature and extent of the impact associated with the proposed project/development. There is an ethical obligation in the visualisation process, as visualisation can be misleading if not undertaken ethically.

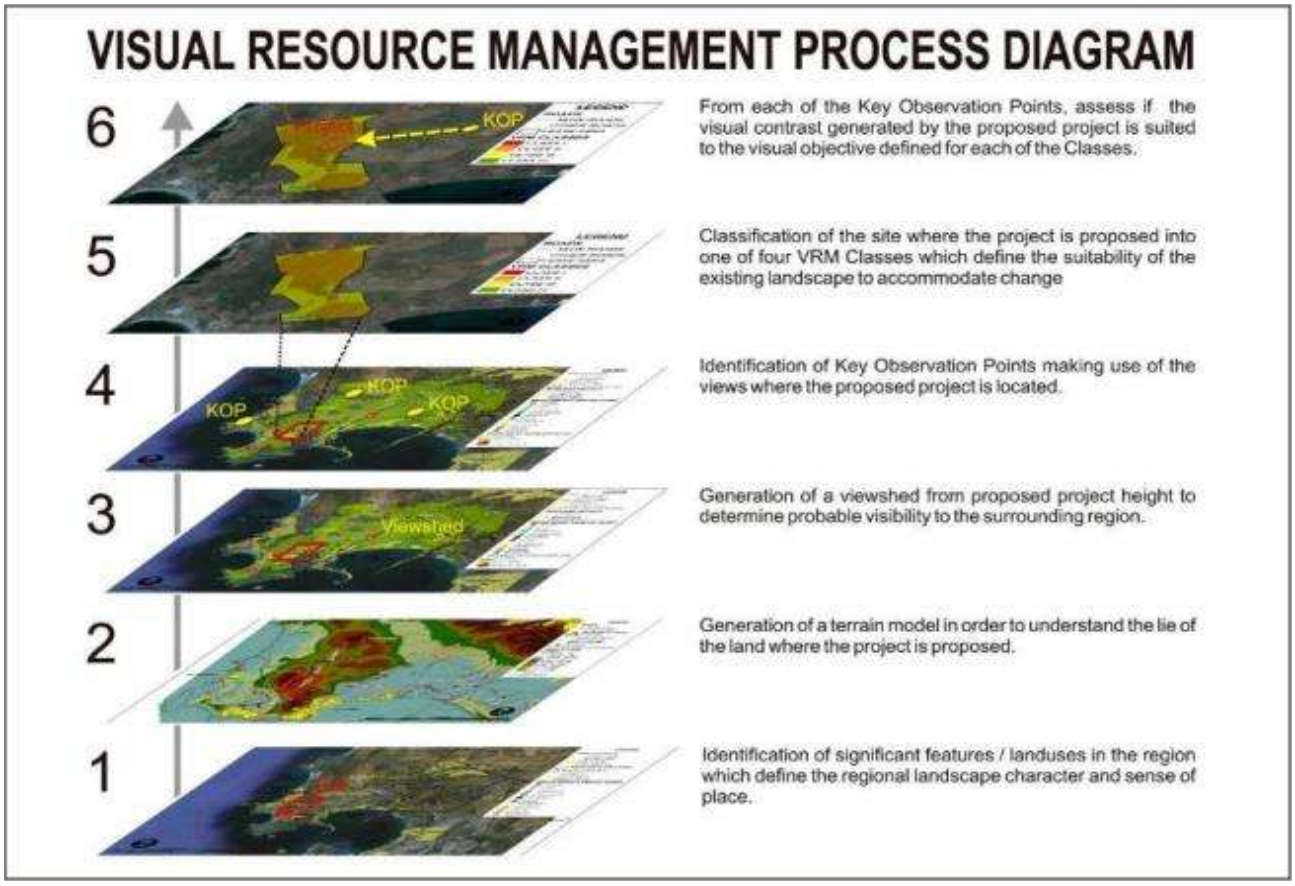


Figure 2: VRM process diagram

2 PROJECT DESCRIPTION

The proposed project will consist of two substations, Dyasonsklip and Sirius, and the associated 132 kV overhead transmission lines to connect each facility to the proposed Eskom Solar Park MTS as depicted in the project locality map provided by the client (Figure 3 below).

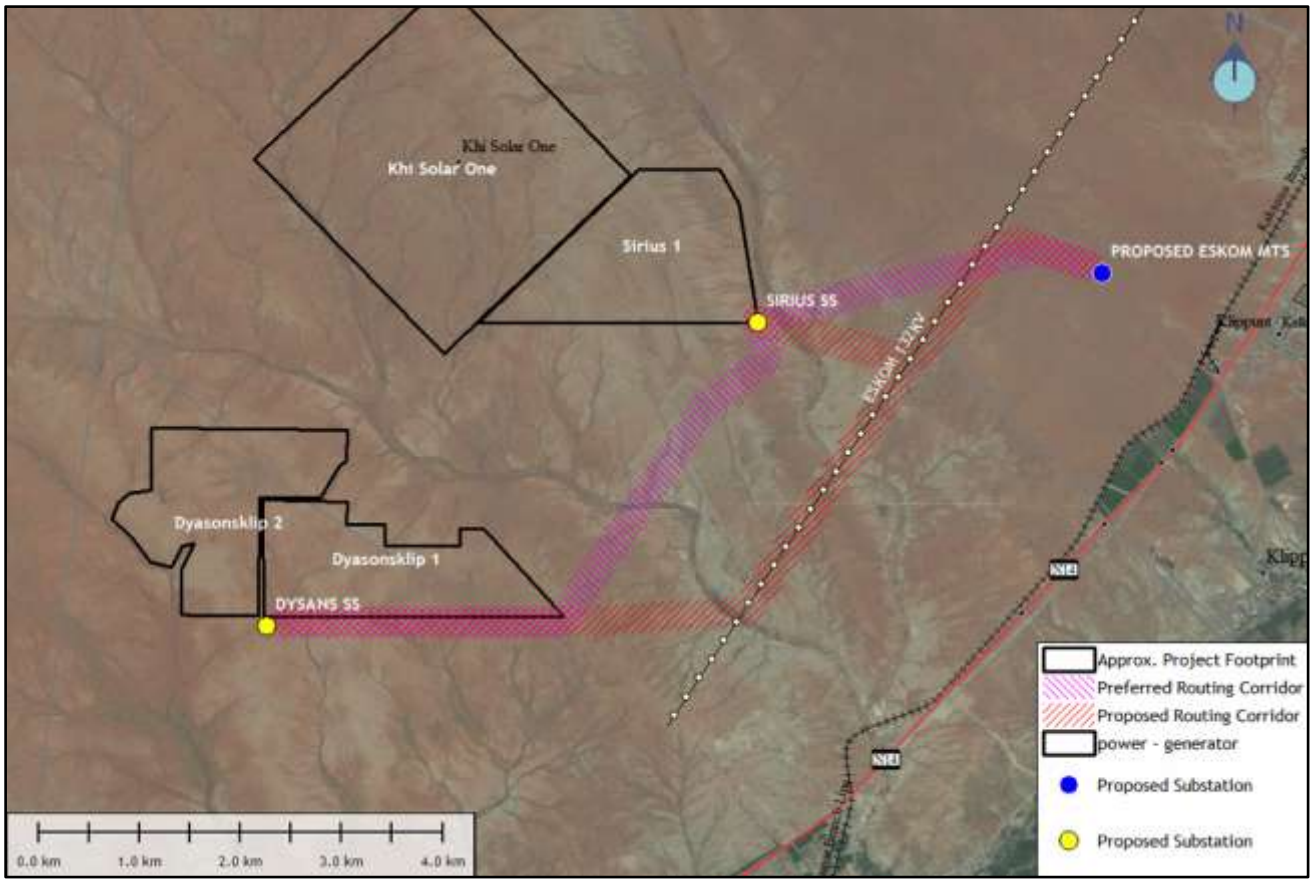


Figure 3: Proposed routing map provided by the client.

The Dyasonsklip substation would entail the following:

- 1 x 132kV line feeder bay;
- 2 x transformer feeder bays;
- 132kV busbar(s);
- Space for 3 future line feeder bays (Trans-Africa Projects, 2015)

The Sirius substation would entail the following:

- 2 x 132kV line feeder bay;
- 1 x transformer feeder bays;
- 132kV busbar(s);
- Space for 2 future line feeder bays and 1 future transformer feeder bay (Trans-Africa Projects, 2015)

The 132kV line will consist of self-supporting monopoles and guyed monopoles, with an approximate height of 25 to 35m above the ground.

2.1.1 *Route Alternatives*

Two routes have been proposed for the line connections between the three substations as depicted in Figure 3 above.

2.1.2 *No Go Alternative*

The No-go alternative proposes that the status quo of the approved line routings for the Sirius and Dyasonsklip projects, would be implemented as depicted in the maps below. Although an impact assessment was not undertaken (visual statement), it was found that the proposed alternatives would not constitute a significant visual impact to the characteristic landscape and further detailed visual assessment is not necessary for the following reasons:

- The proposed project's close proximity to the existing Khi Solar One Concentrated Solar Power (CSP) project.
- The area being an unofficial node for Solar Energy development with adjacent sites already having authorization.
- The alignment of the proposed project with municipal planning;
- To reduce visual intrusion from the possible multiple power lines linking up to different proposed PV projects in the vicinity, it is recommended that the power lines follow existing transmission line corridors as much as possible;
- From a cumulative visual impact perspective, it is important to ensure that the proposed Solar Energy projects to not detract from the tourism associated with the viniculture cultural landscape along the Orange River and the N14 national road (VRMA , 2014).

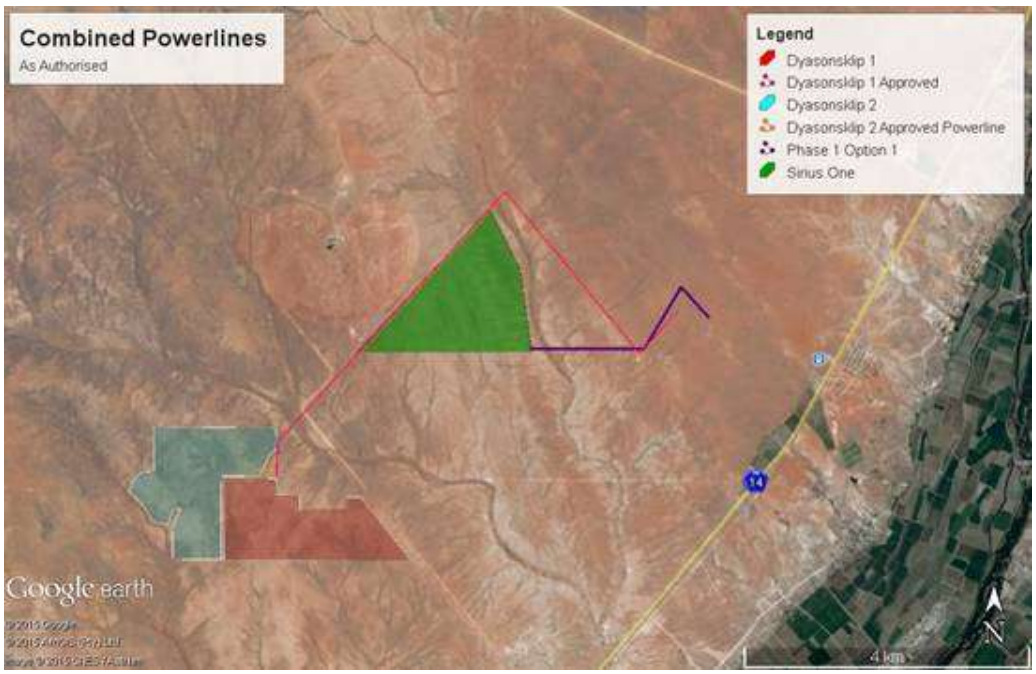


Figure 4: Map depicting the approved Dyasonsklip and Sirius SEF power lines (CapeEAPrac ##)

(Source: Cape EAPrac. TOR.2013)

(Source: Jawatha, India. www nccprojects com)

Figure 5: Monopole photographic examples

3 LANDSCAPE CONTEXT

3.1 Project Visibility

The visible extent, or viewshed, is 'the outer boundary defining a view catchment area, usually along crests and ridgelines' *(Oberholzer, 2005).* This reflects the area, or extent, where a landscape modification of a specified height would probably be seen. As the viewsheds were undertaken for both the previous project transmission lines, indicating a localised extent, a viewshed analysis was not undertaken for this transmission line. However, an approximate zone of visual influence (ZVI) of the proposed activities was defined. The ZVI was restricted to 4km as the monopoles have a relatively small visual footprint, which dissipates in the surrounding middle ground areas. In addition, visibility tends to diminish exponentially with distance, which is well recognised in visual analysis literature (*(Hull, R.B. and Bishop, I.E., 1988)*.

3.2 Key Landmarks

Based on the 4km ZVI defined above, the following landmarks were identified as significant in defining the surrounding areas characteristic landscape:

- Orange River
- Khi Solar One CSP Facility and Other Solar Energy Facilities
- Existing 132 kv Transmission Line
- Higher VAC levels along certain sections of the N14 National Road

3.2.1 *Orange River Viniculture Cultural Landscape*

Figure 6: View of Orange River town of Keimoes

The main landscape feature in the area is the Orange River valley. This landscape includes the river and residential and agricultural developments along the valley. Landform is fairly undulating and hilly, with rocky outcrops scattered along the banks where the river has eroded down creating a slight valley. Due to the proximity to water, vegetation is more prolific along the riverbank and is predominantly associated with cultivated vineyards and small-scale agriculture, although there are some larger residential developments that do detract from the overall landscape character. The cultural landscapes of this area are primarily associated with agricultural activities and vineyards on the more fertile lands along the Orange River and they add value to the overall vista. The types of receptors making use of the Orange River visual resources are mostly related to agriculture, tourism

and residential. It is likely that maintaining the existing sense of place would be important to these receptors. The area is also strongly associated with the 'vineyard' cultural landscape and hence attractive to landscape based tourism. Receptor sensitivity to change in landscape character in these areas would likely be *moderate to high*.

3.2.2 *Khi Solar One CSP Facility and Other Solar Energy Facilities*

Figure 7: View of Khi Solar One CSP under construction as seen from the N14.

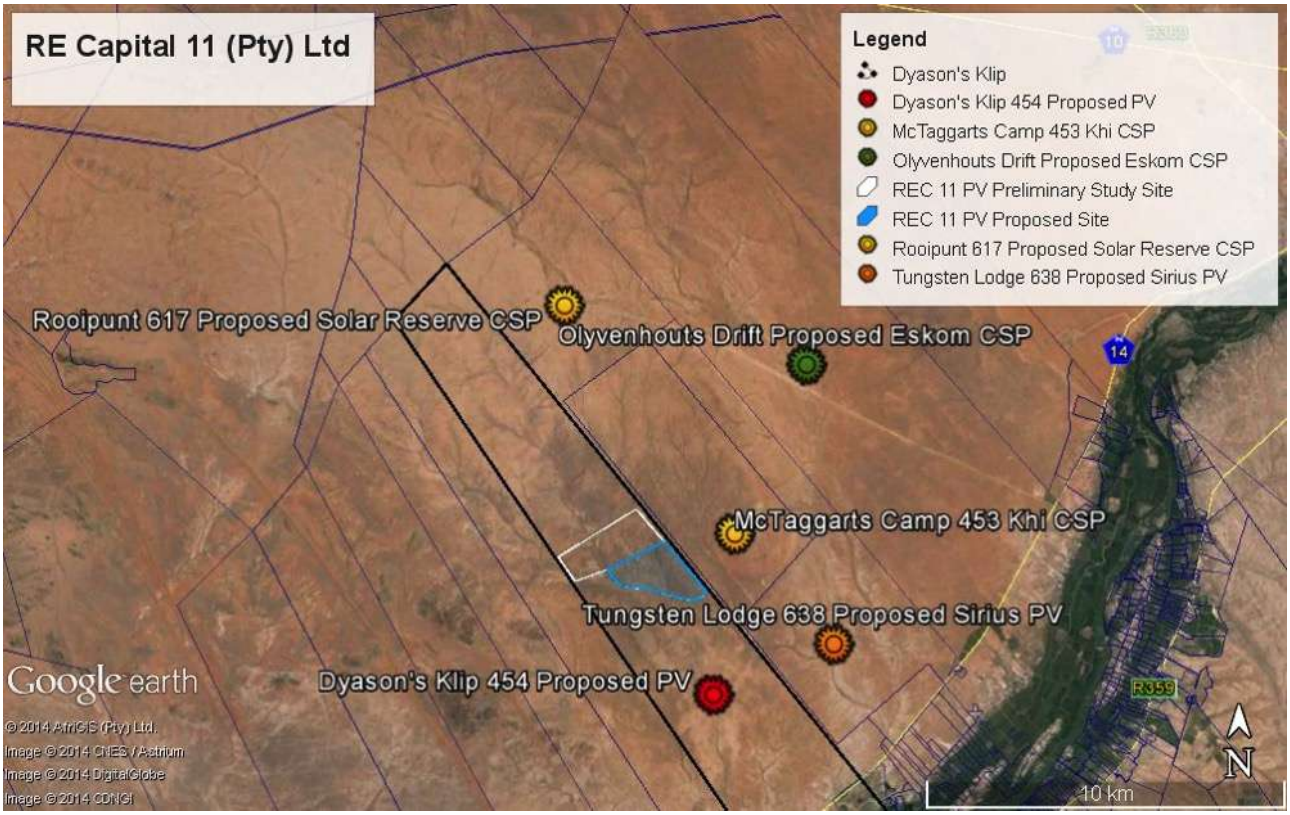


Figure 8: Other solar developments in relation to the proposedSite
(Source: Cape EAPrac. 2014)

The site is situated in close proximity to the Khi Solar One CSP tower project, currently under construction. This creates a large vertical feature in the landscape. It is likely that the area will become a solar energy hub, as within the surrounding landscape there are other proposed and approved CSP towers and large scale PV projects as well as a proposed Eskom substation.

3.2.3 *Existing 132 kV Transmission Line*

Figure 9: Photograph of the existing transmission lines located to the south of the proposed site.

There are existing 132 kv lines that are routed to the north of the N14, supported on wooden structures. The thin line, brown colour, mat texture and limited form reduces the degree of visual contrast that is generated by this power line, reducing the extent of the visual influence to within the local area.

3.2.4 *Higher Visual Absorption Capacities of the Agricultural areas along the N14 National Road*

Figure 10: View east from the N14 of the vineyard agriculture and associated distribution / telecommunication infrastructure, increasing the VAC levels.

The majority of the surrounding landscape to the south and north of the proposed site is associated with rural agriculture and low intensity grassland farming, with viticulture along the Orange River Valley. The N14 is an important tourist view corridor and it is recommended that a suitable visual buffer along the road is set in place to ensure that views of the proposed PV facilities do not detract from the viniculture sense of place found in this section of the N14 and the Orange River Valley. As depicted in Figure 10 above, sections of the N14 have higher VAC levels generated by the vineyard agriculture and associated distribution / telecommunication infrastructure.

4 SITE TERRAIN ANALYSIS

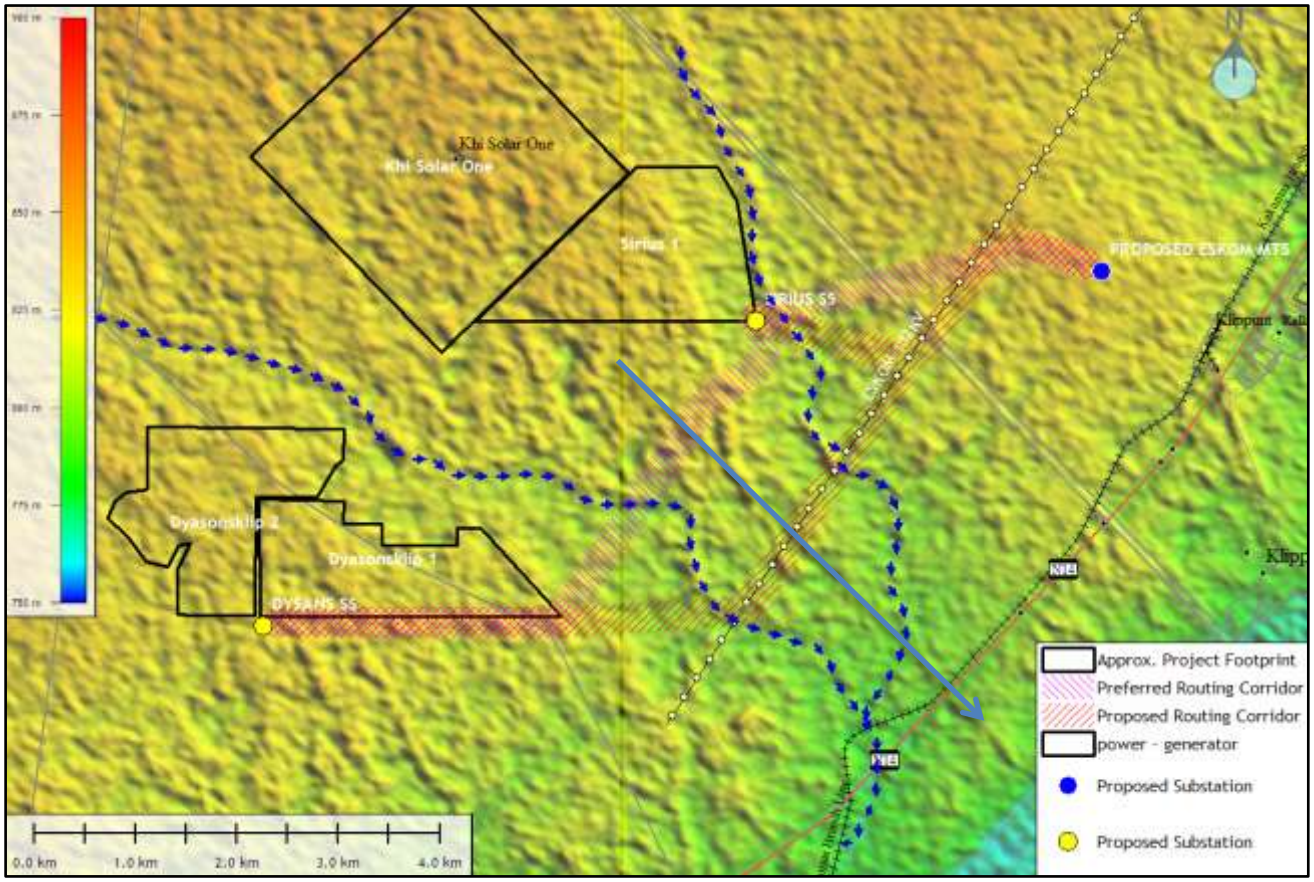
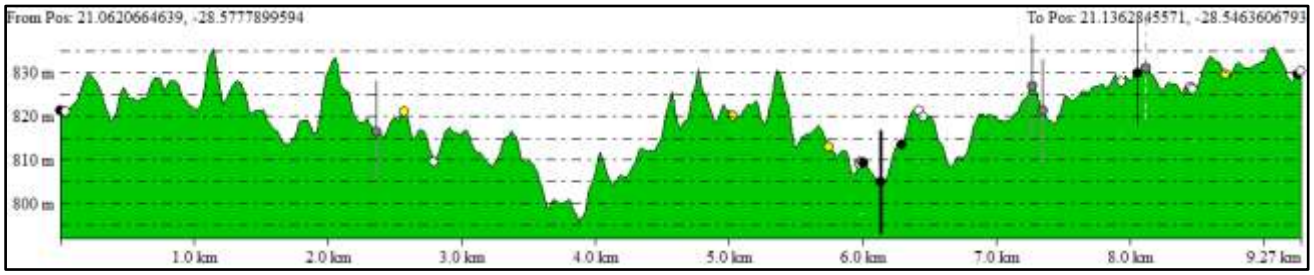


Figure 11: Area DEM depicting the proposed routings in relation to the terrain from which the below profiles were generated and the NW to SE profile line in blue.

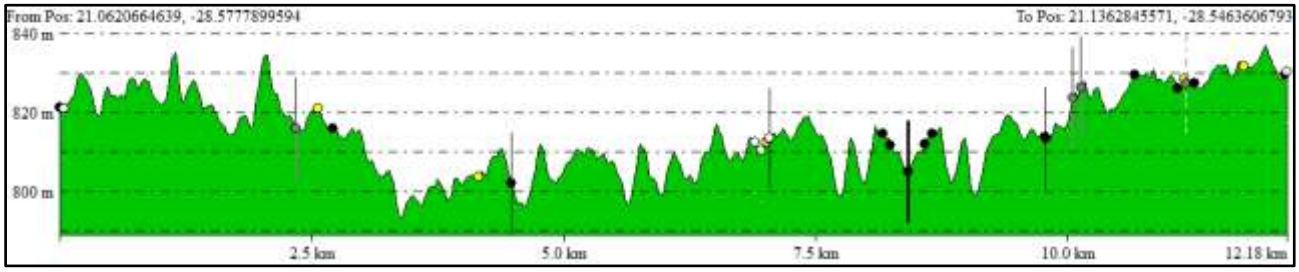
Preferred Alternative Profile (Dyasonsklip SS to Eskom MTS)



The Preferred Alternative routing is approximately 9.27 km in length. The minimum elevation is 790 mamsl, with the maximum elevation 838m amsl. The average elevation is 820m amsl The maximum slope percentage is 32% which indicates that there could be some steeper terrain along the route. The average slope percentage is 7.8%, with a standard deviation of 4%, indicating that most of the route is fairly flat. The average aspect is SE (134 deg). As indicated in the profile

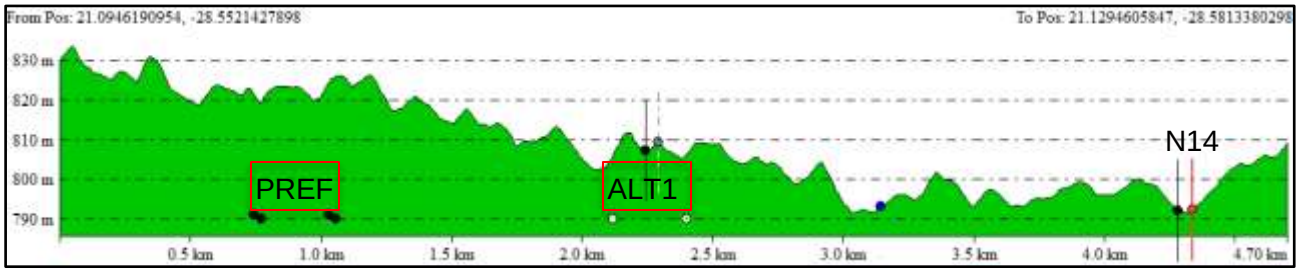
above, the proposed route crosses two river systems with a slight 30m rise between the two river valleys.

Alternative 1 Profile (Dyasonsklip SS to Eskom MTS)



The Alternative 1 routing is approximately 12.18 km in length, due to the LILO link to the Sirius SS. The minimum elevation and maximum elevations are the same as in the preferred routing, but with the average elevation slightly lower at 814 mamsl. The maximum slope percentage is 18% which indicates that there could be some steeper terrain along the route, but would be less steep than the preferred route. The average slope percentage and standard deviation are very similar, also indicating that most of the route is fairly flat. The average aspect is SE (156 deg). As indicated in the profile above, the proposed route also crosses also crosses two river systems, but with a less prominent rise between the two shallow river valleys.

Northwest to Southeast Profile



The Northwest to the Southeast profile reflects the gradual drop in elevation towards the south, with some slight undulation along the length. The preferred alternative (left) is slightly less prominent than Alternative 1, as the slight undulation to the south of the route would help reduce visibility as seen from the N14 receptors (right). Alternative 1 is slightly more locally prominent (in this central elevated area) with respect to the views from the N14. It is important to note that the N14 falls within the expected 4km zone of visual influence, whereas the N14 is located just out the Preferred Alternative zone of visual influence.

5 PRELIMINARY IMPACTS

5.1 Assessment Methodology

The Cape Environmental Practitioners Assessment Methodology was utilised in this assessment. The potential impacts and recommended mitigation measures must be separated into:

- Pre-construction (demarcation, vegetation clearing etc.)
- Construction
- Operation / Maintenance
- Cumulative impacts must also be described and mitigation measures provided where possible.
- Specific management and monitoring requirements/guidelines must be provided. These requirements/ guidelines will be used as conditions of approval for the Environmental Authorisation (should it be granted) and the Environmental Management Programme (EMP).

Criteria for Assessment
These criteria are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998). These criteria include:

Nature of the impact
This is an appraisal of the type of effect the construction, operation and maintenance of a development would have on the affected environment. This description should include what is to be affected and how.

Extent of the impact
Describe whether the impact will be: local extending only as far as the development site area; or limited to the site and its immediate surroundings; or will have an impact on the region, or will have an impact on a national scale or across international borders.

Duration of the impact
The specialist should indicate whether the lifespan of the impact would be short term (0-5 years), medium term (5-15 years), long term (16-30 years) or permanent.

Intensity
The specialist should establish whether the impact is destructive or benign and should be qualified as low, medium or high. The specialist study must attempt to quantify the magnitude of the impacts and outline the rationale used.

Probability of occurrence
The specialist should describe the probability of the impact actually occurring and should be described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).
The impacts should also be assessed in terms of the following aspects:

Status of the impact
The specialist should determine whether the impacts are negative, positive or neutral ("cost – benefit" analysis). The impacts are to be assessed in terms of their effect on the project and the environment. For example, an impact that is positive for the proposed development may be negative for the environment. It is important that this distinction is made in the analysis.

Accumulative impact
Consideration must be given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts must be evaluated with an assessment of similar

developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

Degree of confidence in predictions

The specialist should state what degree of confidence (low, medium or high) is there in the predictions based on the available information and level of knowledge and expertise.

Based on a synthesis of the information contained in the above-described procedure, you are required to assess the potential impacts in terms of the following significance criteria:

- **No significance**: the impacts do not influence the proposed development and/or environment in any way.
- **Low significance**: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- **Medium significance**: the impacts will have a medium influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance**: the impacts will have a major influence on the proposed development and/or environment and will result in the “no-go” option on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

Table 1: Impact Summary Table

Construction Phase:

Alternative	**Nature of Impact**	**Extent of Impact**	**Duration of Impact**	**Intensity**	**Probability**	**Status of Impact**	**Degree of confidence**	**Level of Significance**	**Significance after Mitigation**
Status Quo	Degradation of scenic resources	Local	Short Term	Medium	Likely	Negative	High	Medium	Medium
Preferred Alternative	Degradation of scenic resources	Site	Short Term	Low	Likely	Negative	High	Low	Low
Alternative 1	Degradation of scenic resources	Site	Short Term	Medium to Low	Likely	Negative	High	Low	Low

Operational Phase:

Alternative	**Nature of Impact**	**Extent of Impact**	**Duration of Impact**	**Intensity**	**Probability**	**Status of Impact**	**Degree of confidence**	**Level of Significance**	**Significance after Mitigation**
Status Quo	Degradation of scenic resources	Local	Permanent	Medium to High	Distinctly Possible	Negative	High	Medium to High (Cumul.)	Medium to High (Cumul.)
Preferred Alternative	Degradation of scenic resources	Local	Permanent	Low	Likely	Negative	High	Low	Low
Alternative 1	Degradation of scenic resources	Local	Permanent	Medium	Distinctly Possible	Negative	Medium	Medium to High (Cumul.)	Medium to High (Cumul.)

6 PRELIMINARY FINDINGS

The ***nature of the impact*** was defined as ***negative*** due the potential degradation of local scenic resources, which includes open and undulating Kalahari landscapes, as well as drainage lines. Topographically, both routes have similar spatial statistics, but with the Preferred Alternative routed over a small rise between two river valleys, but not to the degree where it becomes prominent to the surrounding areas. Due to the closer proximity of Alternative 1 to the N14 National Road, which falls within the route ZVI, the routing is slightly more visually prominent.

The construction phase ***extent*** of the visual impact (zone of visual influence) would be contained on ***site*** for the ***two new routing alternatives***, but the ***status quo is rated local*** due to the larger coverage of the multiple routes. Operation phase extent was rated local for all routings, it is unlikely that the negative effects of the proposed power line routings would extend beyond the ***local extent*** due to the small visual footprint of the proposed landscape modification. The ***duration*** of the impact was rated ***short term*** for the construction phase, and ***permanent*** for the operation, as it is likely that the proposed power lines will remain in the landscape for longer than 20 years.

The ***intensity*** of the construction phase was rated ***medium*** for the Status Quo, ***low*** for the Preferred Alternative and ***medium to low*** for the Alternative 1. This is due to the higher visual absorption capacity of the landscape for all routes. The Status Quo and Preferred Alternative would be routed adjacent to the authorized SEF's, and the Alternative 1 would be routed adjacent the existing Eskom 132kV power line. Operational phase intensity was rated ***medium to high*** for the Status Quo, **low** for the Preferred, and ***medium*** for Alternative 1. The higher ratings for the Status Quo relate to the wider distribution of the impact, which like the Alternative 1 Routings, also falls within the N14 National Highway zone of visual influence (hence rated higher than the Preferred which is located further away from the N14 National Road).

Construction phase impacts are likely to take place, but there is a ***distinct possibility*** of the Status Quo operational impacts taking place due to the wider visual distribution, and lack of coordinated alignment to existing cadastral or infrastructure in the landscape, creating a cluttered landscape effect. It is also ***distinctly possible*** for the Alternative 1 Routings impacts to take place, which falls within the N14 zone of visual influence. Due to the background position of the Preferred Routing, which is routed adjacent the authorized SEF projects, the impact is ***likely*** on the small area of slightly raised ground between the two river valleys.

Construction phase visual impact ***significance*** was rated medium for the Status Quo, due to the medium intensity and local extent, and ***low*** for both the new routing options (due the small visual footprint of the construction phase impacts). Operation phase visual impact significance was rated ***medium to high*** for the Status Quo, due to the cumulative visual impacts from the cluttering of the landscapes, setting a precedent for un-aligned routing corridors taking place in the future. Alternative 1 significance was also rated **medium to high** due to the north-south section of the line (Sirius SS LILO), creating a structure barrier that would force any future power line routings to follow the same route, crossing over the existing Eskom 132kV line, and creating a power line corridor to the south of the existing line that is in close visual proximity to the N14 National Road. This barrier effect is not apparent for the Preferred Alternative, which would allow for a new power line corridor, running parallel to the existing Eskom 132kV line, but with a suitable gap and with the routing corridor location outside of the ZVI of the N14 National Road (hence the Preferred Routing was rated ***low)***. As mitigation would not likely reduce the resultant visual impacts, significance for all the routings was rated the same as without mitigation. However, mitigations in terms of best practice are recommended.

7 MITIGATIONS AND RECOMMENDATIONS

7.1 Preferred Routing

It is the recommendation of the study that the Preferred Routing Alternative is ***visually preferred***, with the following mitigations:

- Utilisation of existing northsouth access roads to access the corridor;
- Location of the pylons outside of drainage lines, or significant biodiversity areas (as per the ecology specialists findings);
- Soil erosion management along the maintenance road along the proposed corridor.
- The Preferred Alternative makes a kink to follow the Sirius SEF footprint areas. If possible, it is recommended that the route be aligned as straight as possible, so that any further power lines from future SEF projects to the west, will also be routed in a straight line (adjacent the proposed routing).

7.2 Alternative 1 Routing

It is the recommendation of the study that Alternative 1 Routing is ***not implemented***, due to the higher visual impacts associated with cumulative degradation of the landscapes falling within the N14 National Road. Should this alternative be implemented, the following mitigations are proposed:

- Future power lines should be routed to the north of the authorised;
- Utilisation of existing northsouth access roads to access the corridor;
- Location of the pylons outside of drainage lines, or significant biodiversity areas (as per the ecology specialists findings);
- Soil erosion management along the maintenance road along the proposed corridor.

8 CONCLUSION

It is the recommendation of the study that the Preferred Routing Alternative is ***visually preferred***. Operation phase visual impact significance was rated ***medium to high*** for the Status Quo option, due to the cumulative visual impacts from the cluttering of the landscapes, setting a precedent for un-aligned routing corridors taking place in the future. Alternative 1 significance was also rated **medium to high** due to the north-south section of the line (Sirius SS LILO), creating a structure barrier that would force any future power line routings to follow the same alignment, crossing over the existing Eskom 132kV line, essentially setting a precedent for a power line corridor to the south of the existing line. This routing corridor is in close visual proximity to the N14 National Road, which carries tourist traffic and should be recognised as a tourist view corridor. This barrier effect is not apparent for the Preferred Alternative, which would allow for a new power line corridor, running parallel to the existing Eskom 132kV line, but with a suitable gap and with the routing corridor location outside of the ZVI of the N14 National Road (hence the Preferred Routing was rated ***low)***. As mitigation would not have a major reduction in the resultant visual impacts, significance for all the routings was rated the same as without mitigation. Mitigations in terms of best practice were recommended, to straighten the proposed routing and much as possible, setting in place a precedent for a future power line corridor running parallel, but further to the north, of the existing Eskom 132kV power line.

9 REFERENCES

DEA&DP. *Guideline for involving Visual and Aesthetic Specialists in EIA Processes.*

Department of Environment Affairs. (2013). *DEA National Wind and Solar PV Strategic Environmenal Assessment.*

Gamagara Municipality. (2010). *Gamagara Municipality SDF.*

Hull, R. B., & Bishop, I. E. (1988). *Scenic Impacts of Electricity Power Mine: The Influence of Landscape Type and Observer Distance. Journal of Environmental Management.(27) Pg 99-108.*

IEMA. (2002). *U.K Institute of Environmental Management and Assessment (IEMA). 'Guidelines for Landscape and Visual Impact Assessment' Second Edition, Spon Press. Pg 44.*

Lange, E. (1994). *Integration of computerized visual Simulation and visual Assessment in environmental Planning. Landscape and Urban Planning. .*

Mucina, & Rutherford. (2009). *National vegetation types from Vegetation map for South Africa, Lesotho and Swaziland (2009 update).*

NASA, A. G. (2009). *Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model Version 2 (GDEM V2 2011). Ministry of Economy, Trade, and Industry (METI) of Japan and United States National Aeronauti.*

NELPAG. *New England Light Pollution Advisory Group (NELPAG) http://cfa/ www.harvard .edu /cfa/ps/nelpag.html) and Sky & Telescope http://SkyandTelescope.com/). NELPAG and Sky & Telescope support the International Dark-Sky Association (IDA) (http://www.darksky.o.*

Oberholzer, B. (2005). *Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Deve.*

Trans-Africa Projects. (2015). *Scatec solar 132kV DCt Lines Preliminary Design Report.*

USDI., B. (2004). *Bureau of Land Management, U.S. Department of Interior. 2004. Visual Resource Management Manual 8400.*

VRMA . (2014). *RE Capital 11 Solar Energy Facility Transmission Line Visual Assessment.*

Western Cape Government. (2002). *Guideline for the Management of Developmetn on Mountains, Hills and Ridges in teh Western Cape.* Environmental Affairs & Development Planning.

10 ANNEXURE 1: SPECIALIST DECLARATION OF INDEPENDENCE

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

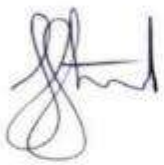
Specialist:	VRM AFRICA CC		
Contact person:	STEPHEN STEAD		
Postal address:	P.O BOX 7233, BLANCO		
Postal code:	6531	Cell:	083 560 9911
Telephone:	044 874 0020	Fax:	086 653 3738
E-mail:	steve@vrma.co.za		
Professional affiliation(s) (if any)	Association of Professional Heritage Practitioners South Africa (APHP)		

The specialist appointed in terms of the Regulations

I, **STEPHEN STEAD**, declare that ---

General declaration:

- I act as the independent specialist in this application
  I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

SILVER SOLUTIONS TRADING AS VRM AFRICA

Name of company (if applicable):

23 JANUARY 2013

Date:

10.1 Curriculum Vitae

Curriculum Vitae (CV)

1. **Position**: Owner / Director
2. **Name of Firm**: Visual Resource Management Africa cc *(www.vrma.co.za)*
3. **Name of Staff**: Stephen Stead
4. **Date of Birth**: 9 June 1967
5. **Nationality:** South African
6. **Contact Details:** **Tel: +27 (0) 44 876 0020**
   Cell: +27 (0) 83 560 9911
   Email: steve@vrma.co.za

7. **Educational qualifications**:
   - University of Natal (Pietermaritzburg):
   - Bachelor of Arts: Psychology and Geography
   - Bachelor of Arts (Hons): Human Geography and Geographic Information Management Systems

8. **Professional Accreditation**
   - Association of Professional Heritage Practitioners (APHP) Western Cape
     - Accredited VIA practitioner member of the Association (2011)

9. **Association involvement:** :
   - International Association of Impact Assessment (IAIA) South African Affiliate
     - Past President (2012 - 2013)
     - President (2012)
     - President-Elect (2011)
     - Conference Co-ordinator (2010)
     - National Executive Committee member (2009)
     - Southern Cape Chairperson (2008)

10. **Conferences Attended:**
    - IAIAsa 2012
    - IAIAsa 2011
    - IAIA International 2011 (Mexico)
    - IAIAsa 2010
    - IAIAsa 2009
    - IAIAsa 2007

11. **Continued Professional Development:**
    - Integrating Sustainability with Environment Assessment in South Africa (IAIAsa Conference, 1 day)
    - Achieving the full potential of SIA (Mexico, IAIA Conference, 2 days 2011)
    - Researching and Assessing Heritage Resources Course (University of Cape Town, 5 days, 2009)

12. Countries of Work Experience:

- South Africa, Mozambique, Malawi, Lesotho, Kenya and Namibia

13. Relevant Experience:

Stephen gained six years of experience in the field of Geographic Information Systems mapping and spatial analysis working as a consultant for the KwaZulu-Natal Department of Health and then with an Environmental Impact Assessment company based in the Western Cape. In 2004 he set up the company Visual Resource Management Africa which specializes in visual resource management and visual impact assessments in Africa. The company makes use of the well documented Visual Resource Management methodology developed by the Bureau of Land Management (USA) for assessing the suitability of landscape modifications. In association with ILASA qualified landscape architect Liesel Stokes, he has assessed of over 100 major landscape modifications through-out southern and eastern Africa. The business has been operating for eight years and has successfully established and retained a large client base throughout Southern Africa which include amongst other, Rio Tinto (Pty) Ltd, Bannerman (Pty) Ltd, Anglo Coal (Pty) Ltd, Eskom (Pty) Ltd, NamPower and Vale (Pty) Ltd, Ariva (Pty) Ltd, Harmony Gold (Pty) Ltd, Mellium Challenge Account (USA), Pretoria Portland Cement (Pty) Ltd

14. Languages:

- English – First Language
- Afrikaans – fair in speaking, reading and writing

15. Projects:

A list of ***some*** of the large scale projects that VRMA has assessed has been attached below with the client list indicated per project (Refer to www.vrma.co.za for a full list of projects undertaken).

YEAR	NAME	DESCRIPTION	LOCATION
2014	Joram Solar	Solar Energy	Northern Cape
2014	RERE PV Postmasberg	Solar Energy	Northern Cape
2014	RERE CPV Upington	Solar Energy	Northern Cape
2014	Rio Tinto RUL Desalinisation Plant	Industrial	Namibia
2014	NamPower PV	Solar Energy	Namibia
2014	Pemba Oil and Gas Port Expansion	Industrial	Mozambique
2014	Brightsource CSP Upington	Solar Energy	Northern Cape
2013	Cape Winelands DM Regional Landfill	Industrial	Western Cape
2013	Drennan PV Solar Park	PV Solar Energy	Eastern Cape
2013	Eastern Cape Mari-culture	Mari-culture	Eastern Cape
2013	Eskom Pantom Pass Substation	Substation /Tx lines	Knysna
2013	Frankfort Paper Mill	Plant	Free State
2013	Gibson Bay Wind Farm Transmission lines	Tranmission lines	Eastern Cape
2013	Houhoek Eskom Substation	Substation /Tx lines	Western Cape
2013	Mulilo PV Solar Energy Sites (x4)	PV Solar Energy	Northern Cape
2013	Namies Wind Farm	Wind Energy	Northern Cape
2013	Rossing Z20 Pit and WRD	Mining	Namibia
2013	SAPPI Boiler Upgrade	Plant	Mpumalanga
2013	Tumela WRD	Mine	North West

2013	Weskusfleur Substation (Koeburg)	Substation /Tx lines	Western Cape
2013	Yzermyn coal mine	Mine	Mpumalanga
2012	Afrisam	Mine	Saldana
2012	Bitterfontein	PV Energy	N Cape
2012	Bitterfontein slopes	Slopes Analysis	N Cape
2012	Kangnas PV	Energy	N Cape
2012	Kangnas Wind	Energy	N Cape
2012	Kathu CSP Tower	Solar Power	Northern Cape
2012	Kobong Hydro	Hydro & Powerline	Lesotho
2012	Letseng Diamond Mine Upgrade	Mine	Lesotho
2012	Lunsklip Windfarm	Windfarm	Stilbaai
2012	Mozambique Gas Engine Power Plant	Plant	Mozambique
2012	Ncondezi Thermal Power Station	Substation /Tx lines	Mozambique
2012	Sasol CSP Tower	Solar Power	Free State
2012	Sasol Upington CSP Tower	Solar Power	Northern Cape
2011	Beaufort West PV Solar Power Station	Power Station	Beaufort West
2011	Beaufort West Wind Farm	Wind Energy	Beaufort West
2011	De Bakke Cell Phone Mast	Mast	Western Cape
2011	ERF 7288 PV	PV	Beaufort West
2011	Gecko Industrial park	Industrial	Namibia
2011	Green View Estates	Residential	Mossel Bay
2011	Hoodia Solar	PV expansion	Beaufort West
2011	Kalahari Solar Power Project	Solar Power	Northern Cape
2011	Khanyisa Power Station	Power Station	Western Cape
2011	Laingsburg Windfarm	Level 4	Mpumalanga
2011	Olvyn Kolk PV	Solar Power	Northern Cape
2011	Otjikoto Gold Mine	Mining	Namibia
2011	PPC Rheebieck West Upgrade	Industrial	
2011	Slopes analysis Erf 7288 Beaufort West	Slopes	Beaufort West
2011	Southern Arterial	Road	George
2010	Bannerman Etango Uranium Mine	Mining	Namibia
2010	Bantamsklip Transmission Revision	Transmission	Eastern Cape
2010	Beaufort West Urban Edge	Mapping	Beaufort West
2010	Bon Accord Nickel Mine	Mine	Barbeton
2010	Herolds Bay N2 Development Baseline	Residential	George
2010	MTN Lattice Hub Tower	Structure	George
2010	N2 Herolds Bay Residental	Residential	Herolds Bay
2010	Onifin(Pty) Ltd Hartenbos Quarry Extension	Mining	Mossel Bay
2010	Rossing South Board Meeting	Mining	Namibia
2010	Still Bay East	Mapping	SA, WC
2010	Vale Moatize Coal Mine and Railwayline	Mining_rail	Mozambique

2010	Vodacom Mast	Structure	Reichterbosch
2010	Wadrif Dam	Dam	Beaufort West
2009	Asazani Zinyoka UISP Housing	Residential Infill	Mossel Bay
2009	Bantamsklip GIS Mapping	Mappig	Western Cape
2009	Eden Telecommunication Tower	Structure Tower	George
2009	George Landscape Characterisation	George SDF	George
2009	George Western Bypass	Structure Road	George
2009	Rossing Uranium Mine Phase 2	Mining	Namibia
2009	Sun Ray Wind Farm	Wind Energy	Still Bay
2008	Bantamsklip Transmission Lines Scoping	Transmission	Western Cape
2008	Erf 251 Damage Assessment	Residential VIA	Great Brak
2008	Erongo Uranium Rush SEA	SEA	Namibia
2008	Evander South Gold Mine Preliminary VIA	Mining	Mpumalanga
2008	George Open Spaces System	George SDF	George
2008	GrooteSchuur Heritage Mapping	Mapping	Cape Town
2008	Hartenbos River Park	Residential VIA	Hartenbos
2008	Kaaimans Project	Residential	Wilderness
2008	Lagoon Garden Estate	Residential VIA	Great Brak
2008	Moquini Beach Hotel	Resort	Mossel Bay
2008	NamPower Coal fired Power Station	Power Station	Namibia
2008	Oasis Development	Residential VIA	Plettenberg Bay
2008	RUL Sulpher Handling Facility	Mining	Walvis Bay
2008	Stonehouse Development	Residential VIA	Plettenberg Bay
2008	Walvis Bay Power Station	Structure	Namibia.
2007	Calitzdorp Retirement Village	Residential VIA	Calitzdorp
2007	Calitzdorp Visualisation	Visualisation	Calitzdorp
2007	Camdeboo Estate	Residential VIA	Graaff Reinet
2007	Destiny Africa	Residential	George
2007	Droogfontein Farm 245	Residential VIA	Danabaai
2007	Floating Liquified Natural Gas Facility	Structure tanker	Mossel Bay
2007	George Municipality Densification	George SDF	George
2007	George Municipality SDF	George SDF	George
2007	Kloofsig Development	Residential VIA	Vleesbaai
2007	OCGT Power Plant Extension	Structure Power Plant	Mossel Bay
2007	Oudtshoorn Municipality SDF	Mapping	Oudtshoorn
2007	Oudtshoorn Shopping Complex	Structure Mall	Oudtshoorn
2007	Pezula Infill (Noetzie)	Residential VIA	Knysna
2007	Pierpoint Nature Reserve	Residential VIA	Knysna
2007	Pinnacle Point Golf Estate	Golf/Residential	Mossel Bay
2007	Rheebok Development Erf 252 Apeal	Residential VIA	Great Brak
2007	Rossing Uranium Mine Phase 1	Mining	Namibia

2007	Ryst Kuil/Riet Kuil Uranium Mine	Mining	Beaufort West
2007	Sedgefield Water Works	Structure	Sedgefield
2007	Sulpher Handling Station Walvis Bay Port	Industrial	Namibia
2007	Trekkopje Uranium Mine	Mining	Namibia
2007	Weldon Kaya	Residential VIA	Plettenberg Bay
2006	Fancourt Visualisation Modelling	Visualisation	George
2006	Farm Dwarsweg 260	Residential VIA	Great Brak
2006	Fynboskruin Extention	Residential VIA	Sedgefield
2006	Hanglip Golf and Residential Estate	Golf/Residential	Plettenberg Bay
2006	Hansmoeskraal	Slopes Analysis	George
2006	Hartenbos Landgoed Phase 2	Residential VIA	Hartenbos
2006	Hersham Security Village	Residential VIA	Great Brak
2006	Ladywood Farm 437	Residential VIA	Plettenberg Bay
2006	Le Grand Golf and Residential Estate	Golf/Residential	George
2006	Paradise Coast	Residential VIA	Mossel Bay
2006	Paradyskloof Residential Estate	Residential VIA	Stellenbosch
2006	Riverhill Residential Estate	Residential VIA	Wilderness
2006	Wolwe Eiland Access Route	Road	Victoria Bay
2005	Harmony Gold Mine	Mining	Mpumalanga.
2005	Knysna River Reserve	Residential VIA	Knysna
2005	Kruisfontein Infill	Mapping	Knysna
2005	Lagoon Bay Lifestyle Estate	Residential VIA	Glentana
2005	Outeniquabosch Safari Park	Residential	Mossel Bay
2005	Proposed Hotel Farm Gansevallei	Resort	Plettenberg Bay
2005	Uitzicht Development	Residential VIA	Knysna
2005	West Dunes	Residential VIA	Knysna
2005	Wilderness Erf 2278	Residential VIA	Wilderness
2005	Wolwe Eiland Eco & Nature Estate	Residential VIA	Victoria Bay
2005	Zebra Clay Mine	Mining	Zebra
2004	Gansevallei Hotel	Residential VIA	Plettenberg Bay
2004	Lakes Eco and Golf Estate	Golf/Residential	Sedgefield
2004	Trekkopje Desalination Plant	Structure Plant	Namibia
1995	Greater Durban Informal Housing Analysis	Photogrametry	Durban

11 ANNEXURE 2: QUESTIONNAIRES AND VRM TERMINOLOGY

11.1 Methodology Detail

Viewshed

The visible extent, or viewshed, is 'the outer boundary defining a view catchment area, usually along crests and ridgelines' *(Oberholzer, 2005).* This reflects the area, or extent, where the landscape modification would probably be seen. However, visibility tends to diminish exponentially with distance, which is well recognised in visual analysis literature. Therefore the views of a landscape modification would not necessarily influence the landscape character within all areas of the viewshed. The information for the terrain used in the 3D computer model on which the visibility analysis is based on the Advanced Spaceborne Thermal Emission and Reflection (ASTER) Radiometer Data, a product of Japan's Ministry of Economy, Trade and Industry (METI) and National Aeronautics and Space Administration (NASA) in USA. (NASA, 2009)

Receptor Exposure

The area where a landscape modification starts to influence the landscape character is termed the Zone of Visual Influence (ZVI) and is defined by the U.K. Institute of Environmental Management and Assessment's (IEMA) *'Guidelines for Landscape and Visual Impact Assessment'* as 'the area within which a proposed development may have an influence or effect on visual amenity (of the surrounding areas).'

The inverse relationship of distance and visual impact is well recognised in visual analysis literature *(Hull, R.B. and Bishop, I.E., 1988)*. According to Hull and Bishop, exposure, or visual impact, tends to diminish exponentially with distance. The areas where most landscape modifications would be visible are located within 2 km from the site of the landscape modification. Thus the potential visual impact of an object diminishes at an exponential rate as the distance between the observer and the object increases due to atmospheric conditions prevalent at a location, which causes the air to appear greyer, thereby diminishing detail. For example, viewed from 1000 m from a landscape modification, the impact would be 25% of the impact as viewed from 500 m from a landscape modification. At 2000m it would be 10% of the impact at 500 m. The relationship is indicated in the following graph generated by Hull and Bishop.

The VRM methodology also takes distance from a landscape modification into consideration in terms of understanding visual resource. Three distance categories are defined by the Bureau of Land Management. The distance zones are:

i. ***Foreground / Middle ground***, up to approximately 6km, which is where there is potential for the sense of place to change;
ii. ***Background areas***, from 6km to 24km, where there is some potential for change in the sense of place, but where change would only occur in the case of very large landscape modifications; and
iii. ***Seldom seen areas***, which fall within the Foreground / Middle ground area but, as a result of no receptors, are not viewed or are seldom viewed.

Scenic Quality

In terms of the VRM methodology, landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and distance of the proposed landscape modification from key receptor points. The scenic quality is determined making use of the VRM scenic quality questionnaire (refer to addendum). Seven scenic quality criteria area scored on a 1 (low) to 5 (high) scale. The scores are totalled and assigned a A (High), B (Moderate) or C (low) based on the following split:
A= scenic quality rating of ≥19;
B = rating of 12 – 18,
C= rating of ≤11

The seven scenic quality criteria are defined below:

- **Land Form:** Topography becomes more of a factor as it becomes steeper, or more severely sculptured.
- **Vegetation:** Primary consideration given to the variety of patterns, forms, and textures created by plant life.
- **Water:** That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration.
- **Colour:** The overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) are considered as they appear during seasons or periods of high use.
- **Scarcity:** This factor provides an opportunity to give added importance to one, or all, of the scenic features that appear to be relatively unique or rare within one physiographic region.
- **Adjacent Land Use:** Degree to which scenery and distance enhance, or start to influence, the overall impression of the scenery within the rating unit.
- **Cultural Modifications:** Cultural modifications should be considered, and may detract from the scenery or complement or improve the scenic quality of an area.

Receptor Sensitivity

Sensitivity levels are a measure of public concern for scenic quality. Receptor sensitivity to landscape change is determined by rating the following factors in terms of Low to High:

- **Type of Users:** Visual sensitivity will vary with the type of users, e.g. recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.
- **Amount of Use:** Areas seen or used by large numbers of people are potentially more sensitive.
- **Public Interest:** The visual quality of an area may be of concern to local, or regional, groups. Indicators of this concern are usually expressed via public controversy created in response to proposed activities.
- **Adjacent Land Uses:** The interrelationship with land uses in adjacent lands. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be as visually sensitive.
- **Special Areas:** Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Areas,

Scenic Roads or Trails, and Critical Biodiversity Areas frequently require special consideration for the protection of their visual values.

- **Other Factors:** Consider any other information such as research or studies that include indicators of visual sensitivity.

Visual Resource Management (VRM) Classes

The VRM Classes represent the relative value of the visual resources of an area and are determined making use of the VRM Class Matrix see Table 8 below:

i. **Classes I and II** are the most valued;
ii. **Class III** represents a moderate value; and
iii. **Class IV** is of least value.

The Classes are not prescriptive and are utilised as a guideline to determine visual carrying capacity. The Visual Inventory Classes are defined using the matrix below and with motivation, can be adjusted to Visual Resource Management Classes:

		VISUAL SENSITIVITY LEVELS								
		High			Medium			Low		
SCENIC QUALITY	A (High)	II	II	II	II	II	II	II	II	II
	B (Medium)	II	III	III/ IV *	III	IV	IV	IV	IV	IV
	C (Low)	III	IV	IV	IV	IV	IV	IV	IV	IV
DISTANCE ZONES		Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen

* If adjacent areas are **Class III** or lower, assign **Class III**, if higher, assign **Class IV**

The visual objectives of each of the classes is listed below:

- The Class I objective is to preserve the existing character of the landscape, the level of change to the characteristic landscape should be very low, and must not attract attention. Class I is assigned when a specialist decision is made to maintain a natural landscape.
- The Class II objective is to retain the existing character of the landscape and the level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer, and should repeat the basic elements of form, line, colour and texture found in the predominant natural features of the characteristic landscape.
- The Class III objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- The Class IV objective is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the

landscape can be high, and these management activities may dominate the view and be the major focus of the viewer's (s') attention.

Key Observation Points (KOPs)

KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. These locations are important in terms of the VRM methodology, which requires that the Degree of Contrast (DoC) that the proposed landscape modifications will make to the existing landscape be measured from these most critical locations, or receptors, surrounding the property.

To define the KOPs, potential receptor locations were identified in the viewshed analysis, and screened, based on the following criteria:

- Angle of observation;
- Number of viewers;
- Length of time the project is in view;
- Relative project size;
- Season of use;
- Critical viewpoints, e.g. views from communities, road crossings; and
- Distance from property.

Contrast Rating

The contrast rating, or impacts assessment phase, is undertaken to determine if the VRM Class Objectives are met. The suitability of landscape modification is assessed by comparing the degree of potential contrast from the proposed activity in comparison to the existing contrast created by the existing landscape. This is done by evaluating the level of change to the existing landscape by assessing the line, colour, texture and form, in relation to the visual objectives defined for the area. The following criteria are utilised in defining the DoC:

- **None**: The element contrast is not visible or perceived.
- **Weak**: The element contrast can be seen but does not attract attention.
- **Moderate**: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong**: The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

As an example, in a Class I area, the visual objective is to preserve the existing character of the landscape, and the resultant contrast to the existing landscape should not be notable to the casual observer and cannot attract attention. In a Class IV area example, the objective is to provide for proposed landscape activities which require major modifications of the existing character of the landscape. Based on whether the VRM objectives are met, mitigations, if required, are defined to avoid, reduce or mitigate the proposed landscape modifications so that the visual impact does not detract from the surrounding landscape sense of place.

Photo Montages and 3D Visualisation

As a component in this contrast rating process, visual representation, such as photo montages are vital in large-scale modifications, as this serves to inform I&APs and decision-making authorities of the nature and extent of the impact associated with the proposed project/development. There is an ethical obligation in this process, as visualisation can be misleading if not undertaken ethically. In terms of adhering to standards for ethical representation of landscape modifications, VRM Africa subscribes to the Proposed Interim Code of Ethics for Landscape Visualisation developed by the Collaborative for Advanced Landscape Planning (CALP) (July 2003)*(Sheppard, S.R.J., 2005)*.This code states that professional presenters of realistic landscape visualisations are responsible for promoting full understanding of proposed landscape changes, providing an honest and neutral visual representation of the expected landscape, by seeking to avoid bias in responses and demonstrating the legitimacy of the visualisation process. Presenters of landscape visualisations should adhere to the principles of:

- Access to Information
- Accuracy
- Legitimacy
- Representativeness
- Visual Clarity and Interest

The Code of Ethical Conduct states that the presenter should:

- Demonstrate an appropriate level of qualification and experience.
- Use visualisation tools and media that are appropriate to the purpose.
- Choose the appropriate level of realism.
- Identify, collect and document supporting visual data available for, or used in, the visualisation process.
- Conduct an on-site visual analysis to determine important issues and views.
- Seek community input on viewpoints and landscape issues to address in the visualisations.
- Provide the viewer with a reasonable choice of viewpoints, view directions, view angles, viewing conditions and timeframes appropriate to the area being visualised.
- Estimate and disclose the expected degree of uncertainty, indicating areas and possible visual consequences of the uncertainties.
- Use more than one appropriate presentation mode and means of access for the affected public.
- Present important non-visual information at the same time as the visual presentation, using a neutral delivery.
- Avoid the use, or the appearance of, ‘sales’ techniques or special effects.
- Avoid seeking a particular response from the audience.
- Provide information describing how the visualisation process was conducted and how key decisions were taken *(Sheppard, S.R.J., 2005)*.

11.2 Questionnaires

Scenic Quality Rating Questionnaire

KEY FACTORS	RATING CRITERIA AND SCORE

SCORE	**5**	**3**	**1**
Land Form	High vertical relief as expressed in prominent cliffs, spires or massive rock outcrops, or severe surface variation or highly eroded formations or detail features that are dominating and exceptionally striking and intriguing.	Steep-sided river valleys, or interesting erosion patterns or variety in size and shape of landforms; or detail features that are interesting, though not dominant or exceptional.	Low rolling hills, foothills or flat valley bottoms; few or no interesting landscape features.
Vegetation	A variety of vegetative types as expressed in interesting forms, textures and patterns.	Some variety of vegetation, but only one or two major types.	Little or no variety or contrast in vegetation.
Water	Clear and clean appearing, still or cascading white water, any of which are a dominant factor in the landscape.	Flowing, or still, but not dominant in the landscape.	Absent, or present but not noticeable.
Colour	Rich colour combinations, variety or vivid colour: or pleasing contrasts in the soil, rock, vegetation, water.	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element.	Subtle colour variations contrast or interest: generally mute tones.
Adjacent Scenery	Adjacent scenery greatly enhances visual quality.	Adjacent scenery moderately enhances overall visual quality.	Adjacent scenery has little or no influence on overall visual quality.
Scarcity	One of a kind: unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing etc.	Distinctive, though somewhat similar to others within the region.	Interesting within its setting, but fairly common within the region.
SCORE	**2**	**0**	**-4**
Cultural Modification	Modifications add favourably to visual variety, while promoting visual harmony.	Modifications add little or no visual variety to the area, and introduce no discordant elements.	Modifications add variety but are very discordant and promote strong disharmony.

Sensitivity Level Rating Questionnaire

FACTORS	QUESTIONS	
Type of Users	**Maintenance of visual quality is:**	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Amount of use	**Maintenance of visual quality becomes more important as the level of use increases:**	
	A high level of use	High
	Moderately level of use	Moderate
	Low level of use	Low
Public interest	**Maintenance of visual quality:**	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Adjacent land Users	**Maintenance of visual quality to sustain adjacent land use objectives is:**	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low
Special Areas	**Maintenance of visual quality to sustain Special Area management objectives is:**	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low

11.3 VRM Terminology

FORM	LINE	COLOUR	TEXTURE
Simple	Horizontal		Smooth
Weak	Vertical		Rough
Strong	Geometric		Fine
Dominant	Angular		Coarse
Flat	Acute		Patchy
Rolling	Parallel		Even
Undulating	Curved	Dark	Uneven
Complex	Wavy	Light	Complex
Plateau	Strong	Mottled	Simple
Ridge	Weak		Stark
Valley	Crisp		Clustered
Plain	Feathered		Diffuse
Steep	Indistinct		Dense
Shallow	Clean		Scattered
Organic	Prominent		Sporadic
Structured	Solid		Consistent

Simple	Basic, composed of few elements	**Organic**	Derived from nature; occurring or developing gradually and naturally
Complex	Complicated; made up of many interrelated parts	**Structure**	Organised; planned and controlled; with definite shape, form, or pattern
Weak	Lacking strength of character	**Regular**	Repeatedly occurring in an ordered fashion
Strong	Bold, definite, having prominence	**Horizontal**	Parallel to the horizon
Dominant	Controlling, influencing the surrounding environment	**Vertical**	Perpendicular to the horizon; upright
Flat	Level and horizontal without any slope; even and smooth without any bumps or hollows	**Geometric**	Consisting of straight lines and simple shapes
Rolling	Progressive and consistent in form, usually rounded	**Angular**	Sharply defined; used to describe an object identified by angles
Undulating	Moving sinuously like waves; wavy in appearance	**Acute**	Less than 90°; used to describe a sharp angle
Plateau	Uniformly elevated flat to gently undulating land bounded on one or more sides by steep slopes	**Parallel**	Relating to or being lines, planes, or curved surfaces that are always the same distance apart and therefore never meet
Ridge	A narrow landform typical of a highpoint or apex; a long narrow hilltop or range of hills	**Curved**	Rounded or bending in shape
Valley	Low-lying area; a long low area of land, often with a river or stream running through it, that is surrounded by higher ground	**Wavy**	Repeatedly curving forming a series of smooth curves that go in one direction and then another
Plain	A flat expanse of land; fairly flat dry land, usually with few trees	**Feathered**	Layered; consisting of many fine parallel strands
Steep	Sloping sharply often to the extent of being almost vertical	**Indistinct**	Vague; lacking clarity or form
Prominent	Noticeable; distinguished, eminent, or well-known	**Patchy**	Irregular and inconsistent;
Solid	Unadulterated or unmixed; made of the same material throughout; uninterrupted	**Even**	Consistent and equal; lacking slope, roughness, and irregularity
Broken	Lacking continuity; having an uneven surface	**Uneven**	Inconsistent and unequal in measurement irregular
Smooth	Consistent in line and form; even textured	**Stark**	Bare and plain; lacking ornament or relieving features
Rough	Bumpy; knobbly; or uneven, coarse in texture	**Clustered**	Densely grouped
Fine	Intricate and refined in nature	**Diffuse**	Spread through; scattered over an area
Coarse	Harsh or rough to the touch; lacking detail	**Diffuse**	To make something less bright or intense