SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

Proposed Construction of 132kV Power Line and Switchyard associated with the Redstone Solar Thermal Energy Plant in the Northern Cape Province

Visual Impact Assessment Report – Basic Assessment

Issue Date: 26 September 2012
Revision No.: 1
Project No.: 11418

Date:	26 September 2012
Document Title:	Proposed Construction of 132kV Power Line and Switchyard associated with the Redstone Solar Thermal Energy Plant in the Northern Cape Province: Visual Impact Assessment Report – Basic Assessment
Author:	Andrea Gibb
Revision Number:	1
Signature:	
For:	SiVEST Environmental Division

SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

PROPOSED CONSTRUCTION OF 132KV POWER LINE AND SWITCHYARD ASSOCIATED WITH THE REDSTONE SOLAR THERMAL ENERGY PLANT IN THE NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT

Contents **Page**

List of Figures

List of Tables

Appendices

GLOSSARY OF TERMS

ABBREVIATIONS

BA	Basic Assessment
DBAR	Draft Basic Assessment Report
ENPAT	Environmental Potential Atlas
I&AP	Interested and/or Affected Party
kV	Kilovolt
SANBI	South African National Biodiversity Institute
VIA	Visual Impact Assessment

DEFINITIONS

Sense of place: The unique quality or character of a place, whether natural, rural or urban. It relates to uniqueness, distinctiveness or strong identity.

Scenic route: A linear movement route, usually in the form of a scenic drive, but which could also be a railway, hiking trail, horse-riding trail or 4x4 trail.

Sensitive visual receptors: An individual, group or community that is subject to the visual influence of the proposed development and is adversely impacted by it. They will typically include locations of human habitation and tourism activities.

Viewshed: The outer boundary defining a visual envelope, usually along crests and ridgelines.

Visual envelope: A geographic area, usually defined by topography, within which a particular project or other feature would generally be visible.

Visual exposure: The relative visibility of a project or feature in the landscape.

Visual impact: The effect of an aspect of the proposed development on a specified component of the visual, aesthetic or scenic environment within a defined time and space.

Visual receptors: An individual, group or community that is subject to the visual influence of the proposed development but is not necessarily adversely impacted by it. They will typically include commercial activities and motorists travelling along routes that are not regarded as scenic.

SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

PROPOSED CONSTRUCTION OF 132KV POWER LINE AND SWITCHYARD ASSOCIATED WITH THE REDSTONE SOLAR THERMAL ENERGY PLANT IN THE NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT

1 INTRODUCTION

SiVEST have been appointed by SolarReserve South Africa (hereafter referred to as SolarReserve) and Eskom Holdings SOC Limited (hereafter referred to as Eskom) to undertake a Basic Assessment (BA) study for the proposed 132kV (kilovolt) overhead power line and switchyard associated with the Redstone Solar Thermal Energy Plant in the Northern Cape Province. As part of the BA study, the need to undertake a visual impact assessment has been identified in order to determine the potential visual issues and impacts that may arise from the proposed development. This report characterises the visual environment of the study area and identifies the areas of visual sensitivity. The report aims to identify how the visual environment and in particular any receptors within the study area may be affected by the visual impacts associated with the proposed development.

1.1 Project Description

The proposed project consists of the following main activities:

- Construction of 1 x switchyard directly adjacent to the proposed Redstone Solar Thermal Energy Plant Substation.
- Construction of 1 x 132kV overhead power line from the proposed Redstone Solar Thermal Energy Plant Substation to Silverstreams Substation, near Lime Acres.
- Construction of 1 x 132kV overhead power line from the proposed Redstone Solar Thermal Energy Plant Substation to each PV Power Plant switching station.
- Extension of the 132kV busbar in the PV Power Plant switching stations.
- Installation of 1 x 132kV feeder bay in the PV Power Plant switching stations.
- Installation of 3 x 132kV feeder bays in Siverstreams Substation.

- Creation of a loop-in configuration to Silverstreams Substation by reconfiguring the existing Olien – Karats 132kV power line currently crossing Silverstreams Substation.
- Construction of a 3x40MVA 11/132kV step-up substation with 2 x 132kV feeder bays at the proposed the Redstone Solar Thermal Energy Plant.
- Construction of an access track along the power line servitude.
- Establishment of associated infrastructure as required by Eskom.

The power line will consist of a series of towers located approximately 200m apart, depending on the terrain and soil conditions. The exact tower type to be used will be determined (based on load and other calculations) during the final design stages of the power line. It is however likely that the Single Steel Pole tower type (e.g. ESKOM D-DT 7649/1) will be used in combination with the Steel Lattice Type Towers at bend points and where greater distances need to be spanned. The Single Steel Pole tower type is between 18m and 25m in height. A photograph of this proposed tower is included in Figure 1 below.

Figure 1: Tower Type

The exact location of the towers will also be determined during the final design stages of the power line.

Two (2) route corridor alternatives, that are approximately 500m wide, will be assessed during the Basic Assessment for the proposed 132kV power line. These are as follows:

- Alternative 1A – approximately 17km (blue)
- Alternative 1B – approximately 26km (purple

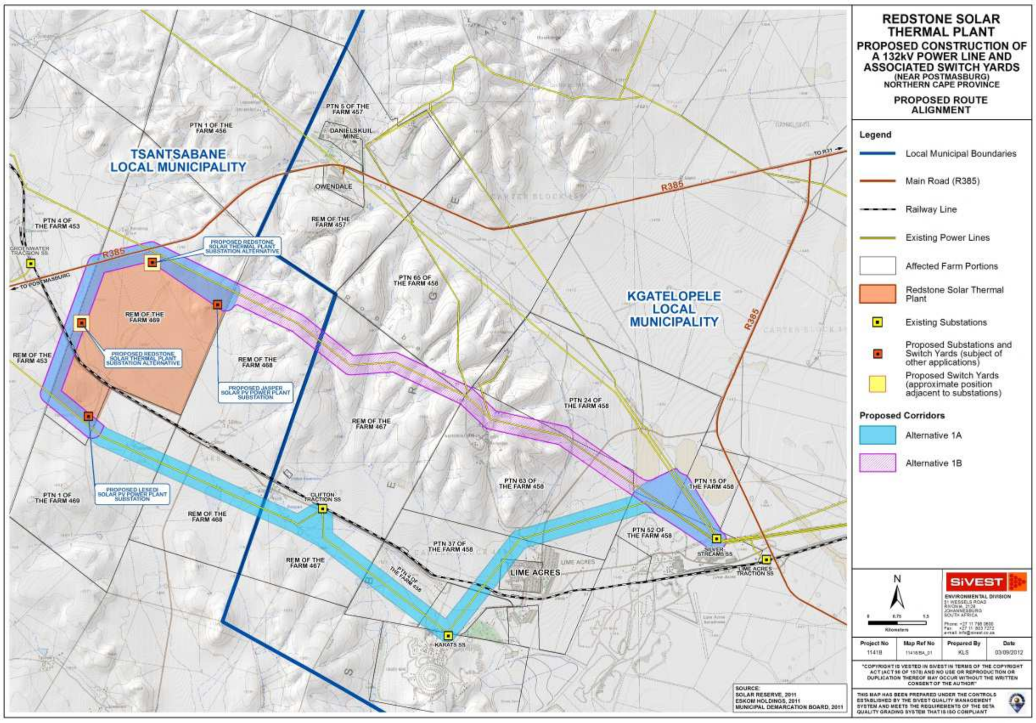

Figure 2: Locality Map

The 500m wide corridors have been proposed for each route alternative to allow flexibility when determining the final route alignment, however only a 31m wide servitude would be required for the proposed 132kV power line. As such, the 31m wide servitude would be positioned within the 500m wide corridor.

1.2 Assumptions and Limitations

The identification of visual receptors has been based on a combination of desktop assessment as well as field-based observation. It should be noted that not all receptor locations may perceive the proposed development in a negative way. Where no receptor or property-specific feedback has been received, a number of broad assumptions have been made in terms of the identification of sensitive receptors; e.g. homesteads / farmsteads in a largely natural setting have been assumed to be likely to be more sensitive from a visual perspective than those in a more urbanised / industrial settings.

For the purpose of this visual assessment, the study area is assumed to encompass a zone of 5km from the proposed power line corridor alternatives – i.e. an area 5km from both corridor alternative 1A and 1B. This area was assigned as distance is a critical factor when assessing visual impacts and beyond 5km any degree of visual impact associated with the proposed development would be virtually nil.

Viewsheds have not been generated for the proposed power line due to the complexity associated with generating viewsheds off multiple points within the context of a corridor. Rather distance banding from the proposed route corridors has been used to gain an understanding of the level of visual exposure associated with the power line alignments.

Visualisation modelling has not been undertaken for the proposed development due to time and budget limitations. Should the need for visualisation modelling be proven by stakeholder / I&AP feedback, then this will be able to be incorporated into this assessment.

No feedback regarding the visual environment has been received from the public participation process to date, however any feedback from the public during the review period of the Draft Basic Assessment Report (DBAR) will be incorporated into further drafts of this report.

1.3 Assessment Methodology

1.3.1 Identification of Visual character and sensitive receptor locations

Initially digital information from spatial databases such as ENPAT and SANBI were sourced to provide information on the topography, vegetation and land use in the study area. These physical landscape characteristics are important factors that influence the visual character, the visual absorption capacity and visual sensitivity of the study area. In order to verify the landscape characteristics of the study area and to identify potentially sensitive receptor locations a site visit was also undertaken in August 2012. During the field investigation potentially sensitive visual receptor locations and routes within the study area, such as any scenic routes and residences were identified as these may be potentially sensitive to the visual impacts associated with the proposed development.

1.3.2 *Impact Assessment*

A rating matrix was used to objectively evaluate the significance of the visual impacts associated with the proposed development, both before and after implementing mitigation measures. Mitigation measures were identified (where possible) in an attempt to minimise the visual impact of the proposed development. The rating matrix made use of a number of different factors including geographical extent, probability, reversibility, irreplaceable loss of resources, duration, cumulative effect and intensity, in order to assign a level of significance to the visual impact of the project. A separate rating matrix was used to assess the visual impact of the proposed development on the sensitive receptor locations, as identified. This matrix is based on the distance of a receptor from the proposed development, the primary focus / orientation of the receptor, the presence of screening factors, the visual character and sensitivity of the area and the visual contrast of the development with the typical elements and forms in the landscape. Thereafter, the alternatives were comparatively assessed, in order to ascertain the preferred corridor alternative from a visual perspective.

1.3.3 *Consultation with I&APs*

Continuous consultation with Interested and Affected Parties (I&APs) undertaken during the public participation process will be used to help establish how the proposed power line development will be perceived by the various receptor locations and the degree to which the impact will be regarded as negative. Although I&APs have not as yet provided any feedback in this regard, the report will be updated to include relevant information as and when it becomes available.

2 VISUAL CHARACTER AND SENSITIVITY OF THE STUDY AREA

The physical and land use related characteristics are outlined below as they are important factors contributing to the visibility of a development and visual character of the study area. Defining the visual character is an important part of assessing visual impacts as it establishes the visual baseline or existing visual environment in which the development would be constructed. The visual impact of a development is measured according to this visual baseline by establishing the degree to which the development would contrast or conform with the visual character of the surrounding area. The inherent sensitivity of the area to visual impacts or visual sensitivity is thereafter determined, based on the visual character, economic importance of the scenic quality of the area, inherent cultural value of the area and presence of visual receptors.

2.1 Physical and Land Use Characteristics

2.1.1 Topography

The topography in the wider study area around the site is characterised by a mix of flat plains and greater relief in the form of hilly terrain which forms part of the Rooiberge. This hilly area forms part of a much wider area of hilly terrain extending to the north, north-east (Asbesberg Hills) and to the south (the Asberg Hills). The land traversed by corridor alternative 1A is characterised by flat to gently sloping topography. In contrast, the central portion of corridor alternative 1B traverses a portion of the Rooiberge, which is characterised by rolling hills with gentle to moderate slopes.

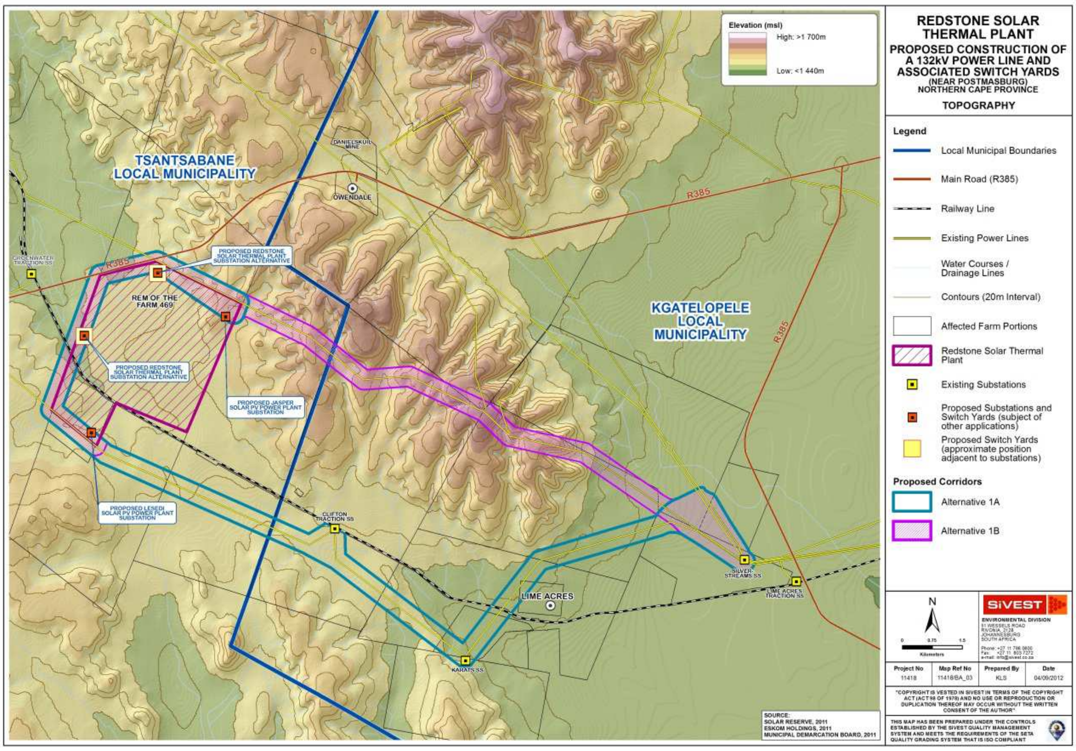

Figure 3: Map showing the topography within the study area

<u>Visual Implications</u>

The mixed nature of the terrain across the study area has differing visual implications, Vistas in the hillier and higher-lying terrain can be both more open and more enclosed, depending on the position of the viewer. Within some of the more incised valleys, the viewshed can be extremely limited, whereas from the higher-lying ridge tops or slopes, a much wider view or vista is available over a much greater distance. The same will be true of a power line traversing different elevations and landscape settings. As such, where alternative 1B pass through high-elevation slopes or ridge tops the structures would be highly visible, whereas the alignment falls within valleys or enclosed plateaux's the visible would be restricted. Alternative 1A traverses land that is characterised by wide ranging vistas, typically to the point at which the surrounding hills would enclose the visual envelope or local landscape. Alternative 1A would therefore be highly visible to the surrounding area, particularly from areas to the south of the Rooiberge where the topography is more uniform and flat.

2.1.2 *Land use and cover*

The two main vegetation units in the study area include the Olifantshoek Plains Thorveld, which dominates the flatter areas to the south and the Kuruman Mountain Bushveld, which prevails on the hilly terrain to the north (Figure 4).

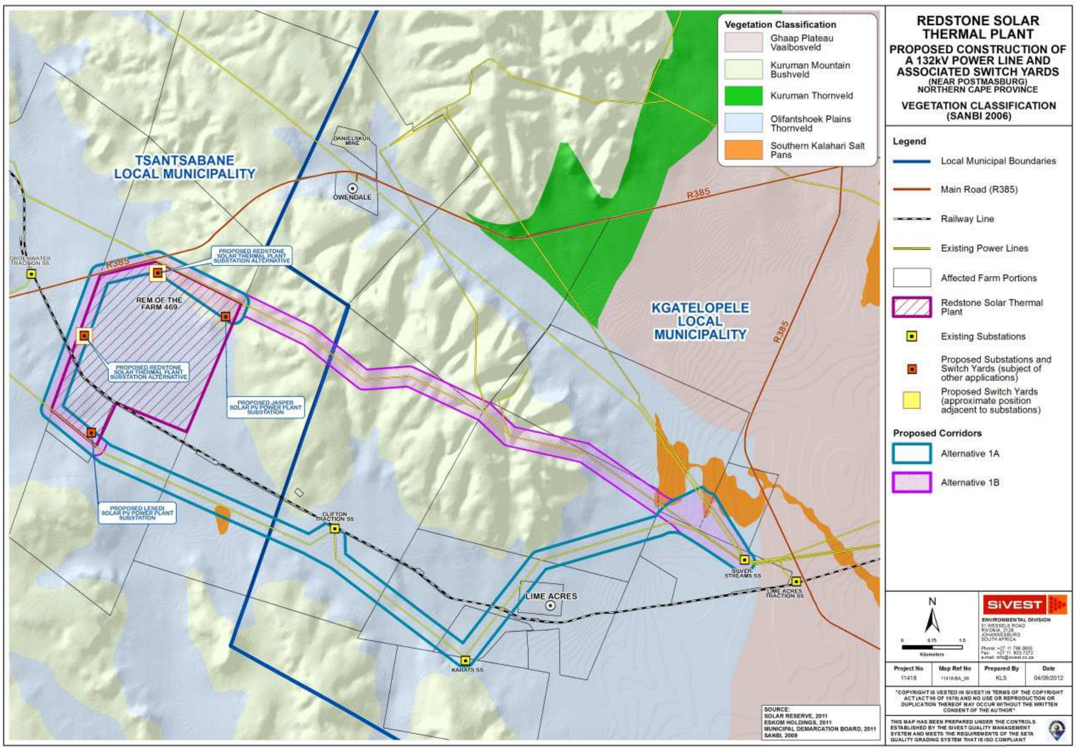

Figure 4: Map showing the vegetation within the study area

The Olifantshoek Plains Thorveld is characterised by wide grassy plains with an open tree and shrub layer. The Kuruman Mountain Bushveld, prevails on the rolling hills traversed by corridor alternative 1B. These ridges and hillsides are characterised by a much bushier open shrubland with a well development grass layer (Figure 5) (Mucina and Rutherford, 2006).

Figure 5: Characteristic vegetation cover in the study area – grassy plains of the Olifantshoek Plains Thornveld in the foreground and shrubland of the Kuruman Mountain Bushveld on the hills in the background.

In certain areas, man has had an impact on the natural vegetation, especially around farmsteads, where over many years tall trees and other typical garden vegetation have been established. In addition, mining operations and built-up residential areas have transformed much of the natural vegetation, particularly in the eastern part of the study area near Lime Acres. Livestock rearing and game farming is the predominant rural land use in the northern and western part of the study area (Figure 6). As such, a natural pastoral visual character has been retained across these areas, as described in more detail below.

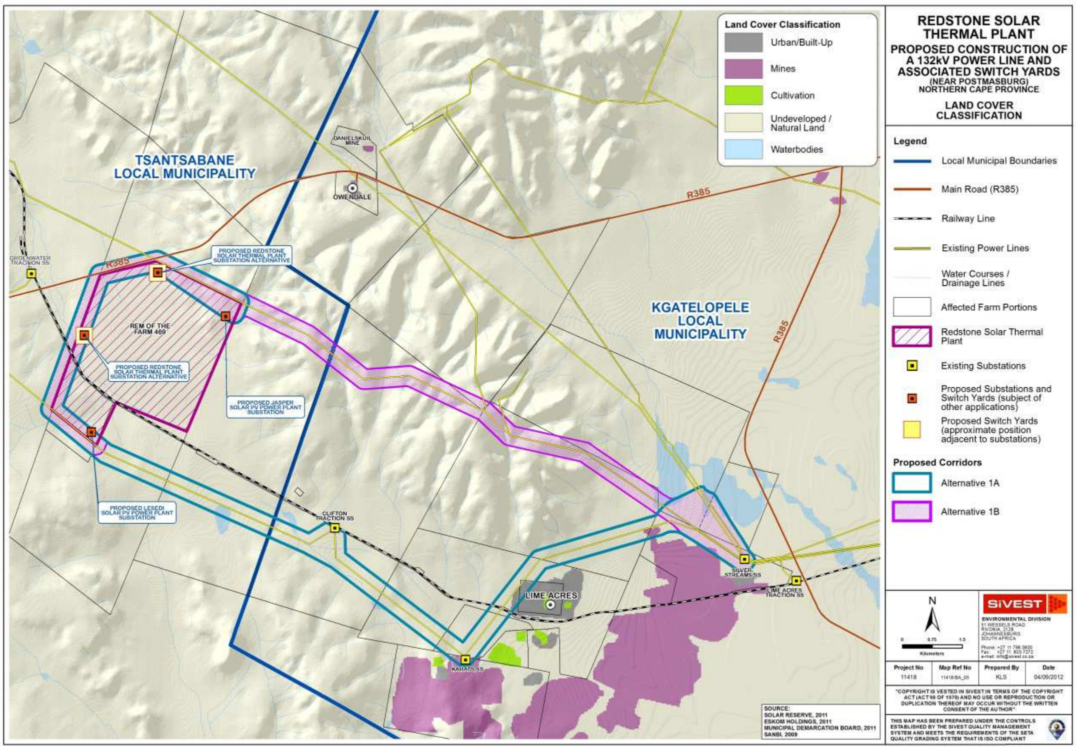

Figure 6: Map showing the land cover within the study area

The nature of the climate and corresponding land use has resulted in low stocking densities and large farm properties across the study area. This is particularly evident in the northern and western part of the study area where there is a low density of rural settlement and a limited number of scattered farmsteads. The only exception to this trend is the small mining-related cluster of houses at Owendale, as well as a small concentration of rural houses in the vicinity of the Groenwater Railway Siding to the west of the Humansrus farm. The cluster of buildings in these areas are very limited in extent and are engulfed by a wider rural setting. Built form in this part of the study area is thus typical of a rural setting and is limited to isolated farmsteads (some of which are abandoned), gravel access roads, ancillary farm buildings, telephone lines, fences and the remnants of old workers' dwellings.

Mining activities which belong to PPC Lime, Finsch Mine and Petra Diamonds are evident in the south-eastern part of the study area. Built-up residential areas in this part of the study area include Lime Acres and the small mining village of Shaleje. In this part of the study area a greater human influence is also evident in the form of mining and several transmission and distribution infrastructure.

Visual Implications

The short grassy vegetation in the southern part of the study area would result in wide-open vistas. Only in areas where artificial wooded vegetation has been established around farmhouses, would the vegetation provide any form of visual screening. The bushier vegetation, which prevails on the hills and ridges in the northern part of the study area, would partially restrict views of the power lines from surrounding farmsteads and motorists travelling along the R385. In this area the low density human habitation and natural vegetation cover would give the viewer the general impression of a largely natural rural setting. In the south-eastern part of the study area, human transformation is more evident, and thus the visual character is typical of a built-up urban environment. The influence of the level of human transformation on the visual character of the area is described below.

2.2 Visual Character

Visual character can be defined based on the level of change or transformation from a completely natural setting, which would represent a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural undisturbed landscape. Visual character is also influenced by the presence of built infrastructure such as buildings, roads and other objects such as electrical infrastructure.

As mentioned above the proposed, power line corridor alternatives traverse land with varying degrees of transformation. In the northern, western and south-western part of the study area the natural vegetation prevails, anthropogenic elements are limited to those associated with a typical rural or pastoral environment and very few houses are present, due to the vast extent of the farm portions. The most prominent anthropogenic elements include the railway line, several existing power lines and two traction substations. The presence of this electrical infrastructure is an important factor in this context, as the introduction of the proposed power line would result in less degradation where this infrastructure is prominent. Overall, this part of the study area has a natural visual character, typical of a rural environment.

Figure 7: Typical visual character and degree of transformation in the south-western part of the study area

It should be noted that the three proposed renewable plants on the Humansrus farm, would significantly alter the visual character and baseline in the western part of the study area once constructed. Solar energy facilities typically consist of very large objects, as such these structures would be highly visible, especially from the flatter areas to the south and east. More importantly, the concentration of these panels would make them highly visible. The scale of this infrastructure would mean that the visual character would be transformed from the current natural / rural character into an industrial-type character, which would be much less sensitivity to the introduction of a power line.

As mentioned above, the presence of infrastructure and other built form is an important factor in the context of potential visual impacts. The southern-eastern part of the study area, is characterised by a more visually degraded landscape, which is mostly attributed to the mining activities and its associated residential settlements, which include Lime Acres and Shaleje (Figure 8). As such, the visual character in the southern part of the study area is visually degraded, typical of a peri-urban environment. The proposed power line would create less visual contrast in this part of the study area, as several existing power lines and other mining infrastructure is already present

Figure 8: Typical visual character and degree of transformation in the south-eastern part of the study area

2.3 Visual Sensitivity

Visual Sensitivity can be defined as the inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (visual character), spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development. A viewer's perception is usually based on the perceived aesthetic appeal of an area and on the presence of economic activities (such as recreational tourism) which may be based on this aesthetic appeal. The visual sensitivity of an area is broken up into a number of categories, as described below:

i) **High** - The introduction of a new development such as the erection of a power line would be likely to be perceived negatively by receptors in this area; it would be considered to be a visual intrusion and may elicit opposition from these receptors

ii) **Moderate** - Presence of receptors, but due to the nature of the existing visual character of the area and likely value judgements of receptors, there would be limited negative perception towards the new development as a source of visual impact.

iii) **Low** - The introduction of a new development would not be perceived to be negative, there would be little opposition or negative perception towards it.

The table below outlines the factors used to rate the visual sensitivity of the study area. The ratings are specific to the visual context of the receiving environment within the study area.

Table 1: Environmental factors used to define visual sensitivity of the study area

FACTORS	**RATING**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pristine / natural character of the environment										
Presence of sensitive visual receptors										
Aesthetic sense of place / scenic visual character										
Value to individuals / society										
Irreplaceability / uniqueness / scarcity value										
Cultural or symbolic meaning										
Scenic resources present in the study area										
Protected / conservation areas in the study area										
Sites of special interest present in the study area										
Economic dependency on scenic quality										
Local jobs created by scenic quality of the area										
International status of the environment										
Provincial / regional status of the environment										
Local status of the environment										
Scenic quality under threat / at risk of change*										

*Any rating above '5' will trigger the need to undertake an assessment of cumulative visual impacts.

Low							**Moderate**							**High**
10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**

Based on the above factors, the visual sensitivity of the study area is rated as being low to moderately-low. This is mainly due to the low density of sensitive receptor locations, the presence of mining activities and the absence of tourism facilities or other sites of cultural significance.

In most instances, the visual sensitivity of a rural setting is closely related to the practising of leisure tourism, which relies on the aesthetics of the area as part of its attraction. Although there is significant 'tourism' visitation in the area, most of it relates to mining activities that occur in the wider area (Tourism Impact Assessment Report undertaken for the proposed Humansrus Concentrating Power Station by SiVEST, 2011). In addition, economic activities and local jobs are largely dependent on these mining activities and not on the scenic quality of the area.

The area is largely natural in character and natural areas are usually associated with a relatively high degree of visual sensitivity, as any large-scale infrastructural development would be likely to alter this visual character. However, the existing presence of mining activities in the wider area is responsible for the introduction of large scale, highly visible industrial infrastructure, and in certain cases physical alterations to the landscape.

As mentioned above three solar power plants are being proposed on the Humansrus site. In this context, the visual sensitivity of the area would markedly decrease due to the potential impact that the proposed solar power plants would have on the visual character of the area. As such, once the solar plants have been constructed the area would have a very low visual sensitivity to the proposed construction of a power line.

The relatively low degree of visual sensitivity of the area under the current baseline is an important factor that has a bearing on the likely visual impacts that would be associated with the proposed power line.

3 GENERIC VISUAL IMPACT ASSOCIATED WITH POWER LINES

Power line towers are by their nature very large objects and thus highly visible. The standard tower height of the proposed 132kV power line typically ranges between 16m and 25m in height (equivalent in height to a 5-7 storey building). The height of a tower / pylon thus means that the pylon is typically visible for a relatively large radius around it. A 132kV power line consists of a series of towers spaced approximately 200m apart in a linear alignment, thus increasing its visible.

The degree of visibility of an object informs the level and intensity of the visual impact, but other factors also influence the nature of the visual impact. The landscape and aesthetic context of the environment in which the object is placed, as well as the perception of the viewer are also important factors. In the context of power lines, the type of tower used as well as the degree to which the towers would impinge upon or obscure a view is also a factor that will influence the experiencing of visual impacts associated with the power line.

As described above, power lines are not a feature of the natural environment, but are rather representative of human (anthropogenic) alteration of the natural environment. Thus when placed in a largely natural landscape, a power line can be perceived to be highly incongruous in this context. The height and linear nature of the power line will exacerbate this incongruity within a natural landscape, as the towers would impinge on views within the landscape. In addition, the practice of clearing a strip of vegetation under the power line servitude in certain vegetation types can worsen the visibility and incongruity of the power line in a largely natural setting, by causing fragmentation of natural vegetation, thus making the power line more visible. The cleared strip of land is often highly visible and draws the viewer's attention to the power line servitude, especially when it occurs within a context of natural thicket / bushveld vegetation where bushes or trees commonly occur.

The perception of the viewer / receptor of impact is also very important, as certain receptors may not consider the development of a power line to be a visual impact. The perception of visual impacts is thus highly subjective and involves 'value judgements' on behalf of the receptor. The scenic / aesthetic value of an area, and the types of land use practiced also tend to affect people's perception of whether a power line is an unwelcome intrusion, and thus the sensitivity of receptors to the erection of a power lines in an area. Power lines are often perceived as visual impacts where value is placed on the scenic or aesthetic character of an area, and where activities, which are based upon the enjoyment of, or exposure to, the scenic or aesthetic features of the area are practiced. Sensitivity to visual impacts is typically most pronounced in areas set aside for conservation of the natural environment (such as protected natural areas or conservancies), or in areas in which the natural character or scenic beauty of the area attracts visitors (tourists) to the area. Residents and visitors to these areas may perceive power lines to be an unwelcome intrusion that would degrade the natural character and scenic beauty of the area, and which would potentially even compromise the practising of tourism activities in the area.

Conversely, the presence / existence of other anthropogenic objects associated with the built environment may influence the perception of whether a power line is a visual impact. Where buildings and other linear structures such as roads, railways and especially other power lines exist, the visual environment could be considered to be 'degraded' and thus the introduction of a new power line in setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible.

Visual impacts can be experienced by different types of receptors, such as people driving along roads, or people living / working in the area in which the power line is visible. The receptor type in turn affects the nature of the visual impact experienced. The impact would be permanent in the case of a residence or other place of human habitation, or transient in the case of vehicles moving along a road.

Viewing distance is a critical factor in the experiencing of visual impacts, as beyond a certain distance, even large objects such as power line towers tend to blend in with the landscape. The visibility of an object tends to decrease exponentially with increasing distance away from the object. The maximum impact would be exerted on receptors at a distance of 500m or less and the impact at 1000m would be a quarter of the impact at 500m away (**Error! Reference source not found.**). At 5000m away or more, the impact would be negligible.

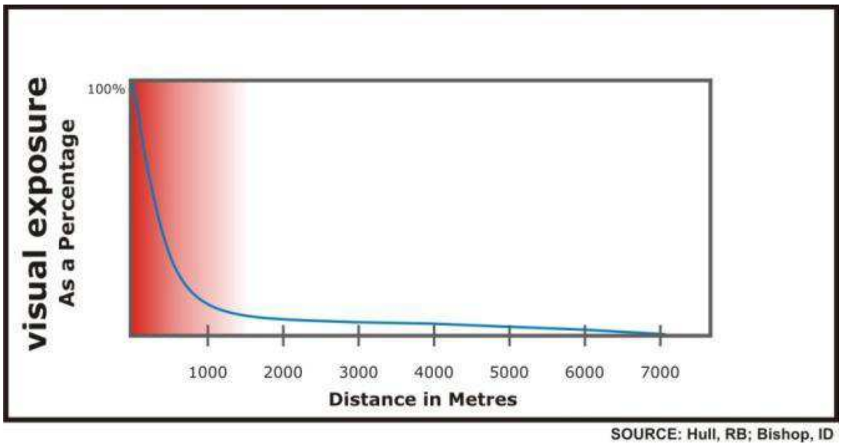

Figure 9: Diagram illustrating diminishing visual exposure over distance

Other factors, as listed below, can also impact the nature and intensity of a potential visual impact associated with a power line:

- The location of a power line in the landform setting – i.e. in a valley bottom or on a ridge top. In the latter example the power line would be much more visible and would 'break' the horizon.
- The presence of macro- or micro-topographical features, such as buildings or vegetation that would screen views from a receptor position to the power line.
- The presence of existing power lines in the area and alignment in relation to these power lines.
- Temporary factors such as weather conditions (presence of haze, or heavy mist) which would affect visibility.

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact; thus in a context where there are no human receptors or viewers present it is unlikely that any visual impacts would be experienced.

4 SENSITIVE VISUAL RECEPTORS

A sensitive receptor is defined as a receptor, which would potentially be adversely impacted by a proposed development. This takes into account a subjective factor on behalf of the viewer – i.e. whether the viewer would consider the impact as a negative impact. As described above, the adverse impact is often associated with the alteration of the visual character of the area in terms of the intrusion of the proposed power line into a 'view', which may affect the 'sense of place'. The identification of sensitive receptors has been undertaken based on a number of factors which include:

- the visual character of the area, especially taking into account visually scenic areas and areas of visual sensitivity
- the presence of residential dwellings and communities that may be subject to permanent visual impacts as a result of the proposed development
- the presence of sites / routes that are valued for their scenic quality and sense of place.
- feedback from interested and affected parties, as raised during the public participation process conducted as part of the wider BA study

A distinction must be made between a receptor location and a sensitive receptor location. A receptor location are sites from where the proposed power line may be visible, but the receptor may not necessarily be adversely affected by any visual intrusion associated with the development. Receptor locations include locations of commercial activities and certain movement corridors, such as roads that are not tourism routes. Sensitive receptor locations typically include sites that are likely to be adversely affected by the visual intrusion of the proposed development. They include; tourism facilities, scenic sites and residential dwellings in natural settings.

Distance bands were used to assign zones of visual impact for each of the proposed power line corridor alternatives, as the visibility of the power line would diminish exponentially over distance. As such, the proposed power line would be more visible to receptors located within a short distance and these receptors would experience a higher adverse visual impact than those located at a moderate or long distance from the proposed power line. The distance of sensitive receptors from each proposed power line corridor alternative was taken into account when rating the visual impact of the proposed development on these receptors.

Based on the height and scale of the project, the radii chosen to assign these zones of visual impact are as follows:

- 0 < 0.5km (High Impact)
- 0.5 < 2km (Moderate Impact)
- 2km < 5km (Low Impact)

During the site visit, it was confirmed that relatively few sensitive visual receptors are present within a 5km radius of the proposed 132kV power line alternatives (Figure 10and Figure 11). This is mainly due to the limited human settlement within the immediate vicinity of the site.

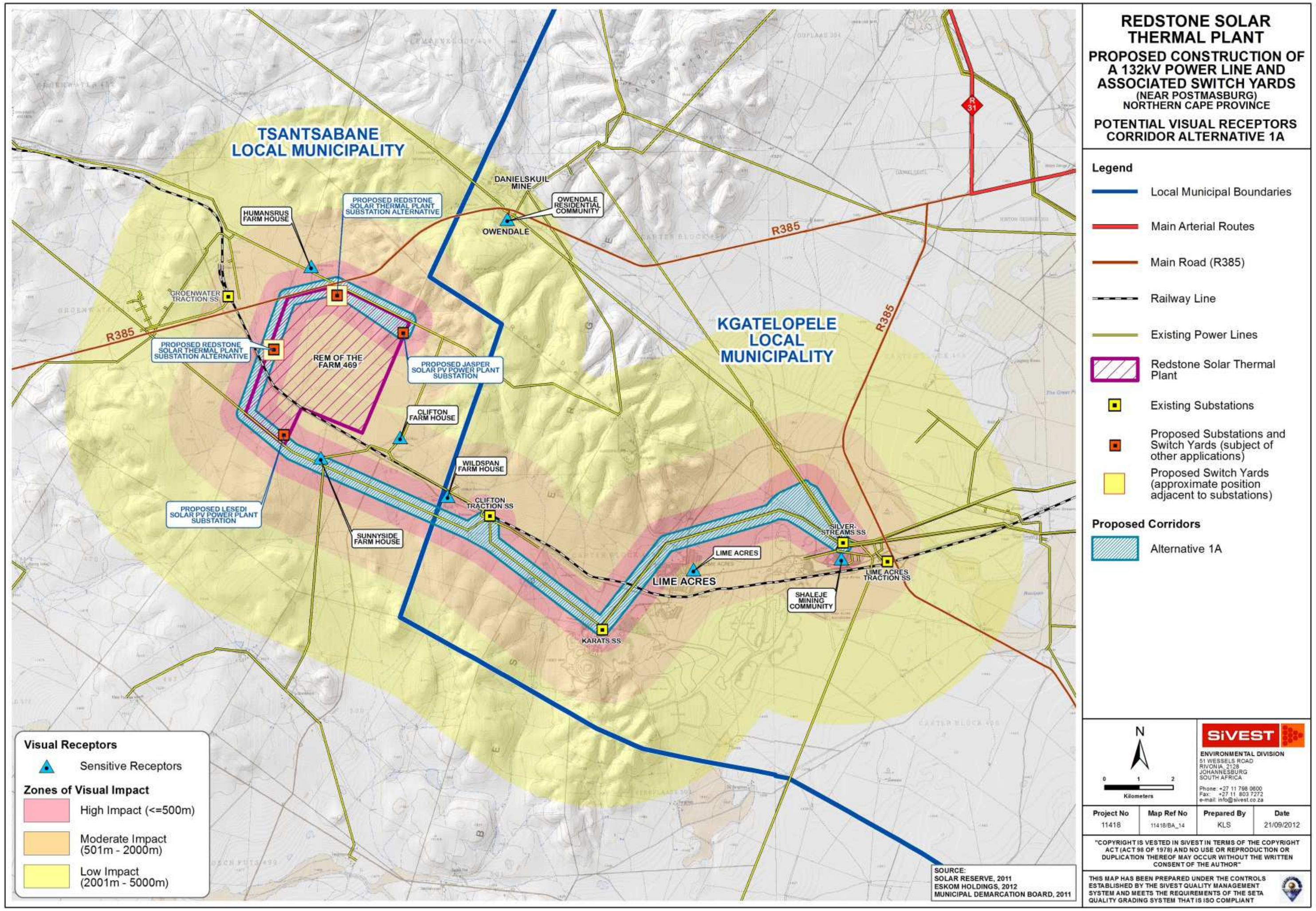

Figure 10: Visually Sensitive Receptors – Corridor Alternative 1A

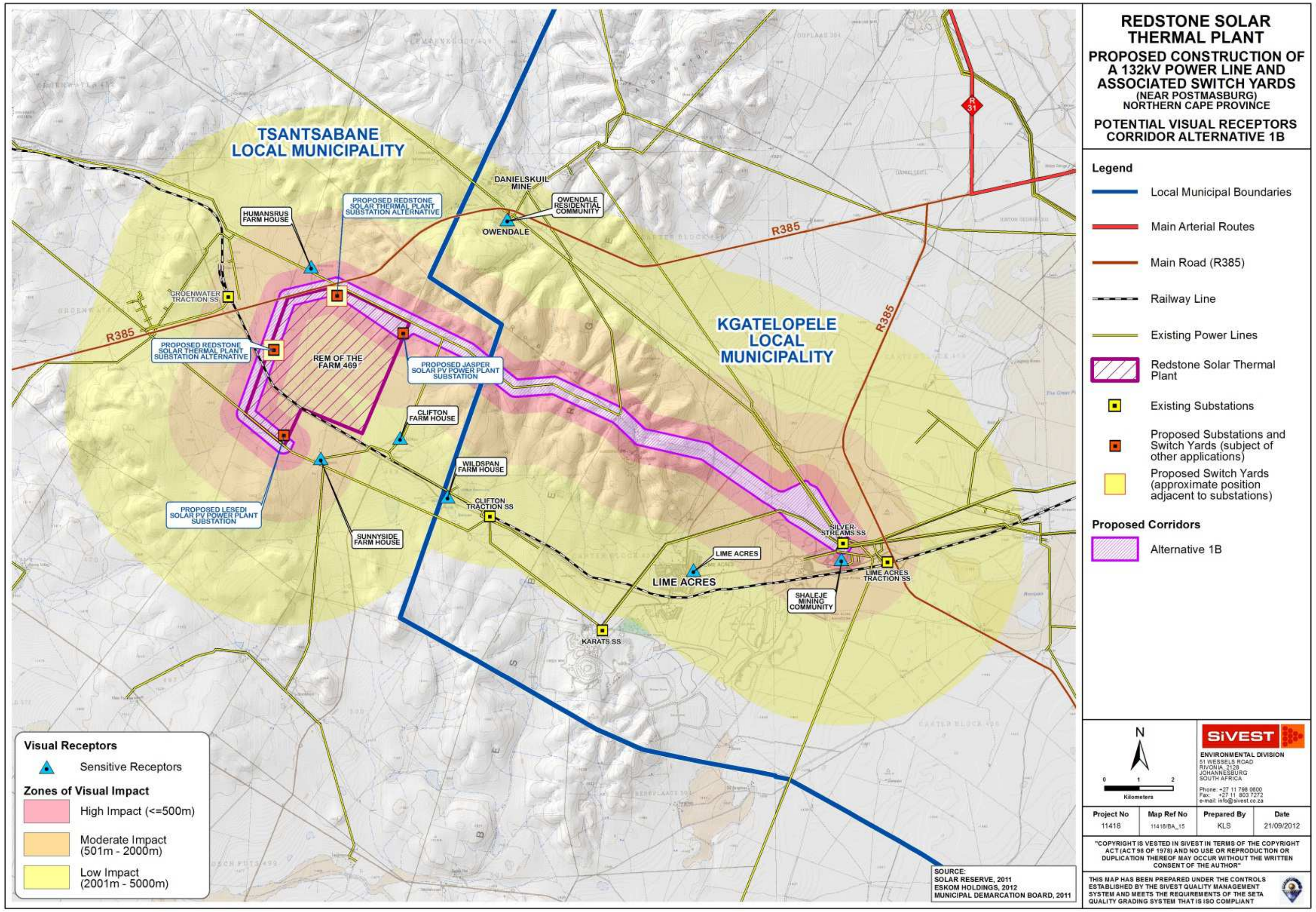

Figure 11: Visually Sensitive Receptors – Corridor Alternative 1B

The table below provides details of the visually sensitive receptors that were identified during the field investigation.

Table 2: Visual receptors in the study area

Name	Receptor Type
Clifton Farmstead	Farm Dwelling
Humansrus Farmstead	Farm Dwelling
Lime Acres	Residential Community
Owendale	Residential Community
Shaleje	Residential Mining Community
Sunnyside Farmsteads	Farm Dwelling
Wiidspan Farmstead	Farm Dwelling

In many cases, roads, along which people travel, are considered as sensitive receptors. The primary thoroughfare in the study area is the R385 provincial (tarred) road. The road is the primary access road into Postmasburg from the areas to the east, and carries much of the local access traffic to and from the town. The road is not part of a scenic tourist route, and is not valued or utilised for its scenic or tourism potential. As a result the road would typically not be classed as a sensitive receptor road – i.e. a road along which motorists would object to the potential visual intrusion posed by power line.

The visual impact of both corridor alternative 1A and corridor alternative 1B on visually sensitive receptors is detailed below in section 5.1 Sensitive Receptor Impact Rating.

5 IMPACT ASSESSMENT

5.1 Sensitive Receptor Impact Rating

In order to assess the impact of the proposed development on the sensitive receptor locations listed above, a matrix that takes into account a number of factors has been developed (Table 3), and is applied to each receptor location.

The matrix has been based on a number of factors as listed below:

- Distance of receptor away from the proposed development (distance banding)
- Primary focus / orientation of the receptor
- Presence of screening factors (topography, vegetation etc.)
- Visual character and sensitivity of the surrounding area
- Visual contrast of the development with the landscape pattern and form

These factors are considered to be the most important factors when assessing the visual impact of a proposed development on a sensitive receptor in this context. It must be remembered that the experiencing of visual impacts is a complex and qualitative phenomenon, and thus difficult to accurately quantify; thus the matrix should be seen as a representation of the likely visual impact at a receptor location.

Table 3: Visual assessment matrix used to rate the impact of the development on sensitive receptors

	VISUAL IMPACT RATING			
VISUAL FACTOR	**HIGH**	**MEDIUM**	**LOW**	**OVERRIDING FACTOR: NIL**
Distance of receptor away from proposed development	0 < 500m	500m < 2km	2km < 5km	5km <
Primary focus / orientation of receptor	'Arc of view' directly towards the proposed development	'Arc of view' partially towards the proposed development	'Arc of view' in opposite direction of the proposed development	
Presence of screening factors	No screening factors – development highly visible	Screening factors partially obscure the development	Screening factors obscure most of the development	Screening factors completely block any views towards the development, i.e. the development is not within the viewshed
Visual character and sensitivity of the area / surrounding views	**Scenic:** Highly natural; almost no visually 'degrading' factors, the area is valued for its scenic quality and is **highly sensitive to change**	**Rural / pastoral:** Mostly natural with typical rural infrastructure present, the area is valued for its uninhabited nature and is **potentially sensitive to change**	**Transformed:** Presence of industrial-type infrastructure (e.g. urban areas and outlying residential areas), not highly valued and **not sensitive to change**	
Visual Contrast	**High contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form)	**Moderate contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form)	**Corresponds** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form)	

As described above, distance of the viewer / receptor location away from the development is an important factor in the context of experiencing of visual impacts. A high impact rating has thus been assigned to receptor locations that are located within 0<500m of the proposed development. Beyond 5km, the visual impact would be virtually nil, as the development would appear to merge with the elements on the horizon. Any receptor location beyond this distance has therefore been assigned an overriding nil impact rating. As such, despite the impact rating assigned to the other visual factors, the overall impact rating would remain nil, as the proposed development would not visually influence any receptors located more than 5km from the development. Where a receptor is located within more than one distance band, such as a receptor road, it is assigned the score according to the closest distance it will get from the proposed development i.e. the highest visual impact experienced.

The orientation of a receptor becomes important in many cases, as the receptor location is typically oriented in a certain direction, e.g. with views towards a certain area from a highly frequented area like a porch or garden. The visual impact of a development could thus be potentially much greater if the development intruded into such a view, and thus the highest rating has been given to a situation where the development would cross directly across an ‘arc of view / orientation’ – i.e. the 180^o panorama in a certain direction. Where the receptor does not have a primary orientation, such as a residential community where the dwellings are focused in different directions, this factor will excluded of the matrix.

The presence of screening factors is equally important in this context as the distance away from the development. Screening factors can be vegetation, buildings, as well as topography. For example, a grove of trees located between a receptor location and an object could completely shield the object from the receptor. Topography (relative elevation and aspect) plays a similar role as a receptor location in a deep or incised valley will have a very limited viewshed and may not be able to view an object that is in close proximity, but not in its viewshed. As such, the complete screening of the development has also been assigned an overriding nil impact rating, as the development would not impose any impact on the receptor.

The visual character of the surrounding area and views is also considered in the matrix, as introducing a development into a natural area may adversely affect or degrade scenic views experienced by receptors. Although pastoral’ or rural landscapes often have a relative density of anthropogenic (human) infrastructure (e.g. fences, centre pivots, buildings such as barns and farmhouses), views of these landscape are often perceived as sensitive to visual impacts, particularly to visual impacts of more industrial or large-scale infrastructure. A moderate rating is thus assigned to the visual character of these views. Transformed industrial landscapes have been assigned a low impact rating as a new development is unlikely to be regarded as negative within this context.

The visual contrast of a development refers to the degree to which the development would be congruent with the surrounding environment. It is based whether or not the development would conform with the land use, settlement density, structural scale, form and pattern of natural elements that define the structure of the surrounding landscape. The visual compatibility is an important factor to be considered when assessing the impact of the development on receptors within a specific context. A development that is incongruent with the surrounding area could have a significant visual impact on sensitive receptors as it may change the visual character of the landscape.

It should be noted that this rating matrix is a relatively simplified way to assign a likely representative visual impact, which allows a number of factors to be considered. Part of its limitation lies in the quantitative assessment of what is largely a qualitative or subjective impact.

The visual impact ratings for the proposed power line on each visual receptor is detailed in Table 4 to Table 10 below. Separate ratings have been provided for both alternative 1A and alternative 1B. As the proposed power line is required to feed the power generated at the Redstone Solar Thermal Plant onto the National grid, the impact ratings have been calculated according to the worst case scenario, after the solar plant has been constructed.

Table 4: Visual impact of the development on residents at Clifton farmstead

VISUAL FACTOR	ALTERNATIVE 1A	ALTERNATIVE 1B
Distance of receptor away from proposed development	**MEDIUM:** The receptor is located approximately 1,5km from the proposed power line corridor.	**LOW:** The receptor is located approximately 3km from the proposed power line corridor.
Primary focus / orientation of receptor	**HIGH:** The farmhouse is oriented directly towards the proposed power line corridor.	**LOW:** The farmhouse is oriented in the opposite direction of the proposed power line corridor.
Presence of screening factors	**LOW:** Tall exotic trees will obscure most views toward the proposed power line from the front porch / 'stoep' (Figure 12). Some of the trees are deciduous, therefore further visual screening would be provided during the summer months.	**LOW:** Groves of trees and the farm worker buildings will obscure most views toward the proposed power line (Figure 13). Some of the trees are deciduous, therefore further visual screening would be provided during the summer months.
Visual character and sensitivity of the area / surrounding views	**LOW:** The surrounding area has a natural pastoral visual character, however large scale infrastructure associated with the Redstone Solar Thermal Energy Plant would transform the visual character into an	**LOW:** The surrounding area has a natural pastoral visual character, however large scale infrastructure associated with the Redstone Solar Thermal Energy Plant would transform the visual character into an

	industrial-type character, once constructed.	industrial-type character, once constructed.
Visual Contrast	**LOW:** The power line corridor follows an existing 132kV power line for the entire route. The proposed power line would therefore correspond with the existing infrastructural elements in the landscape. Grassy vegetation with some scattered trees and shrubs prevails within the proposed corridor, therefore limited vegetation clearing would be required and the natural vegetation pattern would not be disrupted.	**HIGH:** Clearing of the bushier vegetation that prevails on the Rooiberge would create a distinct line along the hillside. The power line corridor follows a wooden pole 22kV power line for only part of the route. The towers of the proposed power line would therefore contrast with the pattern of both the natural and human elements in the landscape.

Figure 12: View south toward corridor alternative 1A from the main porch of the farm house on Clifton farm

Figure 13: View north-east toward corridor alternative 1B from Clifton farmhouse

Table 5: Visual impact of the development on residents at Humansrus farmstead

VISUAL FACTOR	ALTERNATIVE 1A	ALTERNATIVE 1B
Distance of receptor away from proposed development	**HIGH:** The receptor is located approximately 500m from the proposed power line corridor (Figure 14).	**HIGH:** The receptor is located approximately 500m from the proposed power line corridor.
Primary focus / orientation of receptor	**MEDIUM:** The farmhouse is oriented partially towards the proposed power line corridor.	**MEDIUM:** The farmhouse is oriented partially towards the proposed power line corridor.
Presence of screening factors	**LOW:** Tall exotic trees will obscure most views toward the proposed power line from the farmhouse.	**LOW:** Tall exotic trees will obscure most views toward the proposed power line from the farmhouse.
Visual character and sensitivity of the area / surrounding views	**LOW:** The large scale infrastructure associated with the Redstone Solar Thermal Energy Plant would be highly visible from the farmstead, as such the visual character of the views toward the proposed power line corridor would be characteristic of an	**LOW:** The large scale infrastructure associated with the Redstone Solar Thermal Energy Plant would be highly visible from the farmstead, as such the visual character of the views toward the proposed power line corridor would be characteristic of an

	industrial-type environment, once the solar plant is constructed.	industrial-type environment, once the solar plant is constructed.
Visual Contrast	**LOW:** As viewed from the Humansrus farmstead, the power line would appear to be part of the Redstone Solar Thermal Energy Power Plant (once constructed). The tower structures that make up the proposed power line would thus correspond with the large-scale infrastructural form of the solar plant.	**LOW:** As viewed from the Humansrus farmstead, the power line would appear to be part of the Redstone Solar Thermal Energy Power Plant (once constructed). The tower structures that make up the proposed power line would thus correspond with the large-scale infrastructural form of the solar plant

Table 6: Visual impact of the development on the residents of Lime Acres

VISUAL FACTOR	ALTERNATIVE 1A	ALTERNATIVE 1B
Distance of receptor away from proposed development	**HIGH:** Some of the residential dwellings at Lime Acres are located approximately within the proposed power line corridor (Figure 14).	**LOW:** Most residential dwellings at Lime Acres are located more than 2,5km from the proposed power line corridor.
Primary focus / orientation of receptor	Some of the residential dwellings will be oriented toward the proposed power line; there is no primary orientation.	Some of the residential dwellings will be oriented toward the proposed power line; there is no primary orientation.
Presence of screening factors	**MEDIUM:** Exotic trees and buildings within lime acres will partially obscure views toward the proposed power line from the residential dwellings. Only houses on the western edges of Lime Acres are likely to have wide open views of the proposed development.	**LOW:** Exotic trees and buildings within lime acres as well as the hilly terrain to the north will obscure most views toward the proposed power line from the residential dwellings in Lime Acres. The power line would be more visible to houses on the western edges of Lime Acres, however the hilly terrain would obscure most views toward the power line.
Visual character and sensitivity of the area / surrounding views	**LOW:** The surrounding mining activities and built form in Lime Acres has resulted in the area having a visually degraded character, typical of a peri-urban environment. As such, this part of the study area would not be sensitive to change.	**LOW:** The surrounding mining activities and built form in Lime Acres has resulted in the area having a visually degraded character, typical of a peri-urban environment. As such, this part of the study area would not be sensitive to change.

Visual Contrast	**LOW:** The power line corridor follows an existing 132kV power line for the entire route. The proposed power line would therefore correspond with the existing infrastructural elements in the landscape. Grassy vegetation with some scattered trees and shrubs prevails within the proposed corridor, therefore limited vegetation clearing would be required and the natural vegetation pattern would not be disrupted.	**HIGH:** Clearing of the bushier vegetation that prevails on the Rooiberge would create a distinct line along the hillside. The power line corridor follows a wooden pole 22kV power line for only part of the route. The towers of the proposed power line would therefore contrast with the pattern of both the natural and human elements in the landscape.

Figure 14: View of the existing 132kV power line within corridor alternative 1A. Note the residential dwellings at Lime Acres within the corridor.

Table 7: Visual impact of the development on the residents of Owendale

VISUAL FACTOR	ALTERNATIVE 1A	ALTERNATIVE 1B
Distance of receptor away from proposed development	**LOW:** Most residential dwellings at Owendale are located more than 3,5km from the proposed power line	**LOW:** Most residential dwellings at Owendale are located more than 3,5km from the proposed power line

	corridor.	corridor.
Primary focus / orientation of receptor	The orientation of the residential dwellings vary and there is no primary orientation.	The orientation of the residential dwellings vary and there is no primary orientation.
Presence of screening factors	**NIL:** The mountainous terrain of the Rooiberge will completely block out any views toward the proposed power line corridors from Owendale. Therefore, the proposed development will have no impact on these residents.	**NIL:** The mountainous terrain of the Rooiberge will completely block out any views toward the proposed power line corridors from Owendale. Therefore, the proposed development will have no impact on these residents.
Visual character and sensitivity of the area / surrounding views	**MEDIUM:** Despite the residential buildings, and other infrastructure in the form of numerous power lines, this part of the study area has a rural visual character. The hilly terrain would block out views of the mining activities and the proposed solar plants on the Humansus farm. As such, this part of the study area would be potentially sensitive to change.	**MEDIUM:** Despite the residential buildings, and other infrastructure in the form of numerous power lines, this part of the study area has a rural visual character. The hilly terrain would block out views of the mining activities and the proposed solar plants on the Humansus farm. As such, this part of the study area would be potentially sensitive to change.
Visual Contrast	**LOW:** The power line corridor follows an existing 132kV power line for the entire route. The proposed power line would therefore correspond with the existing infrastructural elements in the landscape. Grassy vegetation with some scattered trees and shrubs prevails within the proposed corridor, therefore limited vegetation clearing would be required and the natural vegetation pattern would not be disrupted.	**HIGH:** Clearing of the bushier vegetation that prevails on the Rooiberge would create a distinct line along the hillside. The power line corridor follows a wooden pole 22kV power line for only part of the route. The towers of the proposed power line would therefore contrast with the pattern of both the natural and human elements in the landscape.

Figure 15: View from Owendale toward the proposed power line corridor alternatives

Table 8: Visual impact of the development on the residents of Shaleje

VISUAL FACTOR	ALTERNATIVE 1A	ALTERNATIVE 1B
Distance of receptor away from proposed development	**HIGH:** The residential dwellings at Shaleje are located less than 500m from the proposed power line corridor.	**HIGH:** The residential dwellings at Shaleje are located less than 500m from the proposed power line corridor.
Primary focus / orientation of receptor	The orientation of the residential dwellings vary and there is no primary orientation.	The orientation of the residential dwellings vary and there is no primary orientation.
Presence of screening factors	**LOW:** Exotic trees will obscure most views toward the proposed power line (Figure 16).	**LOW:** Exotic trees will obscure most views toward the proposed power line (Figure 16).
Visual character and sensitivity of the area / surrounding views	**LOW:** Shaleje is located in close proximity to an open cast mine, Silverstreams Substation, Lime Acres Traction Substation and the railway line. The extensive electrical infrastructure and other built form has visually degraded the character in	**LOW:** Shaleje is located in close proximity to an open cast mine, Silverstreams Substation, Lime Acres Traction Substation and the railway line. The extensive electrical infrastructure and other built form has visually degraded the character in

	this part of the study area, therefore the area would not be sensitive to change.	this part of the study area, therefore the area would not be sensitive to change.
Visual Contrast	**LOW:** Extensive electrical infrastructure exists within this part of the study area. The proposed power line would therefore conform with the infrastructural form and land use.	**LOW:** Extensive electrical infrastructure exists within this part of the study area. The proposed power line would therefore conform with the infrastructural form and land use.

Figure 16: Tall exotic trees surrounding residential dwellings at Shaleje.

Table 9: Visual impact of the development on residents at Sunnyside Farmsteads

VISUAL FACTOR	ALTERNATIVE 1A	ALTERNATIVE 1B
Distance of receptor away from proposed development	**HIGH:** The receptor is located within the proposed power line corridor.	**MEDIUM:** At the closest point, the receptor is located approximately 1km from the proposed power line corridor.
Primary focus / orientation of receptor	**LOW:** The farmhouse is oriented in the opposite direction of the proposed power line corridor.	**HIGH:** The farmhouse is oriented directly towards the proposed power line corridor.
Presence of screening	**HIGH:** Other than a few isolated tall	**MEDIUM:** Scattered trees and the

factors	trees there are no screening factors present and the power line would be highly visible (Figure 17).	hilly terrain to the north would provide partial visual screening (Figure 18). Depending on the layout of the solar plants on the Humansrus farm, they may also contribute to visually blocking out the
Visual character and sensitivity of the area / surrounding views	**LOW:** The surrounding area has a natural pastoral visual character, however large scale infrastructure associated with the proposed Redstone Solar Thermal Energy Plant (once constructed) would degrade the visual character of views in a northerly direction. Views from the farmhouse in a southern direction would remain relatively natural.	**LOW:** The surrounding area has a natural pastoral visual character, however large scale infrastructure associated with the proposed Redstone Solar Thermal Energy Plant (once constructed) would degrade the visual character of views in a northerly direction. Views from the farmhouse in a southern direction would remain relatively natural.
Visual Contrast	**LOW:** The power line corridor follows an existing 132kV power line for the entire route. The proposed power line would therefore correspond with the existing infrastructural elements in the landscape. Grassy vegetation with some scattered trees and shrubs prevails within the proposed corridor, therefore limited vegetation clearing would be required and the natural vegetation pattern would not be disrupted.	**MEDIUM:** Clearing of the bushier vegetation that prevails on the Rooiberge would create a distinct line along the hillside. However, once the solar plants are constructed on the Humansrus farm, large structures will be introduced into the landscape thereby reducing the visual contrast that the power line would have with the land use in the surrounding area.

Figure 17: View from Sunnyside Farmstead toward the existing 132kV power line located within alternative 1A. The power line is highly visible as there are very few screening factors present.

Figure 18: View from Sunnyside Farmstead in a northern direction toward alternative 1B.

Table 10: Visual impact of the development on residents at Wiidspan Farmstead

VISUAL FACTOR	ALTERNATIVE 1A	ALTERNATIVE 1B
Distance of receptor away from proposed development	**HIGH:** The receptor is located approximately 500m from the proposed power line corridor.	**LOW:** The receptor is located approximately 3.5km from the proposed power line corridor.
Primary focus / orientation of receptor	**HIGH:** The farmhouse is oriented directly towards the proposed power line corridor.	**LOW:** The farmhouse is oriented in the opposite direction of the proposed power line corridor.
Presence of screening factors	**LOW:** Tall exotic trees will obscure most views toward the proposed power line from the front porch / 'stoep' (Figure 19). Most of the trees are deciduous, therefore further visual screening would be provided during the summer months.	**MEDIUM:** Scattered trees and hilly terrain to the north will provide partial visual screening.
Visual character and sensitivity of the area / surrounding views	**MEDIUM:** The surrounding area has a natural pastoral visual character. The Redstone Solar Thermal Energy Plant is located more than 3km from the farmstead and therefore it would not have a significant impact on the visual character, once constructed.	**MEDIUM:** The surrounding area has a natural pastoral visual character. The Redstone Solar Thermal Energy Plant is located more than 3km from the farmstead and therefore it would not have a significant impact on the visual character, once constructed.
Visual Contrast	**LOW:** The power line corridor follows an existing 132kV power line for the entire route. The proposed power line would therefore correspond with the existing infrastructural elements in the landscape. Grassy vegetation with some scattered trees and shrubs prevails within the proposed corridor, therefore limited vegetation clearing would be required and the natural vegetation pattern would not be disrupted.	**HIGH:** Clearing of the bushier vegetation that prevails on the Rooiberge would create a distinct line along the hillside. The power line corridor follows a wooden pole 22kV power line for only part of the route. The towers of the proposed power line would therefore contrast with the pattern of both the natural and human elements in the landscape.

Figure 19: View south toward corridor alternative 1A from the main porch of the farmhouse on Wiidspan farm

Based on visual impact ratings in the tables above, an overall impact rating has been assigned for each receptor location. This rating indicates the impact that the proposed power line would have on each visually sensitive receptor. Two separate ratings have been calculated for each identified receptor location, in order to highlight the difference between the corridor alternatives, in terms of the visual impact that the proposed 132kV power line would have on these receptors. As such, the overall visual impact of alternative 1A and alternative 1B on each receptor is presented in Table 11 and Table 12, respectively.

Table 11: Visual impact of alternative 1A on sensitive receptors summary and results

Receptor Location	**Distance**	**Orientation**	**Screening**	**Character / Sensitivity**	**Contrast**	**OVERALL IMPACT RATING**
Clifton Farmstead	Medium	High	Low	Low	Low	**MEDIUM**
Humansrus Farmstead	High	Medium	Low	Low	Low	**MEDIUM**
Lime Acres	High		Medium	Low	Low	**MEDIUM**
Owendale	Low		Nil	Medium	Low	**NIL**

Receptor Location	Distance	Orientation	Screening	Character / Sensitivity	Contrast	OVERALL IMPACT RATING
Shaleje	High		Low	Low	Low	**LOW**
Sunnyside Farmsteads	High	Low	High	Low	Low	**MEDIUM**
Wiidspan Farmstead	High	High	Low	Medium	Low	**MEDIUM**

Table 12: Visual impact of alternative 1B on sensitive receptors summary and results

Receptor Location	Distance	Orientation	Screening	Character / Sensitivity	Contrast	OVERALL IMPACT RATING
Clifton Farmstead	Low	Low	Low	Low	High	**LOW**
Humansrus Farmstead	High	Medium	Low	Low	Low	**MEDIUM**
Lime Acres	Low		Low	Low	High	**LOW**
Owendale	Low		Nil	Medium	High	**NIL**
Shaleje	High		Low	Low	Low	**LOW**
Sunnyside Farmsteads	Medium	High	Medium	Low	Medium	**MEDIUM**
Wiidspan Farmstead	Low	Low	Medium	Medium	High	**MEDIUM**

As depicted in the tables above, there is very little difference between the visual impact rating of the two power line alternatives on visually sensitive receptors within the study area. Although corridor alternative 1A would result in less visual contrast with the surrounding area, as it is aligned parallel to an existing power line, it is located in closer proximity to most visual receptors. In contrast, corridor alternative 1B is located further away from the visually sensitive receptors, but due to its location on the bushier hillside, it would result in a distinct line, which would visually contrast with the surrounding environment. As such, there is minimal preference between alternative 1A and alternative 1B from a visual perspective. This is elaborated further below in 5.3 Comparative Assessment of Route Corridor Alternatives.

5.2 Overall Visual Impact Rating

The BA requires that an overall rating for visual impact be provided to allow the visual impact to be assessed alongside other environmental parameters. SiVEST has developed an impact rating matrix for this purpose. The tables below present the impact matrix for visual impacts associated with the proposed construction of a 132kV power line associated with the Redstone Solar Thermal Energy Plant.

Please refer to Appendix A below for an explanation of the impact rating methodology.

Table 13: Overall visual impact rating

IMPACT TABLE		
Environmental Parameter	Visual Impact	
Issue/Impact/Environmental Effect/Nature	The proposed power line could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptor locations to visual impacts. The proposed 132kV power line may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.	
Extent	Local / District (2)	
Probability	Definite (4)	
Reversibility	Irreversible (4)	
Irreplaceable loss of resources	Marginal loss of resources (2)	
Duration	Long term (3)	
Cumulative effect	Medium Cumulative Impact (3)	
Intensity/magnitude	Low (1)	
Significance Rating	**Prior to mitigation measures:** Low negative impact **After mitigation measures:** Low negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	3
Reversibility	4	4

Irreplaceable loss	2	1
Duration	3	3
Cumulative effect	3	1
Intensity/magnitude	1	1
Significance rating	-18 (low negative)	-14 (low negative)
Mitigation measures	▪ Align the power line to run parallel to existing power lines or other infrastructure, linear impacts or cut lines ▪ Avoid crossing areas of high elevation, especially ridges, koppies or hills ▪ Align the power line as far away from sensitive receptor locations as possible ▪ Avoid areas of natural wooded vegetation where possible	

* In the context of the visual environment, 'resources' are defined as scenic / natural views that are almost impossible to replace.

5.3 Comparative Assessment of Route Corridor Alternatives

Two alternatives have been investigated for the proposed 132kV power line associated with the Redstone Solar Thermal Energy Plant. These alternatives have comparatively assessed in order to determine the preferred corridor alignment from a visual perspective.

The preference rating for each alternative is provided in Table 14 below. The alternatives are rated as being either preferred (the alternative will result in a low visual impact / reduce the visual impact), not-preferred (the alternative will result in relatively high visual impact / increase the visual impact) and favourable (the visual impact will be relatively insignificant).

The degree of visual impact and rating has been determined based on the following factors:

- The alignment of the power line in relation to existing power lines or other infrastructure, linear impacts or cut lines;
- The alignment of the power line in relation to areas of high elevation, especially ridges, koppies or hills;
- The distance of the power line from sensitive receptor locations that were allocated higher impact ratings (medium and high);

- The alignment of the power line in relation to areas of natural bushveld vegetation (clearing a strip of vegetation under the power line servitude worsens the visibility).

Key

Preferred
Not Preferred
Favourable

Table 14: Comparative Assessment of Alternatives

Alternative	Preference	Reasons
Alternative 1A	Preferred	▪ The power line corridor is aligned parallel to an existing 132kV power line for the entire route. ▪ The power line would be located on the lower lying ground in the southern part of the study area. ▪ The power line would have a medium visual impact on five (5) visually sensitive receptors. However, during the site visit, several residents indicated their preference for the power line routing in this area of the study area. ▪ Limited vegetation clearing would be required, as the power line would be routed in an area where grassy plains with scattered trees and shrubs prevail.
Alternative 1B	Favourable	▪ The power line corridor is positioned further away from the visually sensitive receptors and would have medium visual impact on three (3) visually sensitive receptors. ▪ The power line would run parallel to an existing 22kV power line for a portion of the route. ▪ Although the visual impact would be relatively low, it is not

Alternative	Preference	Reasons
		preferred as the route is aligned on the hilly ground to the north. As such, clearing a strip of the bushier vegetation that prevails on these hills would draw attention of the viewer and disrupt the natural texture of the hillside vegetation.

6 CONCLUSION

The Visual Impact Assessment conducted for the proposed 132kV power line has demonstrated that although the surrounding area has a natural and pastoral visual character it is not regarded as sensitive from a visual perspective, due to the low density of potential sensitive receptors and the presence of mining activities that occur across the area. In addition, the power line would be established to connect the Redstone Solar Thermal Energy Plant onto the Eskom grid. As such, the massive structures of the solar plant, along with its associated infrastructure would be likely to alter the visual character of the immediate area, thus lowering the potential sensitivity of the area even further.

It was established that both corridor alternative 1A and alternative 1B would have a medium or low visual impact on most of the visually sensitive receptors within the study area. This is mostly due to the relative close proximity of alternative 1A to the receptors and the location of alternative 1B on the higher lying area, which is dominated by bushier vegetation. Although, the power line corridor alternatives have been rated as having a relatively equal impact on the visually sensitive receptors, corridor alternative 1A is regarded as the preferred alternative. This is mostly due the preference for alternative 1A received from certain residents of the visually sensitive farm houses, and the fact that alternative 1B would disrupt the natural bushy vegetation and create a cleared strip of vegetation along the hillside.

The overall significance of the visual impact as a result of the proposed 132kV power line was assessment according to SiVEST's impact rating matrix. The assessment revealed that the significance of the visual impact resulting from the proposed power line would be low, both before and after implementing mitigation measures.

7 REFERENCES

- Kalibbala, F and da Cruz, P. 2011. Tourism Assessment: Construction of the proposed Humansrus Concentrating Solar Power Plant. SiVEST – Johannesburg.

- Mucina L., and Rutherford M.C., (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

- Oberholzer, B. 2005. Guideline for involving visual & 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 & Development Planning, Cape Town.

Appendix A

IMPACT RATING METHODOLOGY

IMPACT RATING METHODOLOGY

The determination of the effect of an environmental impact on an environmental parameter (in this instance, wetlands) is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global) whereas intensity is defined by the severity of the impact (e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence). Significance is calculated as per the example shown in Table ?.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Impact Rating System Methodology

Impact assessments must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is usually assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

In this case, a unique situation is present whereby various scenarios have been posed and evaluated accordingly. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used:

Table 1. Example of the significance impact rating table.

NATURE		
Includes a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.

4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects

3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY / MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE		

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.

6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

SiVEST ………………………. Division
51 Wessels Road, Rivonia. 2128. South Africa
PO Box 2921, Rivonia. 2128. South Africa

Tel + 27 11 798 0600
Fax +27 11 803 7272
Email info@sivest.co.za
www.sivest.co.za

Contact Person: Andrea Gibb
Tel No.: +27 11 798 0638
Email: andreag@sivest.co.za