ARCUS CONSULTANCY SERVICES SOUTH AFRICA (PTY) LTD

Proposed Construction of the 315MW Phezukomoya Wind Energy Facility near Noupoort, Northern Cape Province

Visual Impact Assessment Report – Impact Phase

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Date:	22 January 2018
Document Title:	Proposed Construction of the 315MW Phezukomoya Wind Energy Facility near Noupoort, Northern Cape Province: Visual Impact Assessment Report – Impact Phase
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Version Number:	#3
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For:	SiVEST Environmental Division

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environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
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Number: Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Proposed 315MW Phezukomoya Wind Energy Facility near Noupoort in Umsobomvu Local Municipality in the Northern Cape Province

Specialist:	**SiVEST Environmental**		
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4.2 The specialist appointed in terms of the Regulations_

I, **Andrea Gibb** , 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 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

SiVEST Environmental

Name of company (if applicable):

13 September 2017

Date:

4.2 The specialist appointed in terms of the Regulations_

I, **Kerry Schwartz**, 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 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

SiVEST Environmental

Name of company (if applicable):

13 September 2017

Date:

4.2 The specialist appointed in terms of the Regulations_

I, **Stephan Jacobs** , 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 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

SiVEST Environmental

Name of company (if applicable):

13 September 2017

Date:

CONTENTS OF THE SPECIALIST REPORT – CHECKLIST FOR APPENDIX 6 (SPECIALIST REPORTS) OF GNR 326

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
(1) A specialist report prepared in terms of the 2014 EIA Regulations (as amended) must contain—	
(a) details of – i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	**Section 1.4**. Specialist CV's are included in **Appendix B**.
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	**Page iii - vi**
(c) an indication of the scope of, and the purpose for which, the report was prepared;	**Section 1**
(cA) an indication of the quality and age of base data used for the specialist report;	**Section 1.5** **Section 3**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	**Section 3** **Section 4** **Section 5** **Section 7**
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**Section 1.5.1** **Section 3**
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	**Section 1.5**
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	**Section 3** **Section 5** **Section 6** **Section 7**
(g) an identification of any areas to be avoided, including buffers;	**Section 6**
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	**Section 6**
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Section 1.3**
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	**Section 5** **Section 8** **Section 7** **Section 8** **Section 9**
(k) any mitigation measures for inclusion in the EMPr;	**Section 7.6**

(l) any conditions for inclusion in the environmental authorisation;	N/A
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
(n) a reasoned opinion— (i) whether the proposed activity, activities or portions thereof should be authorized; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	**Section 10.1**
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Details of any consultation process that was undertaken during the course of preparing the specialist report is included in Appendix D.
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	All correspondence / feedback regarding the visual environment received to date is included in **Section 7.2** as well as in **Appendix D**.
(q) any other information requested by the competent authority	No information regarding the visual study has been requested from the competent authority.
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	**N/A**

ARCUS CONSULTANCY SERVICES SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE 315MW PHEZUKOMOYA WIND ENERGY FACILITY NEAR NOUPOORT, NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT REPORT – IMPACT PHASE

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GLOSSARY OF TERMS

ABBREVIATIONS

DEIAR	Draft Environmental Impact Assessment Report
DoE	Department of Energy
DTM	Digital terrain model
DSR	Draft Scoping Report
EIA	Environmental Impact Assessment
FEIAR	Final Environmental Impact Assessment Report
FSR	Final Scoping Report
GIS	Geographic Information System
I&AP	Interested and/or Affected Party
kV	Kilovolt
MTS	Main Transmission Substation
MW	Megawatt
NGI	National Geo-spatial Information
O&M	Operation & Maintenance
REIPPP	Renewable Energy Independent Power Producer Programme
ROD	Record of Decision
SANBI	South African National Biodiversity Institute
VIA	Visual Impact Assessment
WEF	Wind Energy Facility

DEFINITIONS

Anthropogenic feature: An unnatural feature as a result of human activity.

Aspect: Direction in which a hill or mountain slope faces.

Cultural landscape: A representation of the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (World Heritage Committee, 1992).

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.

Study area: The study area is assumed to encompass a zone of 8km (not factoring the curvature of the earth's surface) from the proposed turbine locations and 5km from the proposed power line corridors, and is also referred to as the visual assessment zone.

Vantage point: A point in the landscape from where a particular project or feature can be viewed.

Viewpoint: A point in the landscape from where a particular project or feature can be viewed.

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

Visual assessment zone: The visual assessment zone / study area is assumed to encompass a zone of 8km (not factoring the curvature of the earth's surface) from the proposed turbine locations and 5km from the proposed power line corridors.

Visual character: The physical elements and forms and land use related characteristics that make up a landscape and elicit a specific visual quality or nature. Visual character can be defined based on the level of change or transformation from a completely natural setting.

Visual contrast: The degree to which the development would be congruent with the surrounding environment. It is based on whether or not the development would conform with the land use, settlement density, forms and patterns of elements that define the structure of the surrounding landscape.

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.

Visual sensitivity: 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 the new development, which are usually based on the perceived aesthetic appeal of the area.

ARCUS CONSULTANCY SERVICES SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE 315MW PHEZUKOMOYA WIND ENERGY FACILITY NEAR NOUPOORT, NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT REPORT – IMPACT PHASE

1 INTRODUCTION

Phezukomoya Wind Power (Pty) Ltd is proposing to construct a wind energy facility (WEF) near Noupoort in the Northern Cape Province. In accordance with the Department of Energy's (DoE's) Renewable Energy Independent Power Producer Procurement Programme ('REIPPPP') bid requirements, InnoWind (Pty) Ltd (hereafter referred to as InnoWind) established Phezukomoya Wind Power (Pty) as a Special Purpose Vehicle (SPV) that will be used to own all the authorisations, contracts, permits and licenses required to lawfully build and operate the Proposed Phezukomoya Wind Power (Pty). InnoWind has appointed Arcus Consultancy Services SA (Pty) Ltd (hereafter referred to as Arcus) to undertaken the required Environmental Impact Assessment (EIA). The proposed development will consist of a 315MW generation capacity WEF with associated infrastructure referred to as Phezukomoya WEF.

SiVEST has been appointed to undertake a visual impact assessment (VIA) for the proposed construction of the Phezukomoya WEF as part of the EIA study being conducted by Arcus. During the Scoping Phase of the EIA, a scoping-level visual impact assessment study was conducted to identify key visual issues relating to the development of the wind farm within this context and determine the potential extent of the visual impact. This was done by characterising the visual environment of the area and identifying areas of potential visual sensitivity that may be subject to visual impacts. This visual assessment undertaken during the EIA phase focuses on the potentially sensitive receptor locations, and provides an assessment of both the magnitude and significance of the visual impacts associated with the proposed development.

1.1 Project Description

Although the entire assessed site for the proposed Phezukomoya WEF is approximately 15 271 hectares (ha) in extent, the nature of the terrain and the exclusion of sensitive areas identified by

several specialist studies during the EIA process has greatly reduced the amount of land available for the proposed WEF development. The actual footprint of the proposed WEF, including wind turbines and associated infrastructure, will be placed strategically within this buildable area and is estimated to occupy less than 1% of the application site. The electricity generated by the proposed WEF will be fed into the national grid at the proposed Umsobomvu Main Transmission Substation (MTS) via a proposed 132kV power line.

At this stage, it is proposed that the development will consist of up to 63 wind turbines and associated infrastructure with a total generation capacity of 315MW. As mentioned above, the generated electricity will be fed into the national grid at the proposed Umsobomvu MTS via a 132kV power line with a length of between 15.9km and 17.3km, depending on the route alternative selected.

1.1.1 Turbines

The size of the wind turbines will depend on the development area and the total generation capacity that can be produced as a result. The wind turbines are likely to have a hub height of up to 150m, a rotor diameter of up to 150m and a blade length of up to 75m (**Figure 1**). Each wind turbine will have a foundation as well as a hardstand area / platform which will be required for turbine crane usage. There will be up to 63 wind turbines constructed with a capacity of up to 315MW. The electrical generation capacity for each turbine will range between 3MW and 5MW, depending on the final turbine type selected for the proposed development.

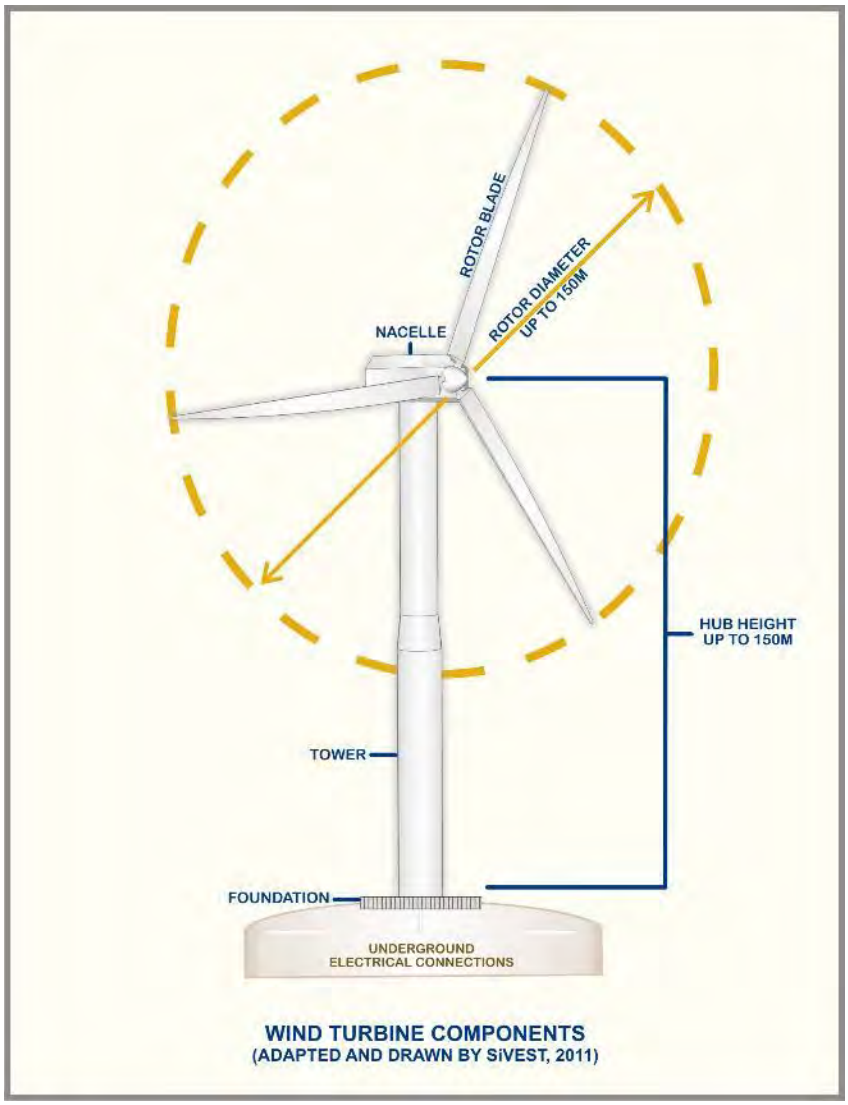


Figure 1: Typical components of a wind turbine

1.1.2 WEF Electrical Infrastructure

The electrical infrastructure includes a new on-site medium voltage/132kV substation (180 000m^2) known as the Phezukomoya Substation, and two (2) on-site switching stations (10 000m^2) connected by way of two (2) overhead medium voltage cables. (Approximately 3 km and 5.6 km in length). The proposed wind turbines will be connected to the proposed on-site switching stations by way of medium voltage underground cables (**Figure 2**) except where a technical assessment of the proposed design suggests that overhead lines are more appropriate such as over rivers, gullies and long runs. As mentioned, the proposed WEF will connect to the national grid by way of a 132kV power line, with a maximum length of 17.3km, linking the on-site substation to the proposed Umsobomvu MTS 132/400kV Substation. Proposed Dual Turn-In lines will link the proposed

Umsobomvu Substation to the existing Hydra/Poseidon 400kV power lines. This includes a short 400kV line corridor that will run from the Umsobomvu Substation to the existing 400kV Eskom Grid, via a loop-in-loop-out connection. An EA for the proposed Dual Turn-In Lines already exists and formed part of the Umsobomvu Record of Decision (ROD). Despite the fact that these Dual Turn-In lines form part of a split EA amendment that will separate the Eskom infrastructure, they have been assessed as part of this VIA.

A power line corridor of approximately 1km wide is being assessed for the proposed overhead medium voltage power lines as well as for the 132kV power lines to allow flexibility when determining the final route alignment of these power lines. In addition, a 100m area surrounding the proposed Umsobomvu Substation forms part of each corridor alternative, and has been assessed as part of each. Thereby, each grid alternative has the option of entering the substation from any direction (e.g. if the grid approaches the Umsobomvu Substation from the north, but needs to enter a bay in the south, then the 100m area allows the option of going around the substation in order to enter at the south). It should be noted that three (3) power line corridor alternatives for the proposed 132kV power line have been assessed in conjunction with three (3) corridor options for the proposed Turn-In lines.

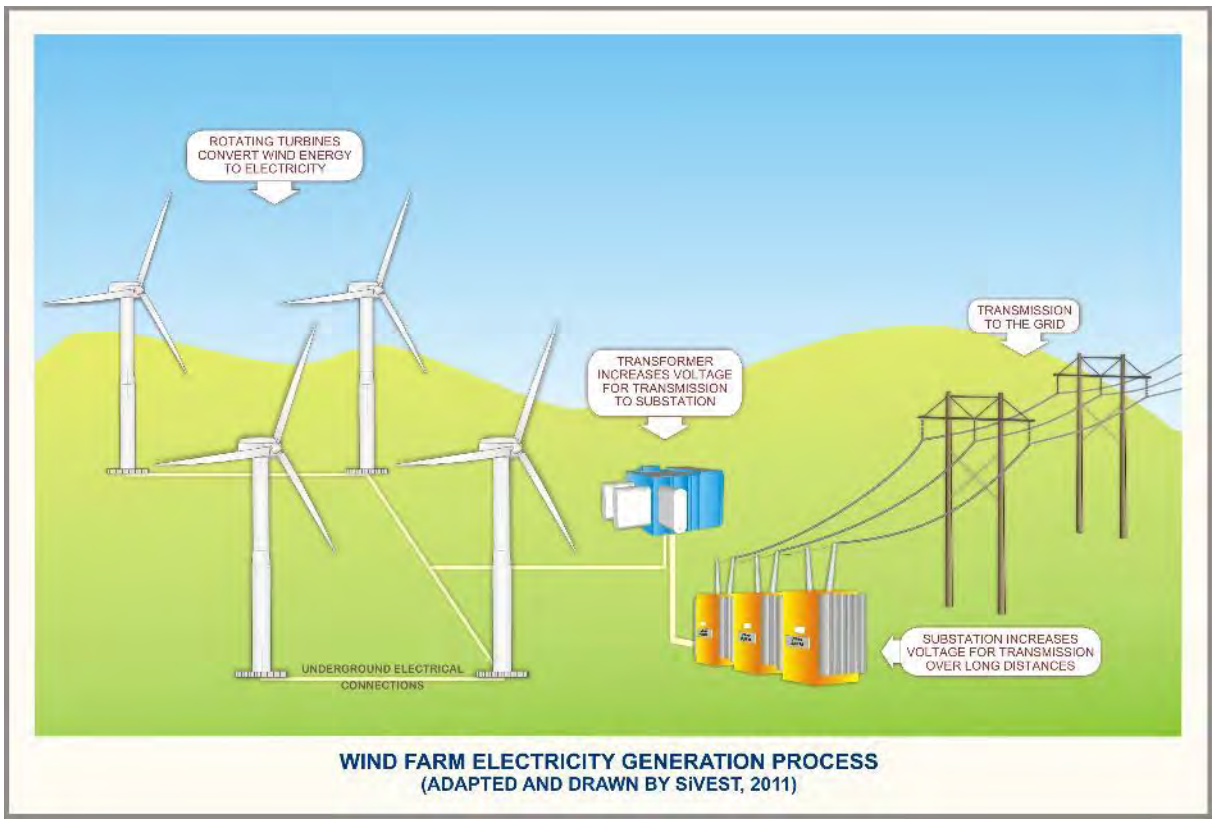


Figure 2: Conceptual wind farm electricity generation process showing electrical connections

1.1.3 Roads

Internal access roads with a maximum width of 14m are initially being proposed for the construction phase. This is however only temporary as the width of the proposed internal access roads will be reduced to approximately 8m for maintenance purposes during the operational phase.

1.1.4 Operations and Maintenance Facilities

The operation and maintenance (O&M) facilities will be located on the proposed Phezukomoya Substation site which is approximately 180 000m^2 in extent.

1.1.5 Batching Plant, Temporary Lay Down Area and Construction Compound

An area of 90 000m^2 has been set aside for the batching plant, temporary laydown area and construction compound.

1.1.6 Other Temporary Infrastructure

Other temporary infrastructure will include an area of approximately 7500m^2 per turbine to accommodate site camps and temporary laydown areas.

The key technical details of the infrastructural components are presented below:

- Up to 63 wind turbines with a generation capacity between 3 – 5MW and a rotor diameter of up to 150m, a hub height of up to 150m and blade length of up to 75m;
- Foundations and hardstands associated with the wind turbines;
- Internal access roads of between 8m (during operation) and 14m (during construction) wide to each turbine;
- Two (2) 10 000m^2 on-site switching stations;
- Medium voltage underground electrical cables will be laid to transmit electricity generated by the wind turbines to the on-site switching station or substation;
- Overhead medium voltage cables between turbine rows where necessary;
- An on-site substation and O&M area (180 000m^2) to facilitate stepping up the voltage from medium to high voltage (132kV) to enable the connection of the WEF to the proposed Umsobomvu WEF 132kV/400kV Substation, from which the generated power will be fed into the national grid;

- Two (2) medium voltage overhead power lines (approximately 3km and 5.6km in length) connecting the on-site switching stations with the on-site medium voltage/132kV substation;
- An approximately 16 km 132kV voltage overhead power line from the on-site substation to the proposed 132/400kV Umsobomvu Substation where the electricity will be transferred to the national grid;
- Three (3) Dual Turn-In line options which will link the proposed Umsobomvu Substation to the existing Hydra/Poseidon 400kV power lines. This includes a short 400kV line corridor that will run from the Umsobomvu Substation to the existing 400kV Eskom Grid, via a loop-in-loop-out connection. As mentioned, an EA for the proposed Dual Turn-In lines already exists and formed part of the Umsobomvu ROD;
- A 90 000m^2 area for batching plant, temporary laydown area and construction compound;
- Temporary infrastructure including a site camp; and a laydown area approximately 7500m^2 in extent, per turbine.

1.2 Site Location

The proposed WEF is located approximately 7km south of Noupoort in the Northern Cape Province. The application site is located in the Umsobomvu Local Municipality (LM), although a small portion of the application site extends across the Municipal/Provincial Boundary into Inxuba Yethemba LM in the Eastern Cape Province (**Figure 3**). The application site comprises several farms and is approximately 15 271ha in extent. As shown in **Figure 4** below, the actual footprint of the proposed WEF development is estimated to be less than 1% of this area.

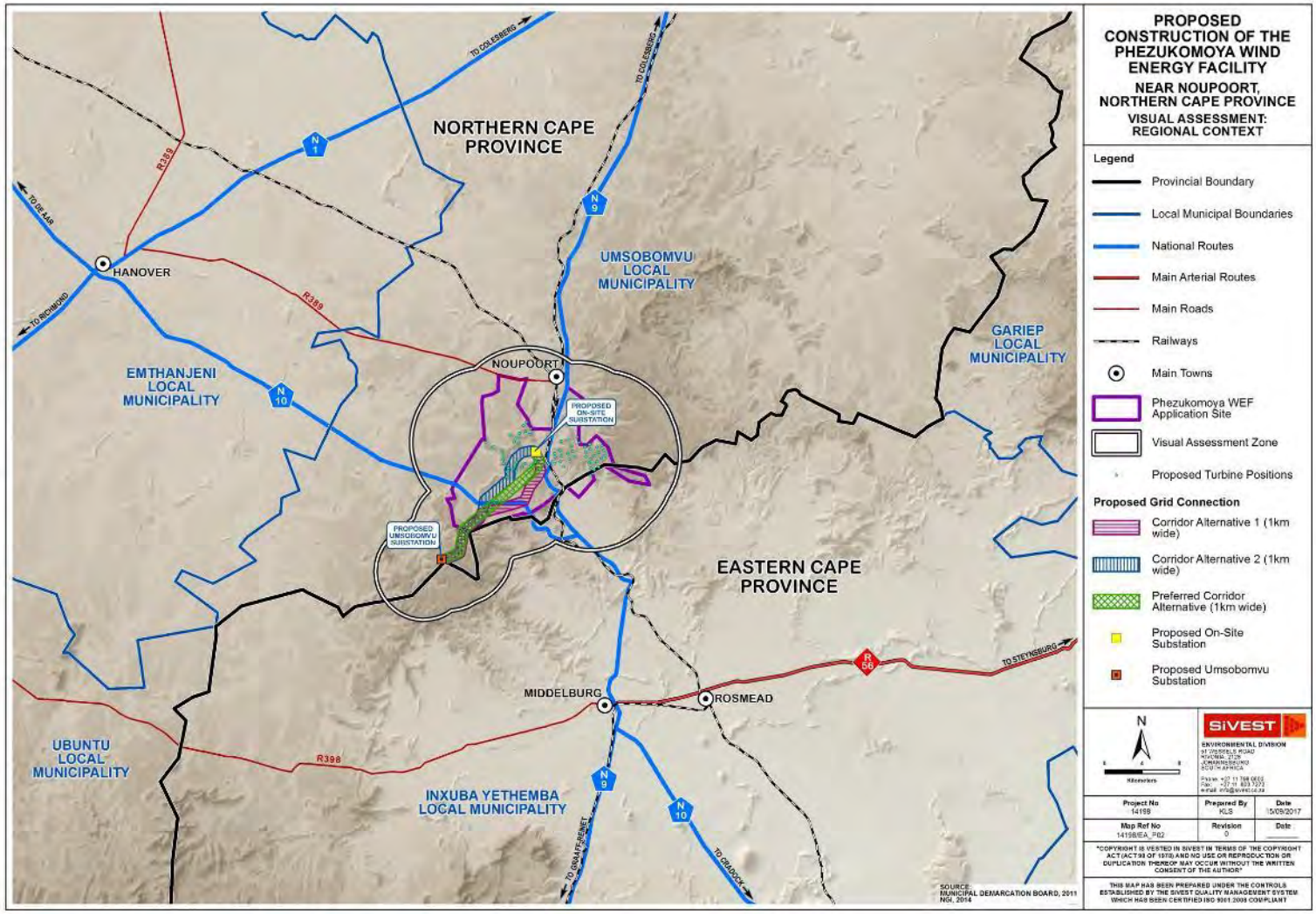


Figure 3: Regional Context Map

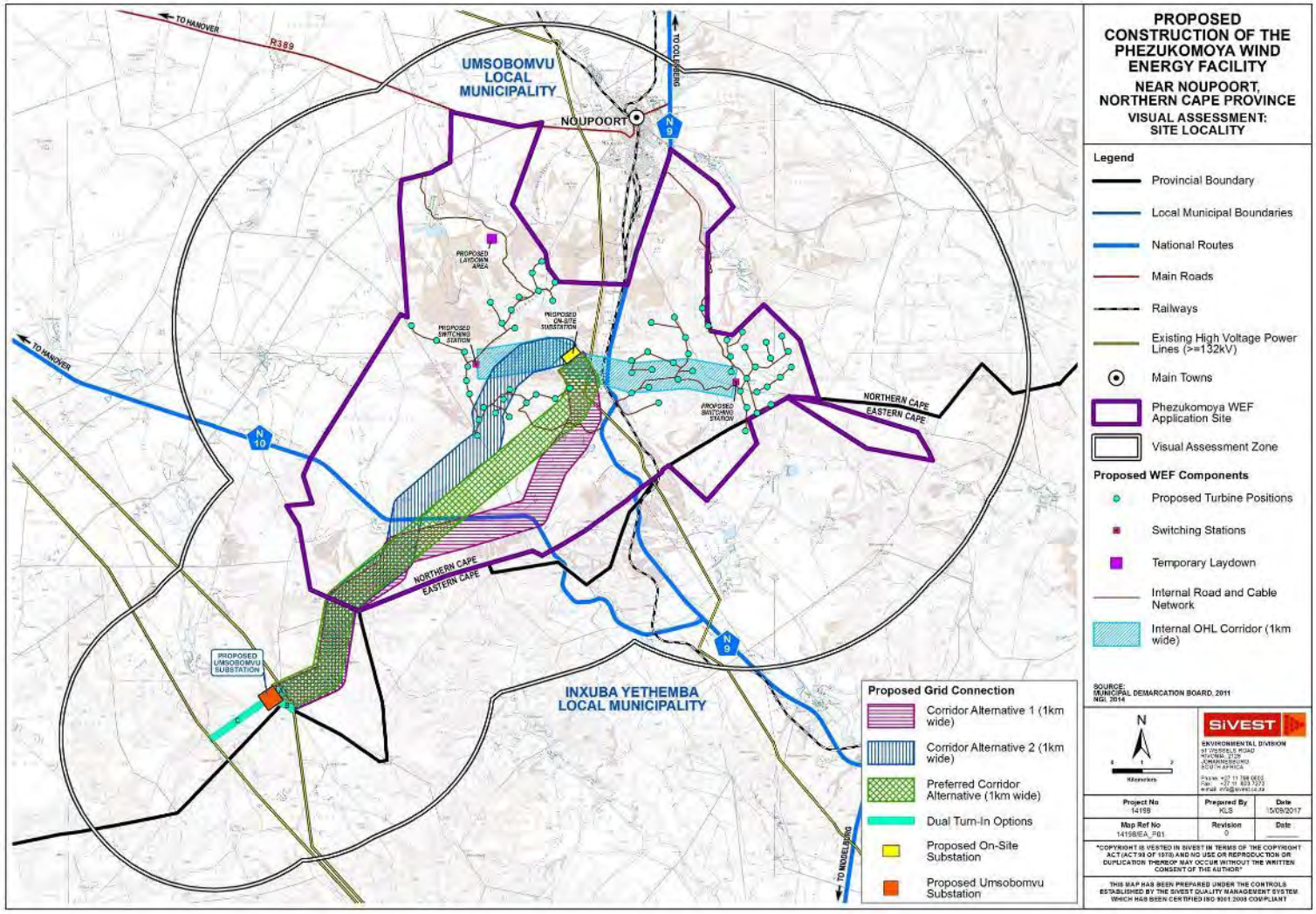


Figure 4: Locality Map

1.3 Assumptions and Limitations

- The identification of visual receptors has been based on a combination of desktop assessment as well as field-based observation. Initially Google Earth imagery was used to identify potential receptors within the study area. Thereafter a site visit was undertaken from the 11th to the 14th of September 2017 in order to verify the sensitive visual receptors within the study area. Due to the extensive area covered by the study area, a number of broad assumptions have been made in terms of the sensitivity of the receptors to the proposed development. It should be noted that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility and the economic dependency on the scenic quality of views from the facility. 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 and scenic locations within natural settings. The presence of a receptor in an area potentially affected by the proposed development does not thus necessarily mean that a visual impact will be experienced.

- Wind turbines are very large structures by nature and could impact on receptors that are located relatively far away, particularly in areas with very flat terrain. Given the nature of the receiving environment and the height of the proposed wind turbines, the study area or visual assessment zone is assumed to encompass a zone of 8km from the proposed WEF – i.e. an area of 8km (not factoring the curvature of the earth's surface) from the proposed turbine locations. This 8km limit on the visual assessment zone was applied because distance is a critical factor when assessing visual impacts and although the WEF may still be visible beyond 8km, the degree of visual impact would diminish considerably. As such the need to assess the impact on potential receptors beyond this distance would not be warranted. From this distance haze may impede views toward the structures, making them appear to blend with the horizon and reducing the visual contrast between the turbines and the landscape.

- In assessing the potential visual impacts for the proposed 132kV power line, the study area or visual assessment zone is assumed to encompass a zone of 5km from the proposed development – i.e. all areas within a 5km radius of the power line alternatives.

- During the site visit, it was observed that a few of the farmsteads / residential dwellings identified via desktop means (i.e. Google Earth) during the scoping phase of this study have been abandoned. No further assessment was therefore undertaken from these abandoned farmsteads / residential dwellings and they were eliminated from the list of potentially sensitive receptor locations for the purpose of this EIA phase study.

- Some receptors identified during the scoping phase of this study were found to be farmsteads on properties which form part of the proposed development and the owners of these properties would benefit financially from the proposed development. These farmsteads would therefore not be visually sensitive to the proposed WEF and were eliminated from the list of potentially sensitive receptor locations for the purpose of this EIA phase study. It should however be noted that some of these farmsteads were not eliminated from the list of potentially sensitive receptor locations as they are still currently occupied (either by the owners or tenants) and according to the socio-economic specialist, could still perceive the proposed WEF in a negative light. In addition, these farmsteads could become potentially sensitive receptor locations in the future (Barbour, T and van der Merwe, S., September 2017). These receptors are thus still regarded as potentially sensitive visual receptor locations.

- All sensitive visual receptor locations which were identified were visited and investigated from a visual perspective during the time of the site visit. However, due to access limitations and time constraints during the site visit, not all of the identified potentially sensitive visual receptor locations (such as farmsteads and/or residential dwellings) could be visited and investigated further and therefore the impact rating assessment of the proposed development on these visual receptor locations was undertaken primarily via desktop means. Although the use of all of these farmsteads / residential dwellings could not be established during the field investigation, they were still regarded as being potentially sensitive to the visual impacts associated with the proposed wind farm and were assessed as part of the VIA.

- A matrix has been developed to assist in the assessment of the potential visual impact at each receptor location. The limitations of quantitatively assessing a largely subjective or qualitative type of impact should be noted. The matrix is relatively simplistic in considering five main parameters relating to visual impact, but provides a reasonably accurate indicative assessment of the degree of visual impact likely to be exerted on each receptor location by the proposed wind energy facility. The matrix should therefore be seen as a representation of the likely visual impact at a receptor location. The results of the matrix should be viewed in conjunction with the visualisation modelling to gain a full understanding of the likely visual impacts associated with the proposed development.

- Due to the varying scales and sources of information as well as the fact that only 20m contours were available to establish the Digital Terrain Model (DTM); maps and visual models may have minor inaccuracies. As such, only large scale topographical variations have been taken into account and minor topographical features or small undulations in the landscape may not be depicted on the DTM.

- A viewshed analysis was undertaken for the proposed WEF based on the layout available at the time of undertaking the EIA phase visual study. The viewshed analysis was undertaken from each turbine location. The worst-case scenario, in which the wind turbines

would have a maximum height of 225m was assumed when undertaking the analysis. The other infrastructure associated with the proposed wind farm was not factored into the viewshed analysis. In addition, screening provided by any existing infrastructure and tall wooded vegetation were not factored into the analysis. It should be noted that detailed topographic data was not available for the entire study area and as such, the viewshed analysis does not take into account any localised topographic variations which may constrain views. The viewshed analysis should therefore be seen as a conceptual representation or a worst-case scenario which rates the geographical area from where the proposed wind farm could be visible from.

- A visual sensitivity analysis was undertaken for the proposed WEF based purely on topographic data available for the broader study area. Localised topographic variations, existing infrastructure and / or vegetation which may constrain views were not factored into the analysis. In addition, the analysis does not take into account differing perceptions of the viewer which largely determine the degree of visual impact being experienced. This sensitivity analysis should therefore be seen as a conceptual representation or a worst-case scenario which rates the visibility of the site in relation to potentially sensitive receptors.

- Some feedback regarding the visual environment has been received following the site visit and this feedback has been incorporated into this report. All correspondence / feedback regarding the visual environment received to date is included in **Appendix D**.

- As previously mentioned, ground-truthing was undertaken between the 11th of September 2017 and the 14th of September 2017, during which time the visual character of the area was investigated.

- Operational and security lighting will be required for the proposed WEF and the associated infrastructure proposed within the development footprint. At the time of undertaking the visual study no information was available regarding the type and intensity of lighting required and therefore the potential impact of lighting at night has not been assessed at a detailed level. As such, the night-time environment in the study area was not characterised. General measures to mitigate the impact of additional light sources on the ambiance of the nightscape have however been provided.

- This EIA phase visual assessment has focused on the proposed development site and the development layout as provided by the client at the time of writing this report.

- The assessment of receptor-based impacts has been based on the turbine layout provided by the proponent. It is however recognised that this layout is subject to changes based on a number of potential factors, including the findings of the EIA studies. The turbine locations may thus move, which may result in greater or lesser visual impacts on receptor locations. It should be noted that the proposed layout was amended in December 2017 and the

turbine numbers were subsequently reduced taking the EIA phase specialist findings into consideration. As such, the current turbine layout is expected to result in lesser visual impacts on the identified receptor locations.

- A cumulative impact assessment has been undertaken to provide a representation of the number of proposed renewable energy facilities likely to be visible from each sensitive and potentially sensitive receptor location, if they were all constructed. Factors affecting visibility, such as localised screening from trees or topographical undulations have not been factored into the cumulative impact assessment.

- The only layout information that was sourced for the proposed renewable energy facilities which are planned in close proximity to the proposed Phezukomoya WEF is that for the proposed San Kraal WEF. The distance of the potentially sensitive receptor locations from the actual layout could therefore not be utilised to determine whether the receptor is likely to be visually exposed to the development. As such, the distance from the farm on which each development is proposed was used to calculate the cumulative visual impact.

- Despite the fact that the proposed Dual Turn-In lines which will link the proposed Umsobomvu Substation to the existing Hydra/Poseidon 400kV power lines form part of a split EA amendment that will separate the Eskom infrastructure, they have been assessed as part of this VIA.

- A literature review of visual impact assessments / studies which were undertaken for the other renewable energy developments (both solar and wind) proposed within a 35km radius of the proposed Phezukomoya WEF was undertaken to ascertain any additional cumulative impacts that should be taken into consideration. Some of the project sites are at a very advanced stage, and the initial studies were undertaken in 2012 and are therefore no longer publically available. In addition, visual impact assessments / studies could not be sourced for all of the other nearby renewable energy developments proposed nearby and thus some visual studies were omitted from the literature review. The literature review was also based on the information which was available at the time and as such, all renewable energy facilities may not be included. Additionally, there could be minor inaccuracies in terms of property information / status etc.

- Visualisation modelling was undertaken for the proposed WEF, although not from all potential receptor locations. An indicative range of locations was selected for modelling purposes to provide an indication of the possible impacts from different locations within the study area. It should be noted that this modelling is specific to the location, and that even sites in close proximity to one another may be affected in different ways by the proposed wind energy facility. The visual models represent a visual environment that assumes all vegetation cleared during construction will be restored to its current state after the construction phase. This is however, an improbable scenario as some trees and shrubs may be removed which may reduce the accuracy of the models generated. At the time of

this study the proposed project was still in its early planning stages. Therefore, the turbine layouts, as provided by Innowind, may change and the infrastructure associated with the facility has not be included in the models.

- Most rainfall within the area occurs from February to March, during the late summer months. It should be noted that the fieldwork was undertaken in September 2017, during early spring time when the surrounding vegetation is expected to provide less potential screening than in the late summer months.

- The weather conditions in the study area also have certain visual implications and are expected to affect the visual impact of the proposed development to some degree. As mentioned above, the fieldwork was undertaken during the early spring which is characterised by clear weather conditions. It should be noted that clear conditions would make the wind turbines appear to contrast more from the surrounding environment than they would on a cloudy overcast day. The weather conditions during the time of the study were therefore taken into consideration when undertaking the impact rating for each identified potentially sensitive receptor location (**Section 7.1**).

1.4 Specialist Credentials

This VIA has been undertaken by Andrea Gibb, Stephan Jacobs and Kerry Schwartz from SiVEST. Andrea Gibb has 9 years' work experience and specialises in undertaking visual impact and landscape assessments, by making use of ArcGIS technology and field surveys. Andrea Gibb's project experiences with regards to VIAs is included in the table below.

Environmental Practitioner	SiVEST (Pty) Ltd – Andrea Gibb
Contact Details	andreag@sivest.co.za
Qualifications	BSc Landscape Architecture and BSc (Hons) Environmental Management
Expertise to carry out the Visual Impact Assessment.	**Visual Impact Assessments:** ▪ VIA (Scoping Phase) for the proposed construction of a 3000MW Wind Farm and associated infrastructure near Richmond, Northern Cape Province. ▪ VIA for the proposed construction of a power line and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces. ▪ VIA for the proposed construction of a power line and associated infrastructure for the proposed Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province.

	▪ VIAs (Impact Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province. ▪ VIA (Impact Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province. ▪ VIAs (Impact Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province. ▪ VIA for the proposed construction of the Tlisitseng substation and associated 132kV power line near Lichtenburg, North West Province. ▪ VIA (Scoping Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province. ▪ VIA (Scoping Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province. ▪ VIA (Scoping Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province. ▪ VIA for the proposed Tinley Manor South Banks Development, KwaZulu-Natal Province. ▪ VIAs (Impact Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province. ▪ VIA (Scoping Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province. ▪ VIA for the proposed agricultural components of the Integrated Sugar Project in Nsoko, Swaziland. ▪ VIA for the proposed Tweespruit to Welroux power lines and substation, Free State Province. ▪ VIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province. ▪ VIA (Impact Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed amendment to the authorised power line route from Hera Substation to Westgate Substation, Gauteng Province. ▪ VIA (Impact Phase) for the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province. ▪ VIA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.

	▪ VIA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province. ▪ VIA (Scoping Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed Rorqual Estate Development near Park Rynie on the South Coast of KwaZulu Natal. ▪ VIA (Scoping Phase) for the proposed construction of a Coal-fired Power Station, Coal Mine and Associated Infrastructure near Colenso, KwaZulu-Natal Province. ▪ VIA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province. ▪ VIA for the proposed construction of the Duma transmission substation and associated Eskom power lines, KwaZulu-Natal Province. ▪ VIA for the proposed construction of the Madlanzini transmission substation and associated Eskom power lines, Mpumalanga Province. ▪ VIA for the proposed rebuild of the 88kV power line from Normandie substation to Hlungwane substation, Mpumalanga and KwaZulu-Natal Provinces. ▪ VIA for the proposed construction of the Nzalo transmission substation and associated Eskom power lines, KwaZulu-Natal Province. ▪ Visual Impact Assessment for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province. ▪ Visual Impact Assessment for the proposed construction of the Eureka 140MW Wind Energy Facility and associated Infrastructure near Copperton, Northern Cape Province. ▪ VIA for the proposed construction of the Graskoppies Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Xha! Boom Wind Farm near Loeriesfontein, Northern Cape Province.

Stephan Jacobs joined SiVEST in May 2015 and holds the position of Graduate Environmental Consultant in the Johannesburg office. Stephan specialises in the field of Environmental Management and has been involved in the undertaking of field work and the compilation of reports

for specialist studies such as visual impact assessments. Stephan Jacobs' project experiences with regards to VIAs is included in the table below.

Environmental Practitioner	SiVEST (Pty) Ltd – Stephan Jacobs
Contact Details	stephanj@sivest.co.za
Qualifications	BSc (Hons) Environmental Management and Analysis
Expertise to carry out the Visual Impact Assessment.	**Visual Impact Assessments:** ▪ Visual Impact Assessment for the Helena Solar PV Plant, Northern Cape Province. ▪ Visual Impact Assessment for the Nsoko Msele Integrated Sugar Project, Swaziland. ▪ Visual Impact Assessments for the proposed construction of the Sendawo Solar 1, Sendawo Solar 2 and Sendawo Solar 3 Photovoltaic (PV) Energy Facilities near Vryburg, North West Province. ▪ Visual Impact Assessments for the proposed construction of the Sendawo Substation and Associated 400kV Power Line near Vryburg, North West Province. ▪ Visual Impact Assessments for the proposed construction of the Tlisitseng Solar 1 and Tlisitseng Solar 2 Photovoltaic (PV) Energy Facilities near Lichtenburg, North West Province. ▪ Visual Impact Assessment for the proposed construction of the 3000MW PhilCo Green Energy Wind Farm and Associated Infrastructure near Richmond, Northern Cape Province. ▪ Visual Impact Assessment for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province. ▪ Visual Impact Assessment for the proposed construction of the Eureka 140MW Wind Energy Facility and associated Infrastructure near Copperton, Northern Cape Province. ▪ Visual Impact Assessment for the proposed construction of the Eureka 400kV Substation and 400kV Power Line near Copperton, Northern Cape Province. ▪ Basic Visual Impact Assessments for the proposed construction of the Tlisitseng 1 and Tlisitseng 2 Substations and Associated 132kV Power Lines near Lichtenburg, North West Province. ▪ Basic Visual Impact Assessment for the proposed construction of up to a 132kV Power Line and Associated Infrastructure for the Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province. ▪ Basic Visual Impact Assessment for the proposed construction of up to a 132kV Power Line and Associated Infrastructure for the proposed

	Kalkaar Solar Thermal Power Plant near Kimberly, Free State and Northern Cape Provinces. ▪ VIA for the proposed construction of the Graskoppies Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Xha! Boom Wind Farm near Loeriesfontein, Northern Cape Province.

Kerry Schwartz is a GIS specialist with more than 20 years' experience in the application of GIS technology in various environmental, regional planning and infrastructural projects undertaken by SiVEST. Kerry's GIS skills have been extensively utilised in projects throughout South Africa in other Southern African Countries. Kerry has also been involved in the compilation of reports for specialist studies such as visual impact assessments. Kerry Schwartz's' project experiences with regards to VIAs is included in the table below.

Environmental Practitioner	SiVEST (Pty) Ltd – Kerry Schwartz
Contact Details	kerrys@sivest.co.za
Qualifications	BA (Geography), University of Leeds 1982
Expertise to carry out the Visual Impact Assessment.	**Visual Impact Assessments:** ▪ Visual Impact Assessment for the proposed relocation of the Skukuza Conference Centre, SANParks. ▪ Visual Impact Assessment for the proposed re-commercialisation of the Skukuza Airport. ▪ Visual Impact Assessment for the proposed development of residential apartments in Ramsgate, KZN. ▪ Visual Impact Assessment for the redevelopment of the Newmarket Racecourse, Alberton, Gauteng ▪ Visual Impact Assessment for the Thyspunt Transmission Lines Integration Project ▪ Visual Impact Assessments for 5 Solar Power Plants in the Northern Cape ▪ Visual Impact Assessments for 4 Wind Farms in the Northern Cape ▪ Visual Impact Assessment for Mookodi Integration Project (132kV distribution lines) ▪ Visual Impact Assessment for 2 Mixed Use Developments near Hillcrest, KZN ▪ Landscape Character Assessment for Mogale City Environmental Management Framework

	▪ VIA for the proposed construction of the Graskoppies Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of the Xha! Boom Wind Farm near Loeriesfontein, Northern Cape Province.

Full CVs are attached as **Appendix B**.

1.5 Assessment Methodology

As mentioned above, this EIA level VIA has been based on a combination of desktop-level assessment as well as field-based observation. This EIA level VIA has therefore initially been undertaken at a desktop-level and thereafter included a site visit.

1.5.1 Fieldwork and photographic review

A four (4) day site visit was undertaken between the 11th and the 14th of September 2017 in order to:

- verify the landscape characteristics identified via desktop means;
- investigate the visual character of the area;
- identify any additional visually sensitive receptor locations within the study area; and
- capture photos to be used for visual models of the proposed WEF.

It should be noted that the fieldwork was undertaken during early spring time, before the summer rainfall, therefore the surrounding vegetation is expected to provide less potential screening than in the late summer months. As such, the proposed development is expected to be more visible during spring and winter times due to a lack of significant vegetative screening factors. Due to the timing of the fieldwork, the results of this visual impact assessment are considered to be indicative of the worst case scenario with regards to vegetative screening factors.

1.5.2 Physical landscape characteristics

A site visit and digital information from spatial databases such as the National Geo-spatial Information (NGI), the South African National Land Cover dataset (2014) and the South African

National Biodiversity Institute (SANBI) were sourced to provide baseline information on the topography, vegetation and land use in the study area. These physical landscape characteristics are important factors which influence the visual character and visual sensitivity of the study area.

1.5.3 Identification of sensitive receptors

During the field investigation, potentially sensitive visual receptor locations, such as residences and routes within the study area were identified and assessed in order to determine the impact of the proposed WEF development on each of the identified potentially sensitive receptor locations.

1.5.4 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 wind farm on each potentially 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 / surrounding views and the degree to which the proposed development would contrast with the surrounding environment.

1.5.5 Visualisation Modelling

Visual simulations were produced from specific viewpoints in order to support the findings of the visual assessment. The wind farm was modelled at the correct scale and superimposed onto the landscape photographs which were taken during the site visit. These were used to demonstrate the visibility of the proposed turbines from various locations within the visual assessment zone and to assist with rating the visual impact.

1.5.6 Consultation with I&APs

Although no feedback has been received from Affected Parties (I&APs) during the public participation process to date, some feedback regarding the visual environment has been received

following the socio-economic specialist's site visit. The feedback received from the socio-economic specialist was subsequently incorporated into this report. All correspondence / feedback regarding the visual environment received to date is included in **Appendix D**.

2 FACTORS INFLUENCING VISUAL IMPACT

2.1 Subjective experience of the viewer

The perception of the viewer/receptor toward an impact is highly subjective and involves 'value judgements' on behalf of the receptor. It is largely based on the viewer's perception and is usually dependent on age, gender, activity preferences, time spent within the landscape and traditions of the viewer (Barthwal, 2002). This is important, as certain receptors may not consider a WEF to be a negative visual impact as it is often associated with employment creation, social upliftment and the general growth and progression of an area, and could even have positive connotations.

2.2 Visual environment

WEF developments are likely to be perceived as visually intrusive in areas that have a natural scenic quality and where tourism activities, based upon the enjoyment of or exposure to the scenic or aesthetic character of the area, are practiced. Residents and visitors to these areas may regard the wind farm as an unwelcome intrusion which degrades the natural character and scenic beauty of the area, and which would potentially even compromise the practising of tourism activities in the area. Wind turbines and power lines are not features of the natural environment, but are rather a representation of human (anthropogenic) alteration. Thus when placed in a largely natural landscape, they could be perceived to be highly incongruous in this context.

The presence / existence of other anthropogenic objects associated with the built environment may not only obstruct views but also influence the perception of whether a development is a visual impact. In industrial areas where structures, buildings and other infrastructure exist, the visual environment could be considered to be 'degraded' and thus the introduction of a WEF into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible. In this case value might not be placed on the aesthetic quality of the landscape, and the WEF may not necessarily be considered to be visually intrusive.

2.3 Type of visual receptor

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 wind farm would be visible. The receptor type in turn affects the nature of the typical 'view', with views being permanent in the case of a residence or other place of human habitation, or transient in the case of vehicles moving along a road. The nature of the view experienced affects the intensity of the visual impact experienced.

It is important to note that visual impacts are only experienced when there are receptors present to experience this impact; thus in the context where there are no human receptors or viewers present there are not likely to be any visual impacts experienced.

2.4 Viewing distance

Viewing distance is a critical factor in the experiencing of visual impacts, as beyond a certain distance, even large developments tend to be much less visible, and difficult to differentiate from the surrounding landscape. The visibility of an object is likely to decrease exponentially as one moves away from the source of impact, with the impact at 1000m likely being a quarter of the impact from 500m away (**Figure** 5). At 8000m away or more, the impact would be negligible (Hull, R.B., et al: 1998).

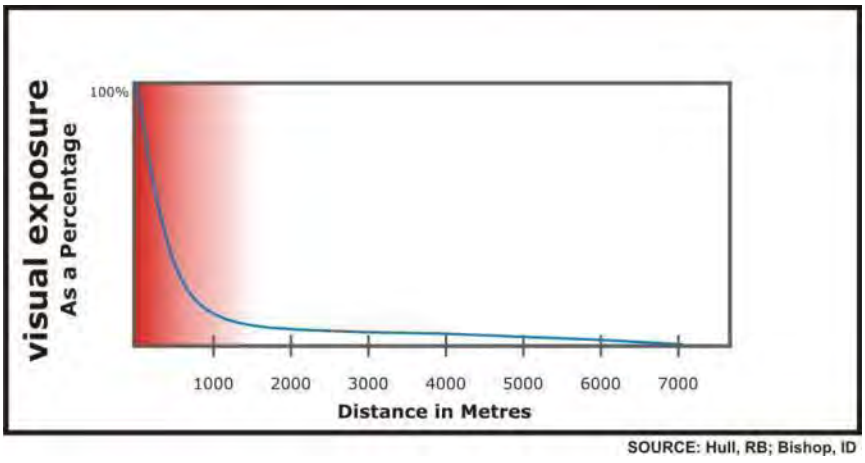


Figure 5: Diagram illustrating diminishing visual exposure over distance

3 VISUAL CHARACTER AND SENSITIVITY OF THE STUDY AREA

The physical and land use related characteristics of the study area 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 against this visual baseline by establishing the degree to which the development would contrast with or conform to 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, the economic importance of the scenic quality of the area, inherent cultural value of the area and the presence of visual receptors.

3.1 Physical and Land Use Characteristics

3.1.1 Topography

The topography in the wider study area around the site is characterised by a mix of very flat plains (typical of much of the Karoo), as well as areas of much greater relief, including isolated dolerite-capped “koppies” and hilly terrain (**Figure 6**). The town of Noupoort (to the north of the proposed Phezukomoya WEF application site) is flanked by hills / koppies to the east (**Figure 7**) and the west (**Figure 8**). Generally the areas to the north and west of the town are characterised by flat Karoo plains and isolated koppies (**Figure 9** and **Figure 10**) while the terrain to the south and east of the town is more hilly in character as a result of the more incised nature of the topography (**Figure 11** and **Figure 12**). The terrain here is characterised by a mix of incised valleys and flatter, higher lying plateaux.

Much of the development site is characterised by these higher-lying plateaux, which are flanked on most sides by hills and koppies which enclose the visual envelope of the area.

Maps showing the topography and slope within and in the immediate vicinity of the proposed application site are provided in **Figure 13** and **Figure 14** respectively.

Figure 6: View of the topography within the wider study area around the site proposed for the Phezukomoya WEF showing the mix of very flat plains (typical of much of the Karoo), as well as areas of much greater relief, including isolated dolerite-capped “koppies” and hilly terrain.

Figure 7: View of the town of Noupoort from the N9 national route showing the hills / “koppies” which flank the town to the east.

Figure 8: View of the town of Noupoort from the N9 national route showing the hills / “koppies” which flank the town to the west.

Figure 9: View of the area to the north the town of Noupoort showing the flat Karoo plains and isolated “koppies” which this area is characterised by.

Figure 10: View of the area to the west of the town of Noupoort showing the flat Karoo plains and isolated “koppies” which this area is characterised by.

Figure 11: View of the terrain to the south of the town of Noupoort which is more hilly in character as a result of the more incised nature of the topography.

Figure 12: View of the terrain to the east of the town of Noupoort which is more hilly in character as a result of the more incised nature of the topography.

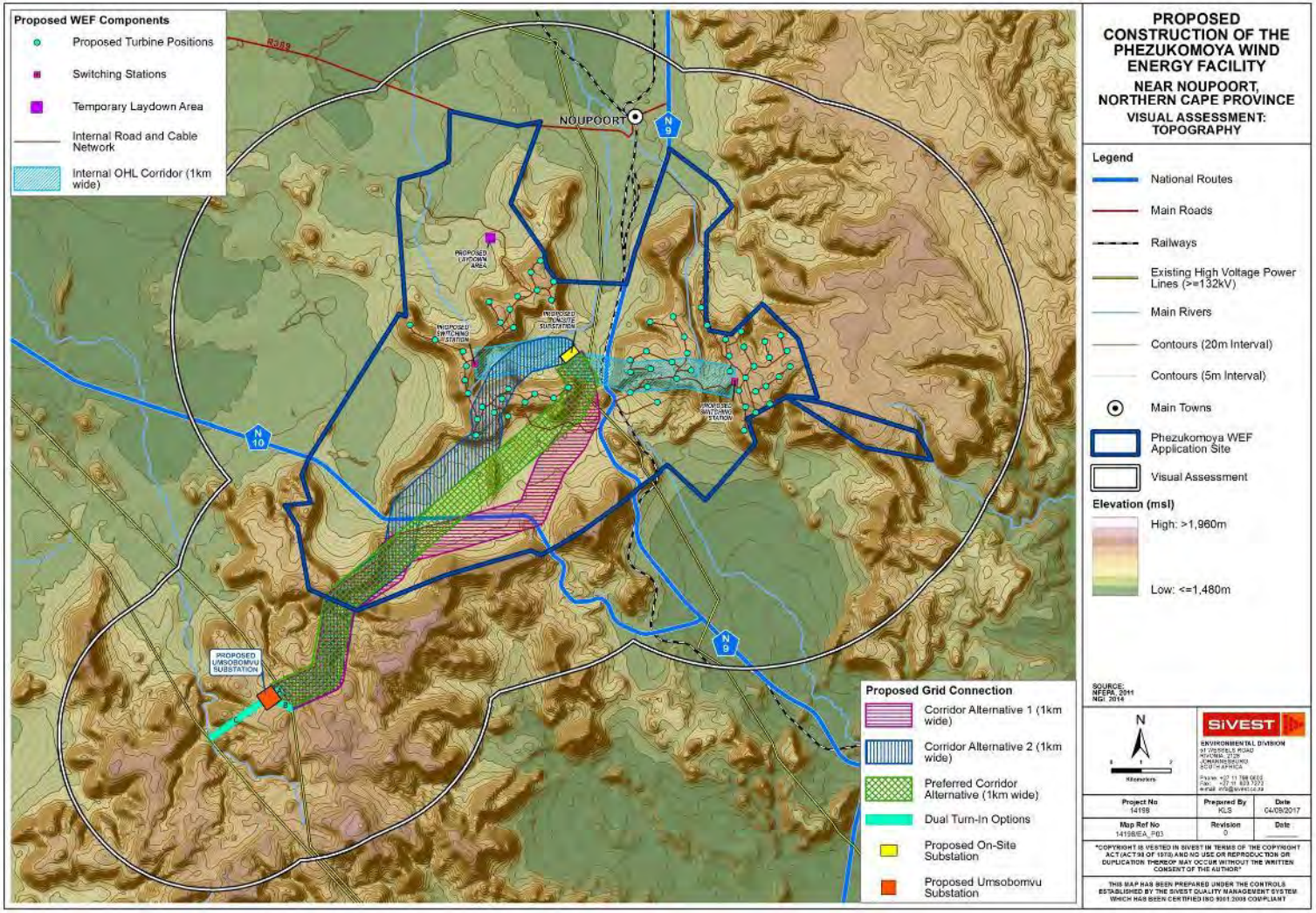


Figure 13: Topography Map

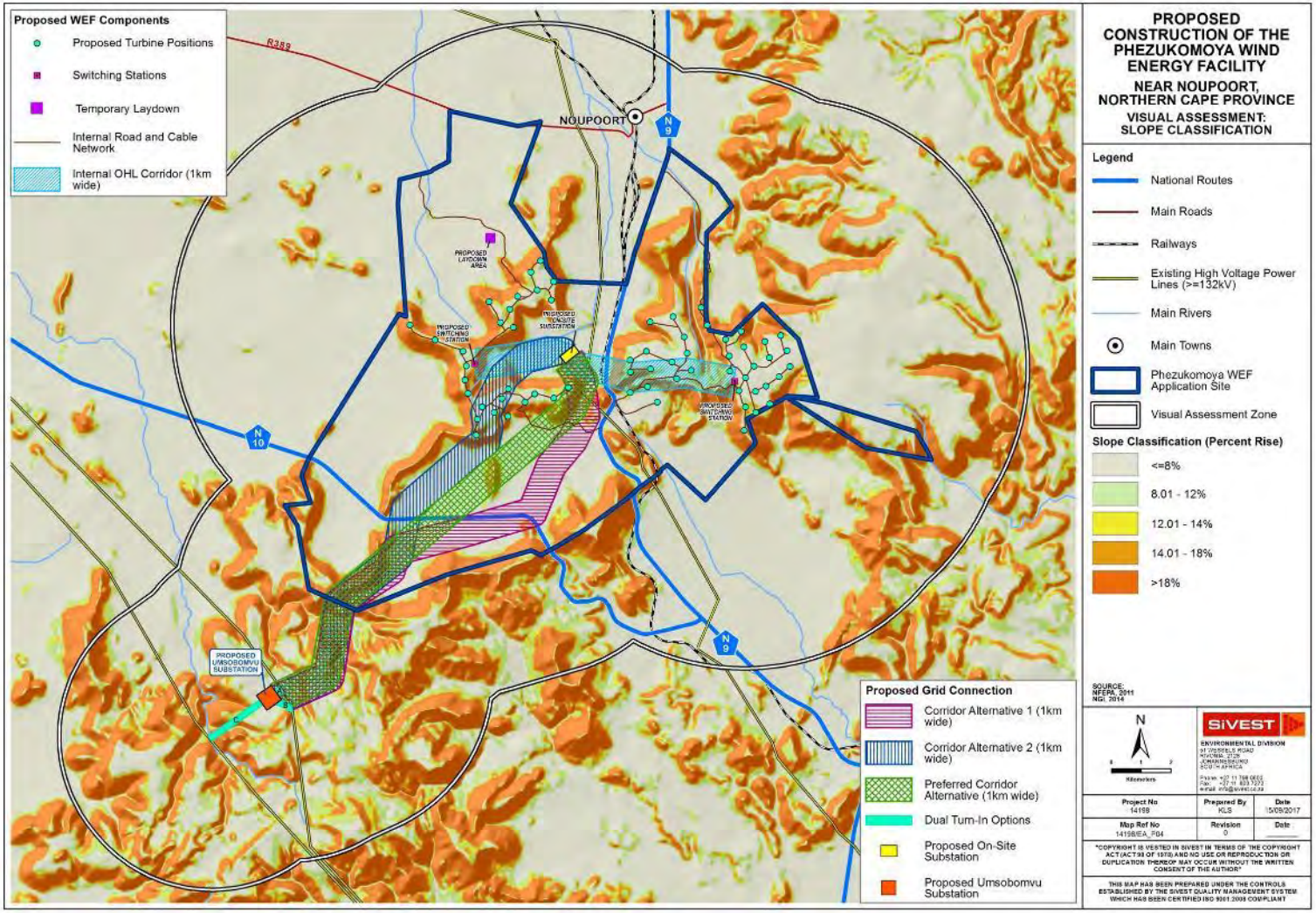


Figure 14: Slope Map

Visual Implications

The mixed nature of the terrain across the study area has differing visual implications. Areas of flat relief, such as the typical Karoo plains and the higher-lying grassy plateaux, are characterised by wide ranging vistas (**Figure 15**), typically to the point at which surrounding hills / "koppies" enclose the visual envelope or local landscape (i.e. these hills form part of the horizon and areas beyond these hills cannot be seen). An example of this is from the town of Noupoort, where the hills that rise up from the plains to the east of the town frame the view, giving a relatively limited viewshed, whereas a much wider viewshed exists to the north of the town as the flat relief extends for quite a distance. Vistas in the hillier and higher-lying terrain can be more open or more enclosed, depending on the position of the viewer. Within some of the more incised valleys, the viewshed can be extremely limited (**Figure 16**), whereas from the higher-lying ridge tops or slopes, a much wider view or vista is available over a wide area (**Figure 17**). Importantly in the context of this study the same is true of objects placed in different elevations and landscape settings, with objects placed on high-elevation slopes or ridge tops being highly visible, and those placed within valleys or enclosed plateaux being visible from a much more restricted area.

Figure 15: View of an area of flat relief found within the wider study area around the site proposed for the Phezukomoya WEF which is characterised by wide ranging vistas.

Figure 16: View from within an incised valley in the south-western section of the visual assessment zone which shows the limited viewshed from within this area.

Figure 17: View from within a higher-lying part of the study area / visual assessment zone where a much wider view or vista is available over a wide area.

GIS technology was used to undertake a viewshed analysis for the proposed turbine layout. The viewshed analysis was undertaken from each turbine location. The worst-case scenario, in which the wind turbines would have a maximum height of 225m was assumed when undertaking the analysis. Other infrastructure associated with the proposed wind farm was not factored into the viewshed analysis as the visual impact of the associated infrastructure is generally not regarded as a significant factor when compared to the visual impact associated with wind turbines. The resulting viewshed indicates the geographical area from where the proposed wind farm would be visible, i.e. the zone of visual influence. This analysis is based entirely on topography (relative elevation and aspect) which is an important factor that should be considered when determining the area of visual influence for a development. The viewshed analysis does not take into account any existing vegetation cover or built infrastructure which may screen views of the proposed development. In addition, detailed topographic data was not available for the broader study area and as such the viewshed analysis does not take into account any localised topographic variations which may constrain views. This analysis should therefore be seen as a conceptual representation or a worst case scenario.

A map showing the potential visual influence of the proposed WEF has been provided in **Figure 18** below, and from this it is evident that the area in which the proposed Phezukomoya turbines are proposed mostly comprises areas of high visibility.

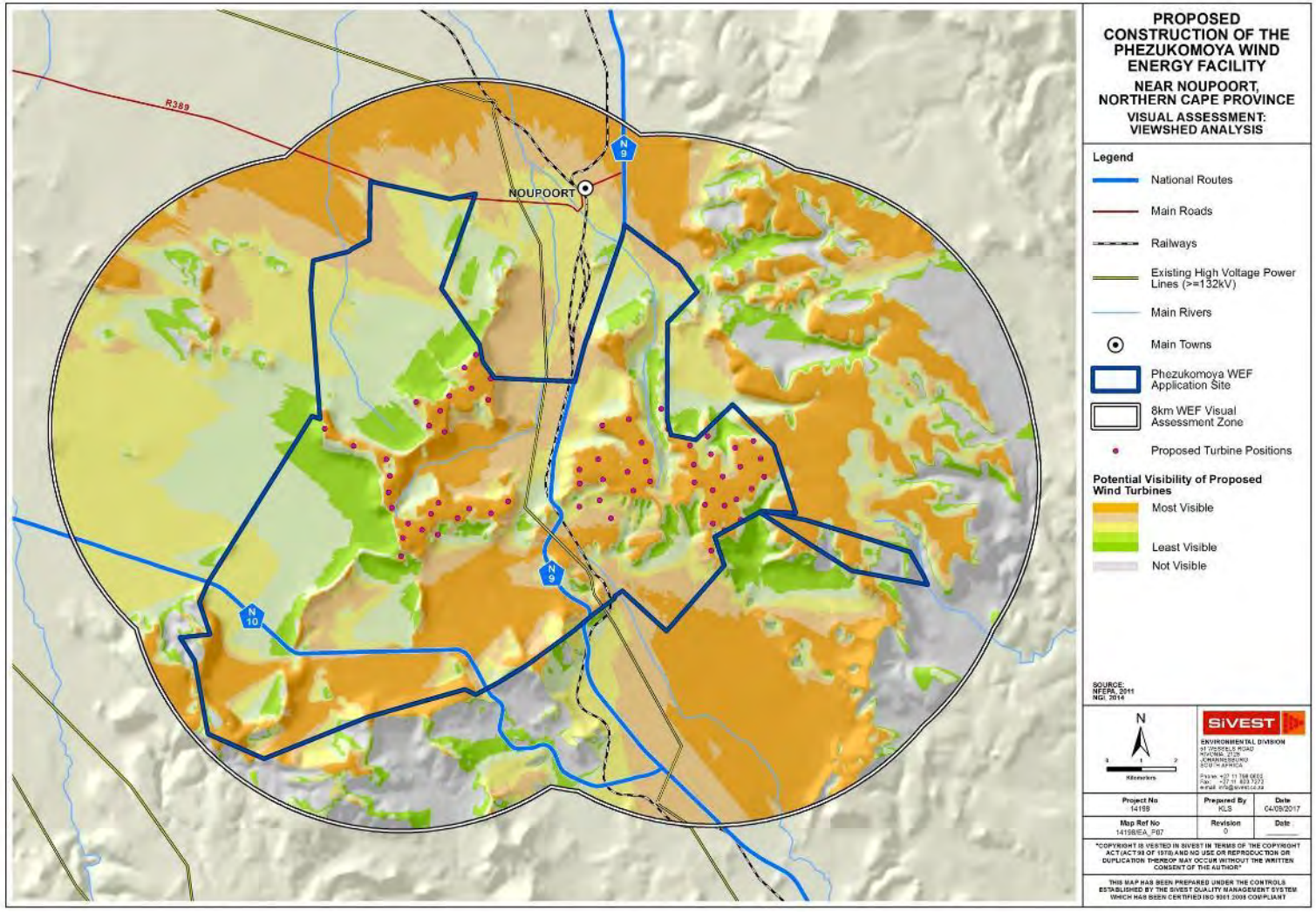


Figure 18: Map showing the potential visual influence of the proposed WEF based on the worst case turbine layout

3.1.2 Vegetation

According to Mucina and Rutherford (2006), the areas of the visual assessment zone which are characterised by flatter Karoo plains are largely covered by the Eastern Upper Karoo vegetation type, while the hillier areas in the south and north-east of the study area are characterised by Besem Karee Koppies shrubland, Karoo Escarpment Grassland and Tarkastad Montane Shrubland (**Figure 22**). The aridity of the area has restricted the vegetation to low shrubs distributed uniformly across the landscape, except in areas of disturbance where patches of bare earth occur (**Figure 19**) (Mucina & Rutherford, 2006). Some tree species (some relatively large and some low) can however also be found within certain parts of the study area (**Figure 20**). In certain areas, man has had an impact on the natural vegetation, especially around some farmsteads, where over many years tall exotic trees and other typical garden vegetation have been established (**Figure 21**).

Figure 19: Typical vegetation cover found within the wider study area as well as within the proposed Phezukomoya WEF application site.

Figure 20: Example of some of the tree species (some relatively large and some low) which can be found in parts of the study area / visual assessment zone.

Figure 21: Example of tall trees that have been established around a farmhouse in the area

Visual Implications

The natural short vegetation cover will offer no visual screening. Parts of the study area / visual assessment zone are however characterised by the presence of some tree species (some relatively large and some low). These trees occur naturally in certain areas of the study area / visual assessment zone and are expected to contribute to the overall natural character of the study area / visual assessment zone as well as provide limited screening from the proposed development. In addition, tall exotic trees may effectively screen the proposed development from farmhouses, where these trees occur in close proximity to the farmhouse and are located directly in the way of views to the site.

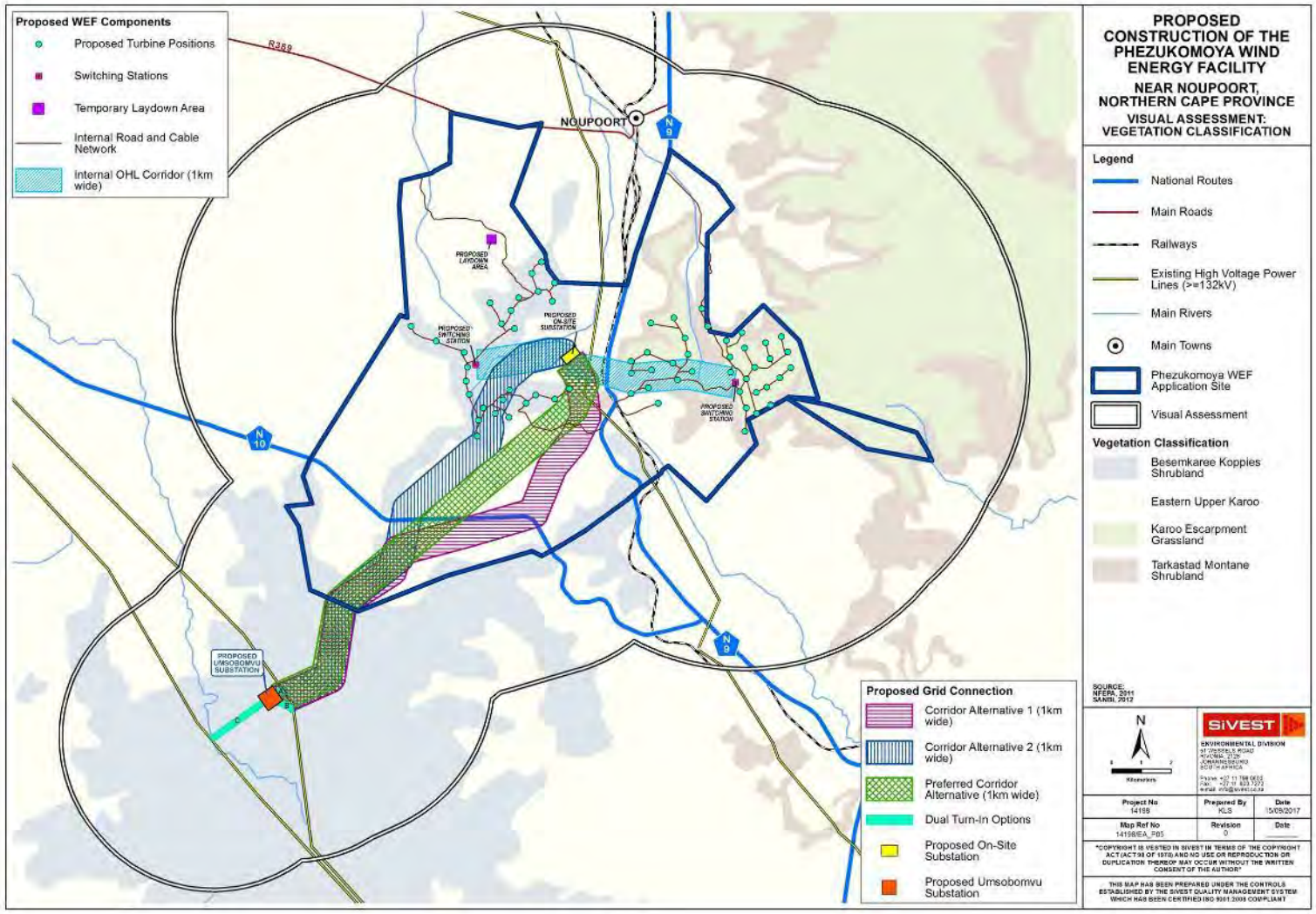


Figure 22: Vegetation Classification Map

3.1.3 Land Use

According to the South African National Land Cover dataset (2013-2014) from Geoterraimage (2014), much of the visual assessment area is characterised by natural unimproved vegetation which is dominated by low shrubland (**Figure 35**). The highly arid nature of the area's climate has resulted in livestock rearing being the dominant activity within the area (**Figure 23**). The nature of the climate and corresponding land use has also resulted in low stocking densities and relatively large farm properties across the area. Only very small areas along valley bottoms have been cultivated (**Figure 24**) and as such, the natural vegetation has been retained across the vast majority of the study area.

Figure 23: Typical view of the sheep farming activities which are dominant within the study area.

Figure 24: Typical view of an area within the study area / visual assessment zone which is characterised by cultivation.

Thus the area has a very low density of rural settlement, with relatively few scattered farmsteads occurring across the area. Built form in the rural parts of the study area is limited to isolated farmsteads, gravel access roads, ancillary farm buildings, telephone lines, fences and the remnants of abandoned workers' dwellings.

It should be noted that the study area / visual assessment zone is also characterised by the presence of certain pastoral elements such as livestock enclosures / camps and windmills etc. (**Figure 25**). These elements can be found throughout the study area / visual assessment zone and are typically present in areas where livestock rearing and other agricultural activities are taking place.

Figure 25: Example of typical pastoral elements (such as livestock enclosures / camps and windmills) which can be found within parts of the study area / visual assessment zone, especially in areas where livestock rearing and other agricultural practices are taking place.

The closest built-up area is the town of Noupoort which is situated on the northern boundary of the proposed application site (**Figure 26**). The wind turbines of the Noupoort Wind Farm are also visible on the hills / "koppies" to the east of this town. The proposed development site is also traversed by the N9 national route (**Figure 27**) and a railway line (**Figure 28**) both running in a north-south direction, as well as the N10 national route (**Figure 29**) and the R389 gravel road running in an east-west direction (**Figure 30**).

Figure 26: View of the town of Noupoort. The wind turbines of the Noupoort Wind Farm are visible on the hills / “koppies” to the east of this town.

Figure 27: View of the N9 national route which traverses the proposed Phezukomoya WEF application site in a north-south direction.

Figure 28: View of the railway line which traverses the proposed Phezukomoya WEF application site in a north-south direction.

Figure 29: View of the N10 national route which runs through the south-western section of the study area / visual assessment zone in an east-west direction.

Figure 30: View of the R389 gravel road which runs through the northern part of the study area / visual assessment zone in an east-west direction.

It should also be noted that a portion of the newly constructed Noupoort Wind Farm encroaches into the north-eastern sector of the study area. Comprising some 35 wind turbines with associated infrastructure, this development has significantly transformed the natural environment in this area and can be seen from within the town of Noupoort as well as from other parts of the study area / visual assessment zone (**Figure 31**).

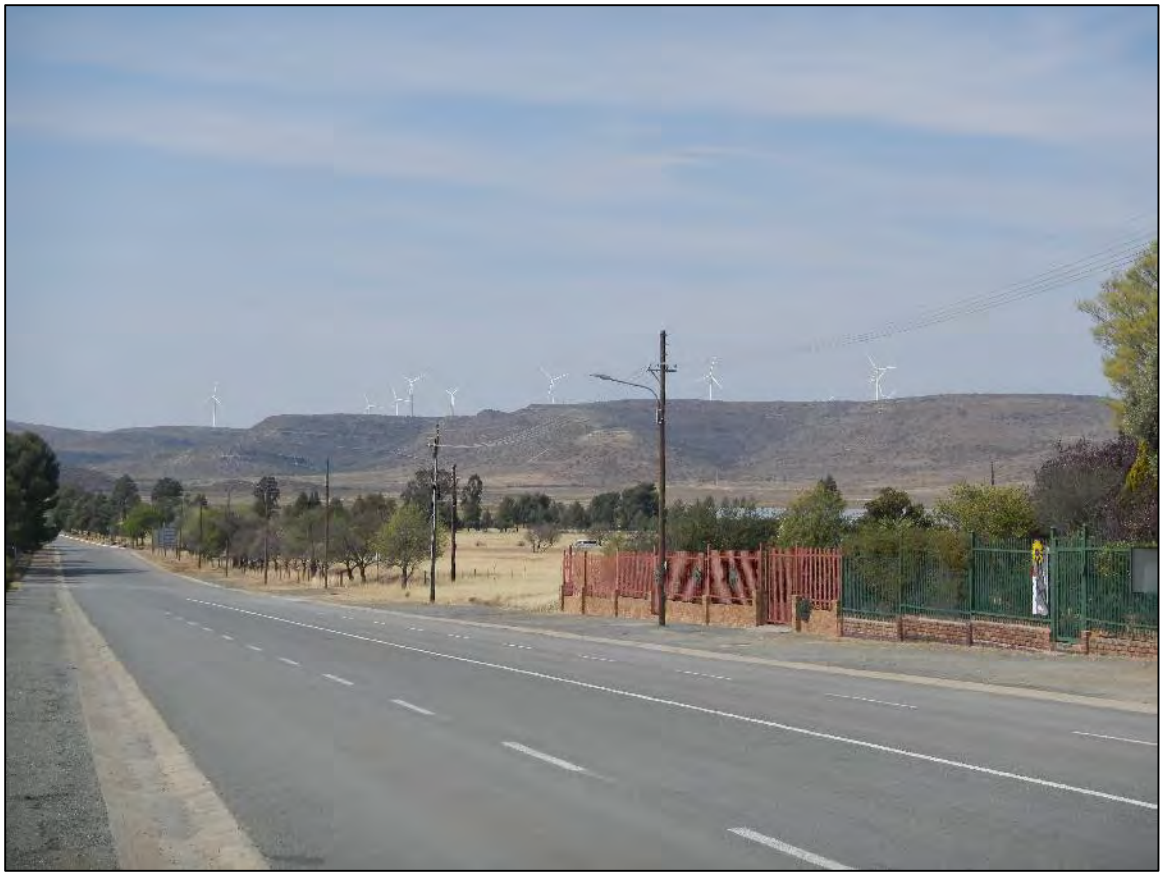


Figure 31: View of the wind turbines of the Noupoort Wind Farm which encroaches into the north-eastern sector of the study area / visual assessment zone and can be seen from within the town of Noupoort as well as from other parts of the study area / visual assessment zone.

Visual Implications

The nature of land use in the rural parts of the area has been largely responsible for the area retaining a largely natural or 'pastoral' character (**Figure 32**), as the natural vegetation has been retained for grazing and the areas have remained largely untransformed. The short, scrubby or grassy vegetation that occurs over the entire study area offers no visual screening in itself, and thus terrain / topography is the most important factor in limiting vistas. The only exception to this situation exists at local farmsteads where trees and shrubs that have been planted over many decades around the farmstead have become established, and provide effective screening from the surrounding areas.

Figure 32: Typical natural or 'pastoral' visual character found within the rural or untransformed parts of the study area / visual assessment zone.

High levels of human transformation are however evident in the vicinity of Noupoort (**Figure 33**) and in the north-eastern sector of the study area where the Noupoort Wind Farm has been established (**Figure 34**).

Figure 33: Example of high levels of human transformation which is evident in the vicinity of the town of Noupoort.

Figure 34: View of the Noupoort Wind Farm which can be found in the north-eastern sector of the study area / visual assessment zone.

The influence of the level of human transformation on the visual character of the area is described in more detail below.

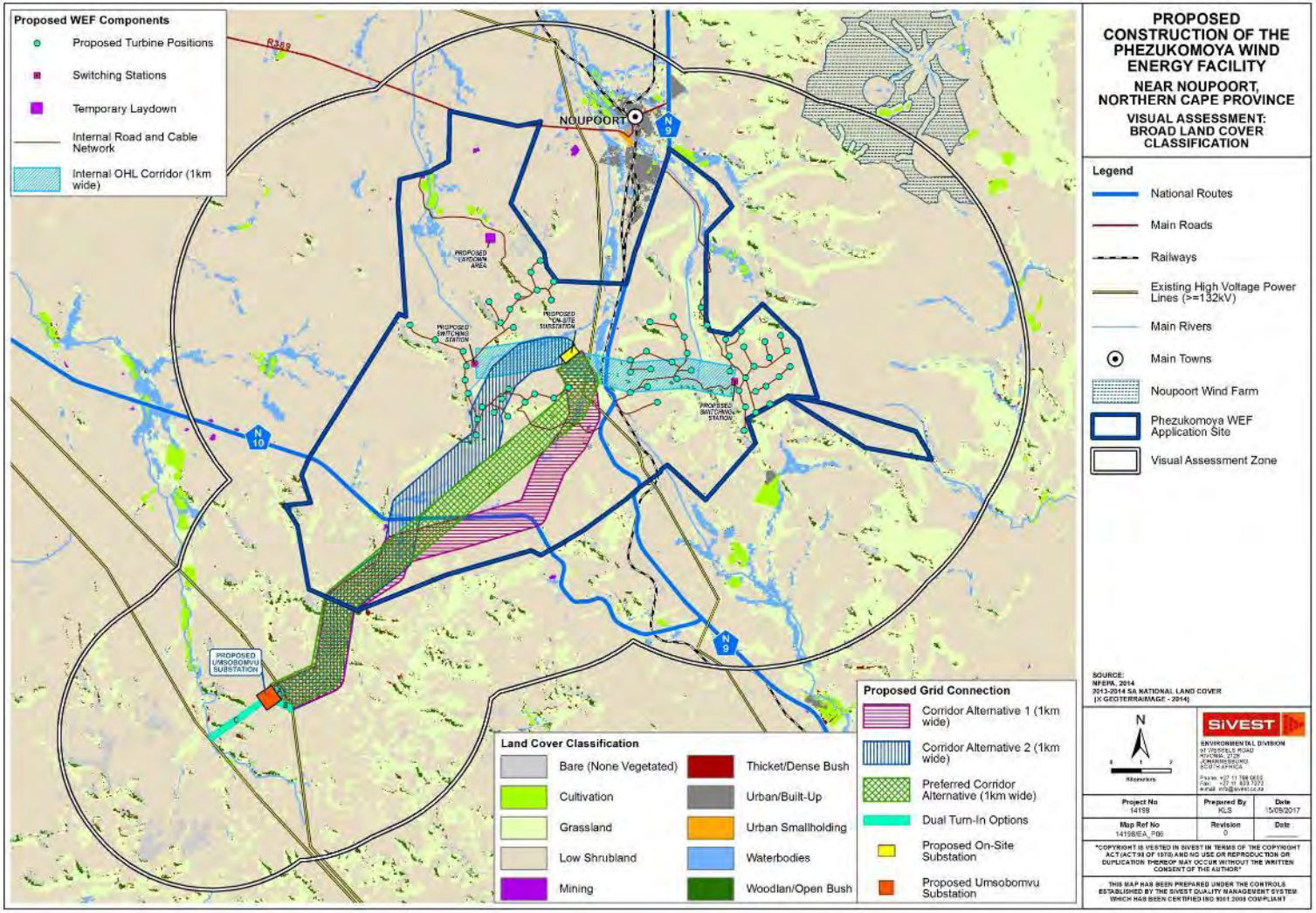


Figure 35: Land Use Classification Map

3.2 Visual Character

The above physical and land use-related characteristics of the study area contribute to its overall 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 telephone or electrical infrastructure.

The majority of the study area / visual assessment zone is considered to have a natural (almost vacant) visual character as natural shrub land prevails throughout the site and there is minimal human habitation and associated infrastructure. In addition, the predominant land use (livestock rearing) has not significantly transformed the natural landscape and the area has thus largely retained its natural rural character. It should be noted that the study area / visual assessment zone is also characterised by the presence of certain pastoral elements, which are expected to give the surrounding area a more pastoral feel. Built infrastructure across much of the study area / visual assessment zone is limited to a low density of gravel access roads, boundary fences, farm buildings, other farming infrastructure, such as windmills and an already operational WEF which can be found in the north-eastern section of the visual assessment zone (**Figure 34**). As explained above, the low density of human settlement and associated low level of change to the natural environment has resulted in a largely rural or pastoral visual character with some existing WEF development present. In this context, the introduction of a WEF with associated power lines in the area could however be considered to be a further degrading factor, although an operational WEF is already present.

Divergence from the above-mentioned rural character however occurs in the area around the town of Noupoort (**Figure 33**). Although it is a small town, Noupoort has a concentration of housing and other buildings such as schools, hospitals and churches, as well as relatively large railway shunting yards to distinguish it from the surrounding rural landscape. The town thus has an urban visual character, which means that it is characterised more by anthropogenic objects (such as buildings and roads) than natural features (**Figure 36**). However it should be noted that the small population of the town, and its limited spatial extent in the town being firmly set in a rural setting, and the rapid change from the edge of the town to rangeland or commonage contributes to the limited spatial extent of its particular urban visual character.

Figure 36: View from within the town of Noupoort showing the urban visual character.

Significant alteration to the rural or pastoral visual character is also evident in the north-eastern sector of the study area / visual assessment zone where the newly established Noupoort Wind Farm has introduced a more industrial-type visual character (**Figure 34**). The turbines of the Noupoort Wind Farm can be seen from various parts of the study area / visual assessment zone and are highly visible in the northern and north-eastern parts of the study area / visual assessment zone, such as from within the town of Noupoort (**Figure 31**) and the northern parts of the N9 national route (**Figure 37**). The presence of these turbines has thus transformed the natural visual character of the northern and north-eastern parts of the study area / visual assessment zone to some degree. In addition, several other renewable energy facilities (solar and wind) are proposed within relatively close proximity to the proposed Phezukamoya WEF, which will further alter the visual character and baseline in the study area once constructed.

Figure 37: View toward the Noupoort Wind Farm from the northern section of the N9 national route showing that the turbines of this wind farm are visible from here.

The scenic quality of the landscape is also an important factor that contributes to the visual character or inherent sense of place. Visual appeal is often associated with unique natural features or distinct variations in form. As such, the various hilly / mountainous terrain which occurs within the application site and within the wider study area are considered to be important features that would increase the scenic appeal and visual interest in the area (**Figure 38**).

Figure 38: View of some of the various hilly / mountainous terrain which occurs within the application site and within the wider study area.

The greater area surrounding the proposed development site is an important component when assessing visual character. The area can be considered to be typical of a Karoo or “platteland” landscape that would characteristically be encountered across the high-lying dry western and central interior of South Africa. Much of South Africa’s dry Karoo interior consists of wide open, uninhabited spaces sparsely punctuated by widely scattered farmsteads and small towns. Traditionally the Karoo has been seen by many as a dull, lifeless part of the country that was to be crossed as quickly as possible on route between the major inland centres and the Cape coast, or between the Cape and Namibia. However, in the last couple of decades this perception has been changing, with the launching of tourism routes within the Karoo. In a context of increasing urbanisation in South Africa’s major centres, the Karoo is being marketed as an undisturbed getaway, especially as a stop on a longer journey from the northern parts of South Africa to the Western and Eastern Cape coasts. Examples of this may be found in the relatively recently published “Getaway Guide to Karoo, Namaqualand and Kalahari” (Moseley and Naude-Moseley, 2008).

The typical Karoo landscape can also be considered a valuable ‘cultural landscape’ in the South African context. Although the cultural landscape concept is relatively new, it is becoming an

increasingly important concept in terms of the preservation and management of rural and urban settings across the world (Breedlove, 2002).

Cultural Landscapes can fall into three categories (according to the Committee's Operational Guidelines):

i) "a landscape designed and created intentionally by man";
ii) an "organically evolved landscape" which may be a "relict (or fossil) landscape" or a "continuing landscape";
iii) an "associative cultural landscape" which may be valued because of the "religious, artistic or cultural associations of the natural element"

The typical Karoo landscape consisting of wide open plains, and isolated relief, interspersed with isolated farmsteads, windmills and stock holding pens, is an important part of the cultural matrix of the South African environment. The Karoo farmstead is also a representation of how the harsh arid nature of the environment in this part of the country has shaped the predominant land use and economic activity practiced in the area, as well as the patterns of human habitation and interaction. The presence of small Karoo towns, such as Noupoort, engulfed by an otherwise rural environment, form an integral part of the wider Karoo landscape. As such, the Karoo landscape as it exists today has value as a cultural landscape in the South African context. In the context of the types of cultural landscape listed above, the Karoo cultural landscape would fall into the second category, that of an organically evolved, “continuing” landscape.

Much of the study area, as visible to the viewer, represents a typical Karoo cultural landscape. This is important in the context of potential visual impacts associated with the development of a WEF as introducing this type of development could be considered to be a degrading factor in the context of the natural Karoo character of the study area, as discussed further below.

3.3 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 (i.e. topography, landform and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (Oberholzer: 2005). 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.

In order to assess the visual sensitivity of the area SiVEST has developed a matrix based on the characteristics of the receiving environment which, according to the Guidelines for Involving Visual and Aesthetic Specialists in the EIA Processes, indicate that visibility and aesthetics are likely to be ‘key issues’ (Oberholzer: 2005).

Based on the criteria in the matrix (**Table** 1), the visual sensitivity of the area is broken up into a number of categories, as described below:

i) **High** - The introduction of a new development such as a wind farm 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 study area is rated as having a moderately-low visual sensitivity. This is mainly owing to the rural or pastoral character of the area. An important factor contributing

to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs. As described below, relatively few sensitive receptors are present in the study area. In addition, relatively few potentially sensitive receptors are present in the study area. Although no formal protected areas or leisure / nature-based tourism activities exist within the study area, the area would still be valued as a typical Karoo cultural landscape and for its scenic mountainous terrain.

As previously mentioned, the Noupoort Wind Farm is located some 4km to the north-east of the proposed Phezukomoya WEF application site and is currently operational. In addition, several other renewable energy facilities (solar and wind) are proposed within relatively close proximity to the proposed project. As such, an assessment of the cumulative impact that will be experienced from each potentially sensitive receptor has been undertaken (**Section 8**).

4 GENERIC VISUAL IMPACTS ASSOCIATED WITH THE WEF AND ASSOCIATED INFRASTRUCTURE

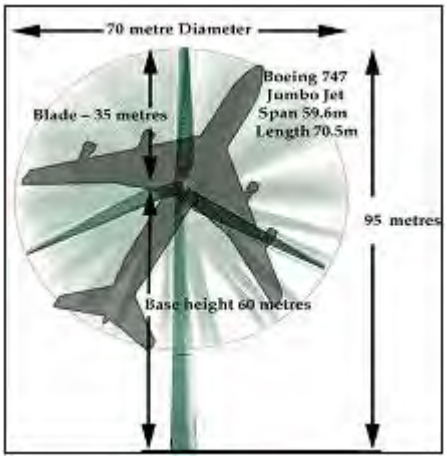
In this section, the typical visual issues / impacts related to the establishment of a WEF and associated infrastructure (such as on-site substations and power lines) are discussed. It is important to note that over the next few years several WEFs (including substations and power lines) are likely to be constructed in South Africa. The development and associated environmental assessment of WEFs in South Africa is relatively new, and thus it is valuable to draw on international experience. This section of the report therefore draws on international literature and web material (of which there is significant material available) to describe the generic impacts associated with WEFs and associated infrastructure such as on-site substations and power lines.

4.1 Wind Energy Facilities

As previously mentioned, at this stage it is anticipated that the proposed project will consist of up to 63 wind turbines and associated infrastructure with a total generation capacity of approximately 315MW. The wind turbines will have a hub height of up to 150m and a rotor diameter of up to 150m (approximate in height to a building of 40 storeys). The height of the turbines and the fact that a WEF comprises a number of these turbines distributed across the site would result in the development typically being visible over a large area.

Internationally, studies have demonstrated that there is a direct correlation between the number of turbines and the degree of objection to a WEF, with less opposition being encountered when fewer turbines are proposed (Devine-Wright, 2005). Certain objectors to wind energy developments also mention the “sky space” occupied by the rotors of a turbine. As well as height, "sky space" is an important issue. “Sky space” refers to the area in which the rotors would rotate. The diagram below

indicates that the “sky space” occupied by rotors would be similar to that occupied by a jumbo jet (http://www.stopbickertonwindturbines.co.uk/ - page on visual impact).



The visual prominence of the development would be exacerbated within natural settings, in areas of flat terrain or if located on a ridge top. Even dense stands of wooded vegetation are likely to offer only partial visual screening, as the wind turbines are of such a height that they will rise above even mature large trees.

4.1.1 Shadow flicker

Shadow flicker is an effect which is caused when shadows repeatedly pass over the same point. It can be caused by wind turbines when the sun passes behind the hub of a wind turbine and casts a shadow that continually passes over the same point as the rotor blades of the wind turbine rotate (http://www.ecotricity.co.uk).

The effect of shadow flicker is only likely to be experienced by people situated directly within the shadow cast by the rotor blades of the wind turbine. As such, shadow flicker is only expected to have an impact on people residing in houses located within close proximity of a wind turbine (less than 500m) and at a specific orientation, particularly in areas where there is little screening present. Shadow flicker may also be experienced by and impact on motorists if a wind turbine is located in close proximity to an existing road. The impact of shadow flicker can be effectively mitigated by choosing the correct site and layout for the wind turbines, taking the orientation of the turbines relative to the nearby houses and the latitude of the site into consideration. Tall structures and trees will also obstruct shadows and prevent the effect of shadow flicker from impacting on surrounding residents (http://www.ecotricity.co.uk).

4.1.2 Motion-based visual intrusion

An important component of the visual impacts associated with wind turbines is the *movement* of the rotor blades. Labelled as motion-based visual intrusion, this refers to the inclination of the viewer to focus on discordant, moving features when scanning the landscape. Evidence from surveys of public attitudes towards WEFs suggest that the viewing of moving rotor blades is not necessarily perceived negatively (Bishop and Miller, 2006). The authors of the study suggest two possible reasons for this; firstly when the turbines are moving they are seen as being 'at work', 'doing good' and producing energy. Conversely, when they are stationary they are regarded as a visual intrusion that has no evident purpose. More interestingly, the second theory that explains this perception is related to the intrinsic value of wind in certain areas and how turbines may be an expression or extension of an otherwise 'invisible' presence.

Famous winds across the world include the Mistral of the Camargue in France, the Föhn in the Alps, or the Bise in the Lavaux region of Switzerland. The wind, in these cases, is an intrinsic component of the landscape, being expressed in the shape of trees or drifts of sands, but being otherwise invisible. The authors of the study argue that wind turbines in these environments give expression, when moving, to this quintessential landscape element. In a South African context, this phenomenon may well be experienced if wind farms are developed in areas where typical winds, like berg winds, or the south-easter in the Cape are an intrinsic part of the environment. In this way, it may even be possible that wind farms will, through time form part of the cultural landscape of an area, and become a representation of the opportunities presented by the natural environment.

4.1.3 Associated Infrastructure

The infrastructure associated with the proposed Phezukomoya WEF will include the following:

- Internal access roads of between 8m (during operation) and 14m (during construction) wide to each turbine;
- Two (2) 10 000m^2 on-site switching stations;
- Medium voltage underground electrical cables will be laid to transmit electricity generated by the wind turbines to the on-site switching station or substation;
- Overhead medium voltage cables between turbine rows where necessary;
- An on-site substation and OMS area (180 000m^2) to facilitate stepping up the voltage from medium to high voltage (132kV) to enable the connection of the WEF to the proposed Umsobomvu WEF 132kV/400kV Substation, from which the generated power will be fed into the national grid;
- Two medium voltage overhead powerlines (approximately 3km and 5.6km in length) connecting the on-site switching stations with the on-site medium voltage/132kV substation;

- An approximately 16km 132kV voltage overhead power line from the on-site substation to the proposed 132/400kV Umsobomvu Substation where the electricity will be transferred to the national grid;
- Three (3) Dual Turn-In line alternatives which will link the proposed Umsobomvu Substation to the existing Hydra/Poseidon 400kV power lines. This includes a short 400kV line corridor that will run from the Umsobomvu Substation to the existing 400kV Eskom Grid, via a loop-in-loop-out connection. As mentioned, an EA for the proposed Dual Turn-In lines already exists and formed part of the Umsobomvu ROD;
- A 90 000m^2 area for batching plant, temporary laydown area and construction compound;
- Temporary infrastructure including a site camp; and
- A laydown area approximately 7500m^2 in extent, per turbine.

The new switching stations, substation and overhead power lines by their nature are large objects and will typically be visible for great distances. Power lines consist of a series of tall towers thus making them highly visible and, like wind turbines, power lines and substations are not features of the natural environment, but are representative of human (anthropogenic) alteration. Thus when placed in largely natural landscapes, they will be perceived to be highly incongruous in this setting. Conversely, the presence of other anthropogenic objects associated with the built environment, especially other power lines or substations, may result in the visual environment being considered to be 'degraded' and thus the introduction of new power lines or substations into this setting may be less of a visual impact than if there was no existing built infrastructure visible

Other proposed infrastructure may also be associated with visual impacts. As previously mentioned, the wind turbines are inter-connected by a series of cables, which are likely to be buried, but which also may take the form of above-ground power lines if deemed necessary. These cables may become a visual intrusion if placed in areas of the site that are visible to the surrounding areas, especially those areas that are located on low ridges and associated sloping ground. Trenches accommodating the cable (both during construction and post-construction once the trench has been back-filled) may become prominent if they create a linear feature that contrasts with the surrounding vegetation.

A similar principle exists with respect to any access roads constructed in visible areas of the site. Roads are likely to be wider than cable trenches and thus could be even more visible than the cable servitude. Cutting a 'terrace' into a steep side slope would increase the visibility and contrast the road against the surrounding vegetation.

Lastly, buildings placed in prominent positions such as on ridge tops may also break the natural skyline, drawing the attention of the viewer.

The visual impact of the associated infrastructure is generally not regarded as a significant factor when compared to the visual impact associated with wind turbines. They would however, magnify

the visual prominence of the development if located on ridge tops or on flat sites in natural settings where there is limited tall wooded vegetation present to conceal the impact.

5 SENSITIVE VISUAL RECEPTORS

A sensitive receptor location is defined as a location from where receptors 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 wind farm into a 'view', which may affect the 'sense of place'. The identification of sensitive receptors is typically 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 leisure-based (especially nature-based) tourism in an area;
- the presence of sites / routes that are valued for their scenic quality and sense of place;
- the presence of homesteads / farmsteads in a largely natural settings where the development may influence the typical character of their views; and
- feedback from interested and affected parties, as raised during the public participation process conducted as part of the EIA study.

A distinction must be made between a receptor location and a sensitive receptor location. A receptor location is a site from where the proposed wind farm 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 from the proposed turbine locations and from the proposed power line alternatives as the visibility of the development would diminish exponentially over distance (refer to **Section 2.4** above). As such, the proposed development would be more visible to receptors located within a short distance and these would experience a higher adverse visual impact than those located at a moderate or long distance from the proposed development. The degree of visual impact experienced will vary from one inhabitant to another, as it is largely based on the viewer's perception. Factors influencing the degree of visual impact experienced by the viewer include the following:

- Value placed by the viewer on the natural scenic characteristics of the area.

- The viewer's sentiments toward the proposed structures. These may be positive (a symbol of progression toward a less polluted future) or negative (foreign objects degrading the natural landscape).
- Degree to which the viewer will accept a change in the typical Karoo character of the surrounding area.

5.1 WIND ENERGY FACILITY RECEPTORS

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

- ≤ 2km (high impact zone);
- 2 ≤ 5km (moderate impact zone); and
- 5km ≤ 8km (low impact zone).

During the EIA phase VIA, only two (2) receptor locations were identified as being visually sensitive to the proposed development. These are The Dairy BnB (VR 28) and the Carlton Heights Lodge (VR 36). These guesthouses / guest farms are regarded as sensitive visual receptors as they are used as tourism facilities and visitors to these facilities are likely to perceive the proposed development in a negative light.

The Dairy Bed and Breakfast (VR 28) is situated approximately 2km outside of the town of Noupoort and is accessed via the N9 national route. It should be noted that this facility is situated approximately 4.9km from the nearest proposed turbine location and is located within the moderate zone of potential visual impact. This guesthouse / guest farm is set on a quiet farm and offers three (3) bedrooms (https://airportstay.co.za/noupoort/the-dairy-bnb-adventures/). This facility is frequently used as a stop-over for a nights rest when travelling to Cape Town or Port Elizabeth via the N9 national route. In addition, this guesthouse / guest farm offers a range of activities and outdoor facilities, such as horse riding, cycling and hiking (https://www.booking.com/hotel/za/the-dairy-bnb.ro.html). It should however be noted, according to the socio-economic specialist, potential visual intrusion by the proposed WEF turbines was not identified as a concern as the owner of this facility (Annatjie van Huyssteen) has indicated that many of her visitors consider it a draw card (Barbour, T and van der Merwe, S., September 2017).

Figure 39: View of the main guestroom / guesthouse facility at The Dairy BnB (VR 28).

Figure 40: View of the backpacker's accommodation facility at The Dairy BnB (VR 28)

This guesthouse / guest farm is situated within a largely natural or rural setting and is characterised by the presence of certain pastoral elements as well as some other anthropogenic elements such as existing low voltage power lines (**Figure 41**). Views from this receptor are thus considered to be mostly natural / scenic. There are also a significant number of screening factors (such as the surrounding mountains and vegetation) surrounding this receptor which are expected to block views towards the proposed development. It should however be noted that the town of Noupoort is slightly visible from this receptor and reduces the visual character of the area to some degree (**Figure 42**).

Figure 41: View of the typical pastoral elements and other anthropogenic elements (such as existing low voltage power lines) which are present at this receptor.

Figure 42: View towards the proposed Phezukomoya WEF Application Site from VR 28 showing the largely natural /scenic views. The town of Noupoort is slightly visible from this receptor.

Carlton Heights Lodge (VR 36) is situated approximately 25km north of the town of Middelburg, 1.5km from the national highway on the N9/N10 towards Port Elizabeth. As such, this facility is accessible via either the N9 or N10 national routes (**Figure 43**). It should be noted that this facility is situated approximately 5.3km from the nearest proposed turbine location and is located within the low zone of potential visual impact. This facility is situated in scenic surroundings and offers a fully equipped Karoo Style farmhouse with 5 rooms (**Figure 44**), DSTV and braai facilities. The area offers scenic views, walking opportunities, bird watching and viewing of game such as Springbuck, Reebuck, Kudu, Steenbuck and Duiker among others. This facility also offers scenic 4x4 routes on the farm and a campsite with power points for caravans, motor homes and tents (http://www.carltonheights.co.za/).

Figure 43: View of the entrance of the Carlton Heights Lodge (VR 36) which is accessible via the N9 and N10 national routes.

Figure 44: View of the accommodation facilities (farmhouse) which can be found at the Carlton Heights Lodge (VR 36).

This guesthouse / guest farm is situated within a largely natural or rural setting and as such views from this receptor are considered to be mostly natural / scenic (**Figure 45**). This receptor is however characterised by the presence of anthropogenic elements such as existing power lines which are visible from this receptor (**Figure 46**). It should be noted that the series of tall trees located to the north-east of the main guesthouse are expected to provide a moderate amount of screening and thus partially obscure views towards the proposed development (**Figure 47**).

Figure 45: View towards the proposed Phezukomoya WEF Application Site from VR 36 showing the largely natural / scenic views from this receptor.

Figure 46: View of the existing power lines which are visible from VR 36.

Figure 47: View of the series of tall trees which are located to the north-east of the main guesthouse which are expected to partially obscure views towards the proposed development.

A total number of twenty-three (23) potentially sensitive receptors have been identified within the visual assessment zone of the proposed Phezukomoya WEF (5 of which are situated within the high zone of potential visual impact, 6 within the moderate zone of potential visual impact and 12 which are within the low zone of potential visual impact). These include residential areas in the town of Noupoort, the Noupoort Golf Course, and several scattered farmsteads / homesteads which house the local farmers as well as farm workers. Additionally, one (1) of these receptor locations was identified as being the Middelburg Hang Gliding Club, namely VR 52. These receptors are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these dwellings. It should be noted that the local farmers that own farmsteads within the application site form part of the project. In addition, some of the farmers that own farmsteads on some of the surrounding farms also form part of this project or the proposed San Kraal WEF project (also being proposed by InnoWind as part of a separate on-going EIA process). As such, these farm owners will benefit financially from the proposed development. This is likely to offset the visual impact experienced by the landowners and reduce the negative sentiments they may have towards the developments. Accordingly some (but not all) of these farmsteads have been eliminated from the list of potentially sensitive receptor locations for the purpose of this EIA phase study. Certain farmsteads (namely VR 9, VR 10, VR 11, VR 31 and VR 32) were however not eliminated from the list of potentially sensitive receptor locations, despite having a vested interest in this development or the proposed

San Kraal WEF development, as they are still currently occupied (either by the owners or tenants) and according to the socio-economic specialist, could still perceive the proposed WEF in a negative light. In addition, some of these farmsteads (such as VR 11) could become potentially sensitive receptor locations in the future (Barbour, T and van der Merwe, S., September 2017). It should also be noted that VR 52 is the Middelburg Hang Gliding Club, which does not have a vested interest in the proposed development. These receptors were thus not eliminated and were still regarded as potentially sensitive visual receptor locations for the purpose of this study.

As previously mentioned, due to access limitations and time constraints during the site visit, not all of the identified potentially sensitive visual receptor locations could be visited and investigated further and therefore the impact rating assessment of the proposed development on the potentially sensitive visual receptor locations was undertaken primarily via desktop means. Although the use of all of these farmsteads / residential dwellings could not be established during the field investigation, they were still regarded as being potentially sensitive to the visual impacts associated with the proposed wind farm and were assessed as part of the VIA. As mentioned above, twenty-three (23) potentially sensitive visual receptors were identified within the study area, as well as two (2) sensitive visual receptors. This is mainly due to low levels of leisure-based or nature based tourism activities in the assessment area.

Table 2 below provides details of the sensitive and potentially sensitive places that have cultural and symbolic importance that were identified within the study area.

Table 2: Visual receptor locations sensitive and/or potentially sensitive to the proposed Phezukomoya WEF

Name	Details	Distance from the nearest wind turbine location	Visual Impact Zone
VR1	Farmstead/Homestead	Approximately 5.3km	Low
VR2	Farmstead/Homestead	Approximately 6.6km	Low
VR3	Farmstead/Homestead	Approximately 7.9km	Low
VR4	Farmstead/Homestead	Approximately 4.9km	Moderate
VR6	Farmstead/Homestead	Approximately 6.3km	Low
VR9*	Farmstead/Homestead	Approximately 0.9km (inside WEF application site)	High
VR10**	Farmstead/Homestead	Approximately 1.0km (inside WEF application site)	High
VR11***	Farmstead/Homestead	Approximately 1. 8km (inside WEF application site)	High
VR13	Farmstead/Homestead	Approximately 3.8km	Moderate
VR17	Smallholdings	Approximately 5.5km	Low
VR19	Noupoort Residential (west)	Approximately 4.2km	Moderate
VR20	Kwazamuxolo Residential	Approximately 4.7km	Moderate
VR21	Noupoort Golf Course	Approximately 7.3km	Low

Name	Details	Distance from the nearest wind turbine location	Visual Impact Zone
VR22	Noupoort Residential (central)	Approximately 5.9km	Low
VR23	Farmstead/Homestead	Approximately 5.6km	Low
VR24	Farmstead/Homestead	Approximately 5.5km	Low
VR25	Farmstead/Homestead	Approximately 5.5km	Low
VR27	Farmstead/Homestead	Approximately 7.1km	Low
VR28	The Dairy B&B	Approximately 5.1km	Low
VR31****	Farmstead/Homestead	Approximately 1.9km	High
VR32*****	Farmstead/Homestead	Approximately 1.6km	High
VR33	Farmstead/Homestead	Approximately 4.2km	Moderate
VR36	Carlton Heights Lodge	Approximately 5.2km	Low
VR51	Farmstead/Homestead	Approximately 5.6km	Low
VR52	Middelburg Hang Gliding Club	Approximately 4.7km	Moderate

**This receptor is located within the proposed Phezukomoya WEF application site. It is assumed that the occupants would have a vested interest in the development and would therefore not perceive the proposed wind farm in a negative light. However, according to the socio-economic specialist and owner of this dwelling, this dwelling is currently occupied by tenants and the occupants of this receptor could possibly still perceive the proposed WEF in a negative light. This receptor was thus still regarded as a potentially sensitive visual receptor location (Barbour, T and van der Merwe, S., September 2017).*

***This receptor is located within the proposed Phezukomoya WEF application site. It is assumed that the occupants would have a vested interest in the development and would therefore not perceive the proposed wind farm in a negative light. However, according to the socio-economic specialist and owner of this dwelling, this dwelling is currently occupied by tenants and the occupants of this receptor could possibly still perceive the proposed WEF in a negative light. This receptor was thus still regarded as a potentially sensitive visual receptor location (Barbour, T and van der Merwe, S., September 2017).*

****This receptor is located within the proposed Phezukomoya WEF application site. It is assumed that the occupants would have a vested interest in the development and would therefore not perceive the proposed wind farm in a negative light. In addition, during the time of the audit it was noted that this farmstead was unoccupied / uninhabited. Despite this however, it was advised that this receptor could be revived as a guest farm (as it was until 7 years ago), possibly also to include a paid hunting component. This is however still uncertain, as transfer of the property to the new owner (Mr. Jean Gillmer) has not been finalised (Barbour, T and van der Merwe, S., September 2017). This receptor was thus still regarded as a potentially sensitive visual receptor location.*

*****VR 31 is located on an adjacent property which will be used for the proposed San Kraal WEF application site (also being proposed as part of a separate on-going EIA process by InnoWind). It is thus assumed that the occupants of this dwelling would have a vested interest in the development*

and would therefore not perceive the proposed development in a negative light. Despite this however, it was advised by the socio-economic specialist that the occupants could possibly still perceive the proposed development in a negative light (Barbour, T and van der Merwe, S., September 2017) and thus this receptor was still regarded as a potentially sensitive visual receptor location.

******VR 33 is located on an adjacent property which will be used for the proposed San Kraal WEF application site (also being proposed as part of a separate on-going EIA process by InnoWind). It is thus assumed that the occupants of this dwelling would have a vested interest in the development and would therefore not perceive the proposed development in a negative light. Despite this however, it was advised by the socio-economic specialist that the occupants could possibly still perceive the proposed development in a negative light (Barbour, T and van der Merwe, S., September 2017) and thus this receptor was still regarded as a potentially sensitive visual receptor location.*

In many cases, roads along which people travel, are regarded as sensitive receptors. The N9 national route traverses the study area in a north-south direction, passing through a very scenic area as it approaches the town of Noupoort, and can be considered to be the primary sensitive receptor road through the area (**Figure 27**). Proposed turbine locations for the Phezukomoya WEF development are all situated on higher-lying plateaux on either side of the N9 and these are likely to be highly visible to motorists travelling along this road. Other potentially sensitive receptor roads include the following:

- The N10 national route which passes through the southern section of the study area in an east-west direction (**Figure 29**). This is a national route linking Port Elizabeth on the Eastern Cape coast with Upington and the Namibian border to the west. Turbines situated on higher-lying plateaux are likely to be highly visible to motorists travelling along this road.
- The R389 provincial (un-surfaced) road that runs from the town of Noupoort in a westerly direction providing a link to the N1 and the town of Hanover (**Figure 30**). In the setting of flat Karoo plains, turbines placed on top of the higher plateaux on the development site would be highly visible to motorists travelling along this road.

The sensitive and potentially sensitive visual receptor locations in relation to the zones of visual impact for the proposed WEF are indicated in **Figure 48** below.

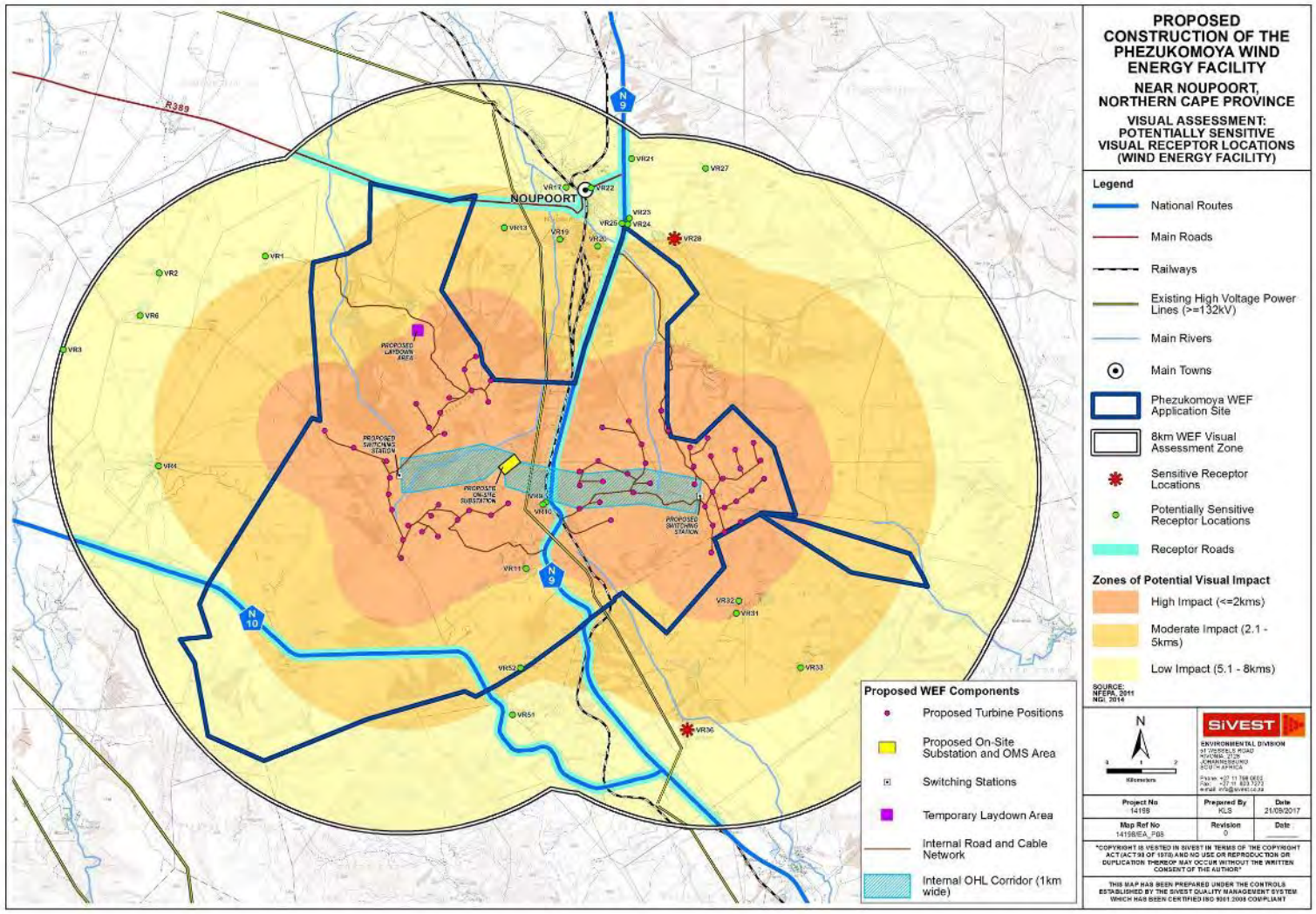


Figure 48: Sensitive and Potentially Sensitive Visual Receptors within the WEF Study Area

5.2 POWER LINE RECEPTORS

Given the length of the proposed power line and the likely height of the associated towers, the radii chosen for the zones of visual impact are as follows:

- ≤ 500m (high impact zone);
- 500m ≤ 2km (moderate impact zone); and
- 2km ≤ 5km (low impact zone).

A total number of ten (10) receptors (4 of which are situated within the high zone of potential visual impact, 3 within the moderate zone of potential visual impact and 3 within the low zone of potential visual impact) have been identified within the combined visual assessment zone for the proposed 132kV power line and the Dual Turn-In lines, most of which are scattered farmsteads / homesteads which house the local farmers as well as farm workers. One (1) of these receptor locations was identified as being the Middelburg Hang Gliding Club, namely VR 52. These receptors are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations.

Table 3 and **Table 4** below provide details of the potentially sensitive places that have cultural and symbolic importance that were identified within the study area.

Table 3: Visual receptor locations potentially sensitive to the proposed 132kV power line linking Phezukomoya WEF to the proposed Umsobomvu Substation

Name	Details	Corridor Option 1		Corridor Option 2		Corridor Option 3	
		Distance	Zone	Distance	Zone	Distance	Zone
VR9*	Farmstead/Homestead	131m	High	987m	Moderate	173m	High
VR10**	Farmstead/Homestead	63m	High	977m	Moderate	67m	High
VR11***	Farmstead/Homestead	604m	Moderate	2.9km	Low	Inside	High
VR45	Farmstead/Homestead	2.7km	Low	2.8km	Low	2.8km	Low
VR46	Farmstead/Homestead	2.9km	Low	2.9km	Low	2.9km	Low
VR47	Farmstead/Homestead	2.3km	Low	2.2km	Low	2.2km	Low
VR48	Farmstead/Homestead	4.5km	Low	4.4km	Low	4.5km	Low
VR49	Farmstead/Homestead	Inside	High	Inside	High	Inside	High
VR51	Farmstead/Homestead	3.5km	Low	4.7km	Low	1.8km	Moderate
VR52	Middelburg Hang-gliding	2.6km	Low	3.8km	Low	1.2km	Moderate

**This receptor is located within the proposed Phezukomoya WEF application site. It is assumed that the occupants would have a vested interest in the development and would therefore not perceive the proposed wind farm in a negative light. However, according to the socio-economic specialist and owner of this dwelling, this dwelling is currently occupied by tenants and the*

occupants of this receptor could possibly still perceive the proposed WEF in a negative light. This receptor was thus still regarded as a potentially sensitive visual receptor location (Barbour, T and van der Merwe, S., September 2017).

***This receptor is located within the proposed Phezukomoya WEF application site. It is assumed that the occupants would have a vested interest in the development and would therefore not perceive the proposed wind farm in a negative light. However, according to the socio-economic specialist and owner of this dwelling, this dwelling is currently occupied by tenants and the occupants of this receptor could possibly still perceive the proposed WEF in a negative light. This receptor was thus still regarded as a potentially sensitive visual receptor location (Barbour, T and van der Merwe, S., September 2017).*

****This receptor is located within the proposed Phezukomoya WEF application site. It is assumed that the occupants would have a vested interest in the development and would therefore not perceive the proposed wind farm in a negative light. In addition, during the time of the audit it was noted that this farmstead was unoccupied / uninhabited. Despite this however, it was advised that this receptor could be revived as a guest farm (as it was until 7 years ago), possibly also to include a paid hunting component. This is however still uncertain, as transfer of the property to the new owner (Mr. Jean Gillmer) has not been finalised (Barbour, T and van der Merwe, S., September 2017). This receptor was thus still regarded as a potentially sensitive visual receptor location.*

Table 4: Visual receptor locations potentially sensitive to the proposed Dual Turn-In lines connection the proposed Umsobomvu Substation with the existing 400kV power lines

Name	Details	Dual Turn-In Option A		Dual Turn-In Option B		Dual Turn-In Option C	
		Distance	Zone	Distance	Zone	Distance	Zone
VR45	Farmstead/Homestead	2.9km	Low	3.0km	Low	2.1km	Low
VR46	Farmstead/Homestead	2.9km	Low	2.6km	Low	641m	Moderate
VR47	Farmstead/Homestead	2.8km	Low	2.2km	Low	2.9km	Low
VR48	Farmstead/Homestead	4.8km	Low	4.5km	Low	3.0km	Low
VR49	Farmstead/Homestead	2.1km	Low	2.1	Low	2.9km	Low

As stated above, both the N9 and the N10 national routes could be considered as potentially sensitive receptor roads in the study area. Motorists travelling along these roads could be visually exposed to the proposed 132kV power line and turn-in lines. The south-western part of the visual assessment zone for the proposed power line corridor is largely untransformed by service infrastructure and is characterised by a largely natural visual character. This is evident when travelling along the N10 national route where limited service infrastructure and other anthropogenic elements are present (**Figure 49**). It should however be noted that existing high voltage power lines traverse the north-eastern and south-western sections of the study area / visual assessment zone. These existing high voltage power lines can be seen when travelling along parts of the N9 and N10 national routes (**Figure 50**). Other anthropogenic elements which are visible from parts of the

above-mentioned national routes include the railway line which traverses both the N9 and N10 national routes (**Figure 28**) as well as other tall linear elements (**Figure 51**).

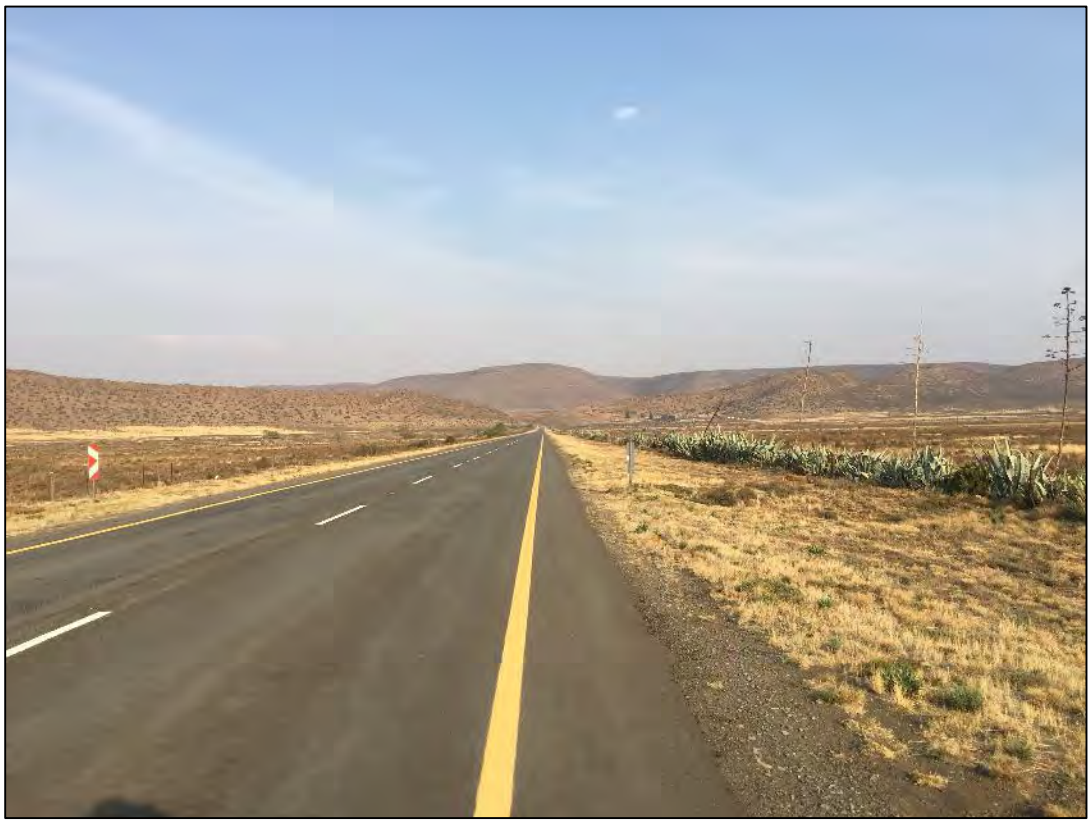


Figure 49: View from the N10 national route showing the largely untransformed nature of the south-western section of the visual assessment zone for the power line corridor.

Figure 50: View of some of the existing power lines which are visible from parts of the N9 national route.

Figure 51: View of some of the typical tall linear anthropogenic elements which can be seen from the N9 and N10 national routes.

The potentially sensitive visual receptor locations in relation to the zones of visual impact for the proposed 132kV power line are indicated in **Figure 52** below.

It should be noted that corridors were assessed with regards to the proposed 132kV power line and the final power line placement can be positioned well away from any of the identified sensitive and/or potentially sensitive receptor locations and any other dwellings, according to building restrictions and Eskom setbacks for such lines.

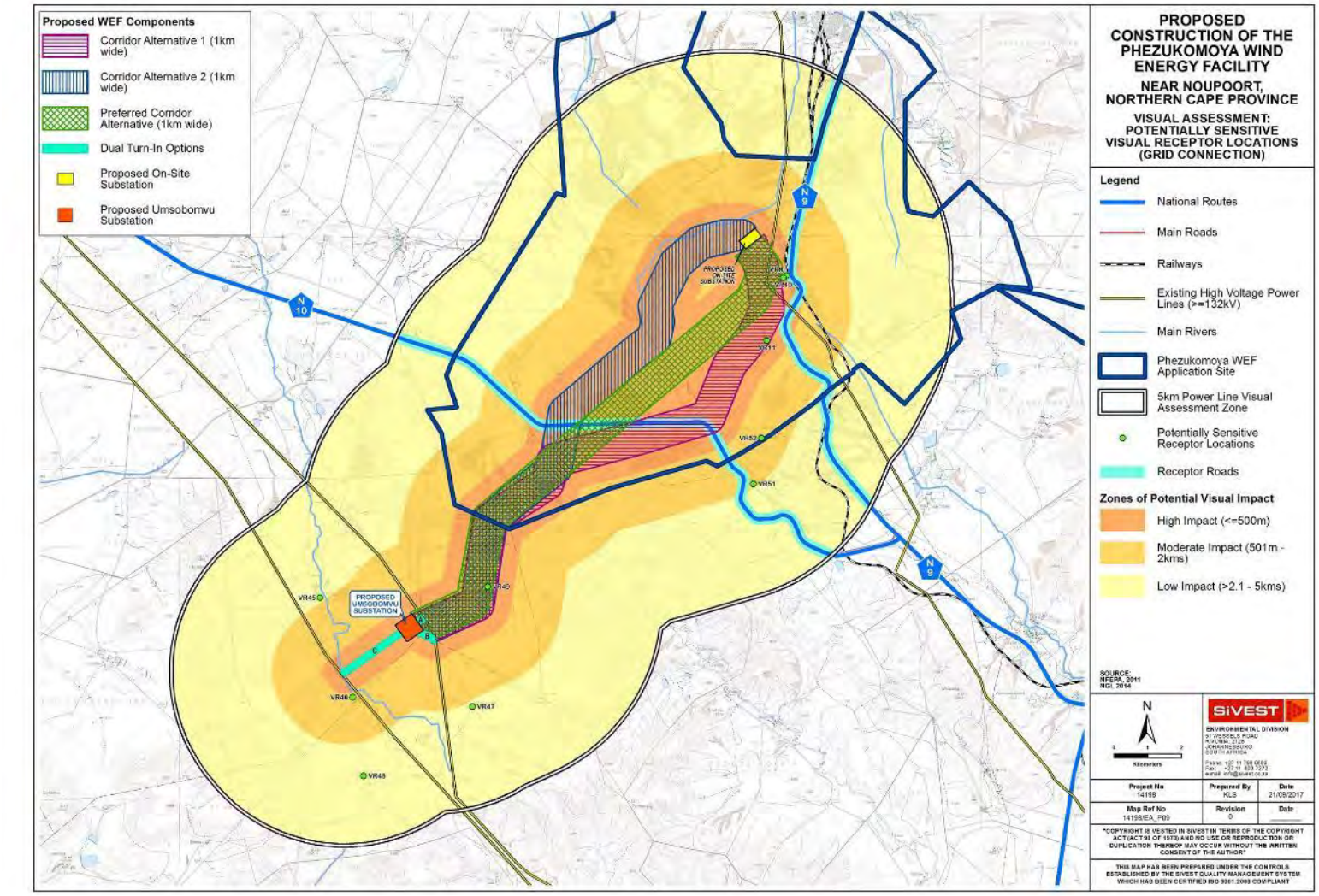


Figure 52: Potentially Sensitive Visual Receptors within the Power Line Study Area

6 VISUAL SENSITIVITY ANALYSIS

During the scoping phase, all project specialists were requested to indicate environmentally-sensitive areas within the development site. This exercise was undertaken to inform the design of the development layout within the application site.

The aim of the assessment was to identify those parts of the application site where locating turbines and other associated infrastructure would result in the greatest probability of visual impacts on potentially sensitive visual receptors, and should be precluded from the proposed development i.e. areas within the application site that should be avoided.

As previously mentioned the visual prominence of a tall structure such as a wind turbine would be exacerbated if located on a ridge top or high lying plateau. Preliminary layout plans for the proposed development have largely utilised the higher lying plateaus within the application site for turbine placement and as such the development is likely to be highly visible from much of the surrounding area. This does not necessarily mean that these plateaus should be precluded from any development and as such a desktop analysis was conducted to determine likely visual sensitivity in relation to the potentially sensitive receptors in the study area. The analysis conducted during the scoping phase of the study was revisited during the EIA phase of the study to factor in changes in the list of potentially sensitive visual receptors resulting from the field investigation.

Using GIS-based visibility analysis, it was possible to determine which sectors of the site would be visible to the highest numbers of receptors in the study area. This analysis took into account all the sensitive and potentially sensitive receptor locations listed in **Table 2** above as well as points along the receptor roads at 500m intervals. The areas visible to the highest number of receptors were rated as areas of 'medium-high sensitivity' and turbines should preferably be precluded from these areas in order to reduce the potential visual impact on the identified sensitive and potentially sensitive receptor locations. However, as the study area as a whole is rated as having a moderately-low visual sensitivity (refer to **Section 3.3**), these zones are not considered areas of high visual sensitivity or no go areas, but rather should be viewed as zones where the number of turbines should be limited, where possible as the turbines will still be highly visible. Therefore, although several turbines are located within the areas of 'medium-high sensitivity' the development is still regarded as acceptable from a visual perspective, but the impact on sensitive and potentially sensitive locations would be lessened if these were relocated. The results of this analysis are shown in **Figure 53** below.

It should be noted that the visibility analysis is based purely on topographic data available for the broader study area and does not take into account any localised topographic variations or any existing infrastructure and / or vegetation which may constrain views. In addition, the analysis does not take into account differing perceptions of the viewer which largely determine the degree of visual impact being experienced.

The visual sensitivity analysis should therefore be seen as a conceptual representation or a worst-case scenario which rates the visibility of the site in relation to potentially sensitive receptors.

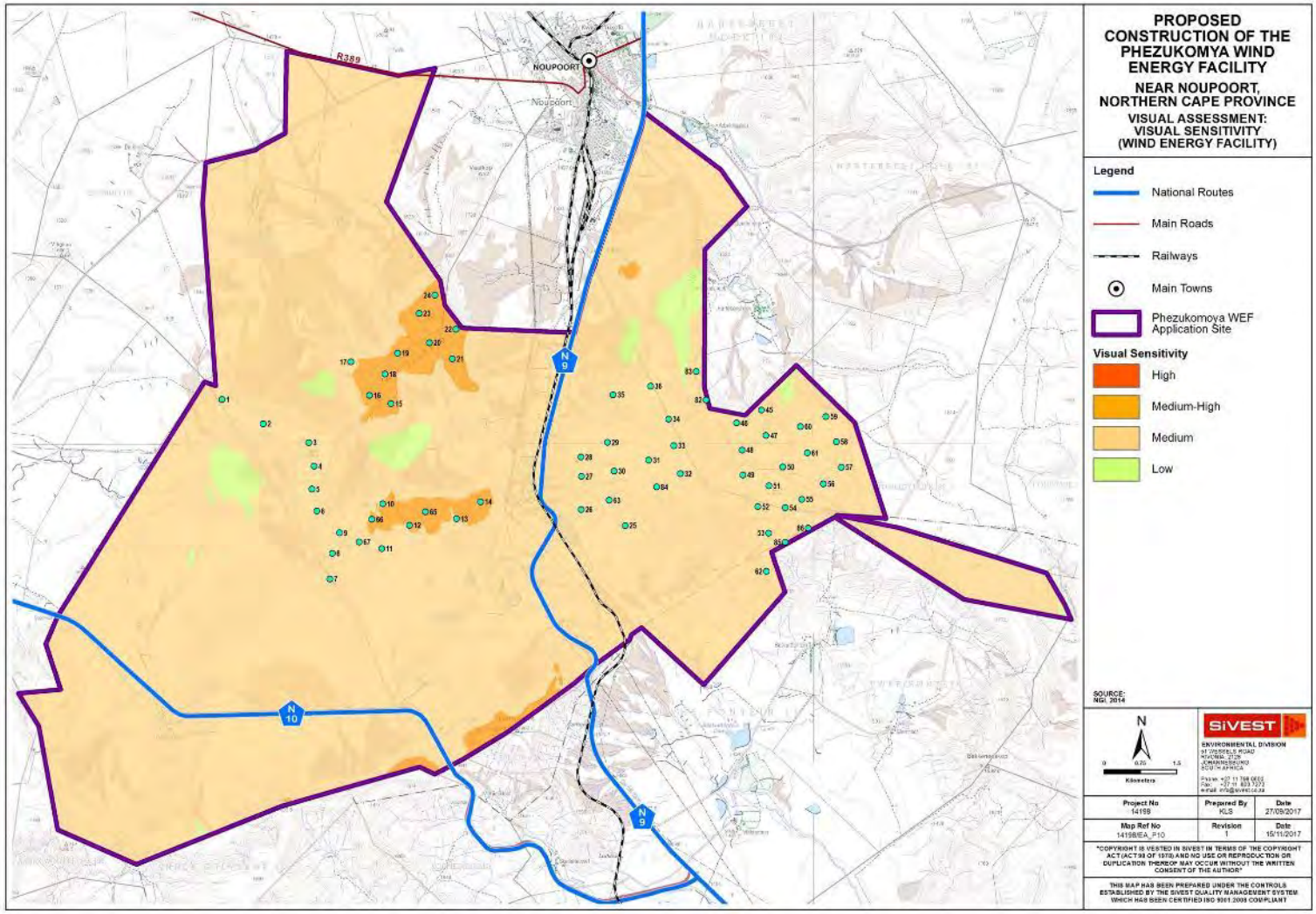


Figure 53: Visual sensitivity of the Phezukomoya WEF application site

7 IMPACT ASSESSMENT

7.1 Visual Compatibility / Contrast

The visual compatibility of the proposed development refers to the degree to which the development would be congruent with the surrounding environment. It is based on whether or not the development would conform with the land use, settlement density, structural scale, form and pattern of elements that define the structure of the surrounding landscape. Visual compatibility is an important factor to be considered when assessing the impact of the development within a specific context. A development that is incongruent with the surrounding area may change the character of the landscape, which could have a significant visual impact from key scenic views within the study area. Where a development corresponds with the surrounding environment the development would be easily absorbed by the surrounding environment and would result in little to no change in the visual character of the area.

In general, the development would not be consistent with the prevailing land uses within the wider study area / visual assessment zone. However, the anthropogenic elements and built-up areas present within parts of the study area are expected to partially alter the visual character and baseline and make certain areas appear to have a more industrial-type visual character. This is true for the northern and north-western sections of the visual assessment zone which are characterised by the presence of the town of Noupoort as well as the operational Noupoort Wind Farm. As such, the proposed development would increase the current level of visual transformation within the study area, but the existing unnatural forms will lessen the degree to which the proposed development would be considered incongruent with the surrounding landscape. In addition, the level of visual contrast would depend on the height, density and colour of the proposed development. If some or all of the other renewable energy facilities that are proposed within relatively close proximity to the proposed project are also constructed, the visual contrast would be significantly less as the proposed development would conform with the scale and form of these facilities.

7.2 Receptor Impact Rating

In order to assess the impact of the proposed development on the sensitive and potentially sensitive receptor locations listed above, a matrix that takes into account a number of factors has been developed (**Table 5**), and is applied to each receptor location.

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

- Distance of a receptor location away from the proposed development (zones of visual impact);
- Presence of screening factors (topography, vegetation etc.); and
- 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 potentially sensitive receptor location in this context. 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. Experiencing of visual impacts is however a complex and qualitative phenomenon, and is thus difficult to accurately quantify. The matrix should therefore be seen as a representation of the likely visual impact at a receptor location. Part of its limitation lies in the quantitative assessment of what is largely a qualitative or subjective impact.

Table 5: Visual assessment matrix used to rate the impact of the proposed development on sensitive and potentially sensitive visual receptors

	VISUAL IMPACT RATING			
VISUAL FACTOR	**HIGH**	**MEDIUM**	**LOW**	**OVERRIDING FACTOR: NEGLIGIBLE**
Distance of receptor away from proposed development	0 ≤ 2km **Score 3**	2km ≤ 5km **Score 2**	5km ≤ 8km **Score 1**	8km <
Presence of screening factors	No / almost no screening factors – development highly visible **Score 3**	Screening factors partially obscure the development **Score 2**	Screening factors obscure most of the development **Score 1**	Screening factors completely block any views towards the development, i.e. the development is not within the viewshed
Visual Contrast.	**High:** The development would contrast highly with the typical land use and/or pattern and form of human elements (infrastructural form). Typically a natural / pastoral environment with low-density rural infrastructure present (low voltage power lines and farm boundary fences). **Score: 3**	**Moderate:** The development would contrast moderately with the typical land use and/or pattern and form of human elements (infrastructural form) and existing level of visual transformation. Typically areas within close proximity to other prominent infrastructure (high voltage power lines and railway lines) and within intensive agricultural lands / cultivated fields. **Score: 2**	**Low:** The development would correspond with the typical land use and/or pattern and form of human elements (infrastructural form) and existing level of visual transformation. Presence of urban form and industrial-type infrastructure. The area is not highly valued or sensitive to change (e.g. outskirts of urban and built-up areas). **Score: 1**	

7.2.1 Distance

As described above, distance of the viewer / receptor location from the development is an important factor in the context of experiencing of visual impacts which will have a strong bearing on mitigating the potential visual impact. A high impact rating has been assigned to receptor locations that are located within 2km of the proposed development. Beyond 8km, the visual impact would be virtually nil, as the development would appear to merge with the elements on the horizon. As previously mentioned, distance bands were used to assign zones of visual impact from the proposed development site. Based on the height and scale of the project, the radii chosen to assign these zones of visual impact for the proposed Phezukomoya WEF are as follows:

- $\leq$ 2km (high impact zone);
- 2 $\leq$ 5km (moderate impact zone); and
- 5km $\leq$ 8km (low impact zone).

Given the length of the proposed power line and the likely height of the associated towers, the radii chosen for the zones of visual impact are as follows:

- $\leq$ 500m (high impact zone);
- 500m $\leq$ 2km (moderate impact zone); and
- 2km $\leq$ 5km (low impact zone).

7.2.2 Screening Factors

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 been assigned an overriding negligible impact rating, as the development would not impose any impact on the receptor.

7.2.3 Visual Contrast

The degree to which the proposed development would appear to contrast with the surrounding land use, settlement density, forms and patterns of elements that define the structure of the surrounding landscape is also considered in the matrix. The visual contrast is an important factor to be

considered when assessing the impact of the proposed development from a specific location, as a development that appears to contrast with the visual backdrop may change the visual character of that landscape. This could have a significant visual impact on potentially sensitive visual receptors within the study area.

Based on the land use and visual character in the surrounding landscape, the area was assessed to determine the level of transformation and degree to which the proposed development would appear to be visually compatible with the surrounding environment when viewed from a particular location. In the context of this proposed development, the presence or absence of existing electrical infrastructure, dense settlement or other urban built-up form is an important factor influencing the level of visual contrast. For example, if the development was located adjacent to an existing renewable energy development it would result in significantly less visual contrast. The following zones / categories were therefore used in order to rate the visual contrast from each receptor location:

- **High** – undeveloped / natural / rural areas;
- **Moderate** – Intensive agricultural lands / cultivated fields or areas within close proximity (i.e. within approximately 500m) of existing power line, road or rail infrastructure in undeveloped / natural / rural areas; and
- **Low** – within 1 km from visually transformed urban / built-up areas (such as the town of Noupoort) as well as any operational Renewable Energy Facilities (such as the operational Noupoort Wind Farm).

Through the matrix a score for each receptor location is calculated. The range in which the score falls, as listed in **Table 6** below, determines the visual impact rating for each receptor location.

Table 6: Ratings scores

Rating	Overall Score
High Visual Impact	8-9
Moderate Visual Impact	5-7
Low Visual Impact	3-4
Negligible Visual Impact	(overriding factor)

An explanation of the matrix is provided in **Table 5**.

*7.2.4 **WIND ENERGY FACILITY RECEPTOR IMPACT RATING***

As previously mentioned, a few of the farmsteads / homesteads identified during the scoping phase were excluded as potentially sensitive receptor locations for the purposes of the EIA phase study as it was discovered during the time of the site visit that these were uninhabited and/or abandoned. No further assessment was undertaken from these abandoned farmsteads / homesteads as no

individuals currently live in these farmsteads / homesteads and therefore no visual impact will be experienced from these locations. In addition, a few of the farmsteads identified during the scoping phase have been eliminated for the purpose of this EIA phase study as they are located within the proposed Phezukomoya WEF application site and on the surrounding farms which form part of either this project or the proposed San Kraal WEF project (also being proposed by InnoWind as part of a separate on-going EIA process). As such, these farm owners will benefit financially from the proposed development and will not perceive the development in a negative light. Despite this however, some of the farmsteads located within the application site were not eliminated from the list of potentially sensitive receptor locations as they are currently occupied by tenants who will not benefit financially from the development and according to the socio-economic specialist, could possibly still perceive the proposed WEF in a negative light. In addition, some of these farmsteads could become potentially sensitive receptor locations in the future (Barbour, T and van der Merwe, S., September 2017). These receptors were thus not eliminated and were still regarded as potentially sensitive visual receptor locations for the purpose of this study.

Table 7: Visual impact of the proposed WEF development on sensitive and potentially sensitive visual receptors within the study area / visual assessment zone

Receptor Location	Distance	Screening	Visual Contrast	OVERALL IMPACT RATING
VR1	Low (1)	Moderate (2)	Moderate (2)	**MODERATE**
VR2	Low (1)	Moderate (2)	High (3)	**MODERATE**
VR3	Low (1)	Moderate (2)	High (3)	**MODERATE**
VR4	Moderate (2)	Low (1)	Moderate (2)	**MODERATE**
VR6	Low (1)	Moderate (2)	High (3)	**MODERATE**
VR9	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR10	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR11	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR13	Moderate (2)	Moderate (2)	Moderate (2)	**MODERATE**
VR17 - Smallholdings	Low (1)	Low (1)	Low (1)	**LOW**
VR19 – Noupoort Residential (west)	Moderate (2)	Low (1)	Low (1)	**LOW**
VR20 – Kwazamuxolo Residential	Moderate (2)	Low (1)	Low (1)	**LOW**
VR21 – Noupoort Golf Course	Low (1)	Moderate (2)	Low (1)	**LOW**
VR22 – Noupoort	Low (1)	Low (1)	Low (1)	**LOW**

Receptor Location	Distance	Screening	Visual Contrast	OVERALL IMPACT RATING
Residential (central)				
VR23	Low (1)	Moderate (2)	Low (1)	**LOW**
VR24	Low (1)	Moderate (2)	Low (1)	**LOW**
VR25	Low (1)	Moderate (2)	Low (1)	**LOW**
VR27	Low (1)	Moderate (2)	Low (1)	**LOW**
VR28 – The Dairy BnB	Low (1)	Moderate (2)	Moderate (2)	**MODERATE**
VR31	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR32	High (3)	Moderate (2)	Moderate (2)	**MODERATE**
VR33	Moderate (2)	Low (1)	High (3)	**MODERATE**
VR36 – Carlton Heights Lodge	Low (1)	Moderate (2)	Moderate (2)	**MODERATE**
VR51	N/A	Negligible	N/A	**NEGLIGIBLE**
VR52 – Middelburg Hang-gliding	Moderate (2)	High (3)	Moderate (2)	**MODERATE**

As indicated above, the proposed development would result in a moderate visual impact on majority of the potentially sensitive visual receptor locations with the study area / visual assessment zone (13 in total). The proposed development would also result in a moderate visual impact on both of the sensitive visual receptors identified within the study area / visual assessment zone, namely VR 28 – The Dairy BnB and VR 36 – Carlton Heights Lodge. It must be noted that the proposed development would not result in a high visual impact on any of the potentially sensitive visual receptors. In addition, the proposed development is expected to have a low visual impact on nine (9) of the potentially sensitive visual receptors. The proposed development would however result in a negligible visual impact on one (1) of the potentially sensitive receptors, namely VR 51. This is due to the fact that the viewshed analysis has shown that this receptor is located within an area in which the proposed wind turbines will not be visible. As such, the proposed WEF is expected to have an overall low to moderate visual impact.

*7.2.5 **POWER LINE RECEPTOR IMPACT RATING***

As previously mentioned, a few of the farmsteads / homesteads identified during the scoping phase were excluded as potentially sensitive receptor locations for the purposes of the EIA phase study as it was discovered during the time of the site visit that these were uninhabited and/or abandoned. No further assessment was undertaken from these abandoned farmsteads / homesteads as no

individuals currently live in these farmsteads / homesteads and therefore no visual impact will be experienced from these locations.

The impacts of each of the proposed 132kV Power Line Corridor Alternatives (i.e. Preferred Alternative, Alternative 1 and Alternative 2) on the sensitive and potentially sensitive visual receptors within the study area / visual assessment zone have been rated in **Table 8**, **Table 9** and **Table 10** below respectively.

Preferred Power Line Corridor Alternative:

Table 8: Visual impact of Preferred Power Line Corridor Alternative on sensitive and potentially sensitive visual receptors within the study area / visual assessment zone

Receptor Location	Corridor Option 1			OVERALL IMPACT RATING
	Distance	Screening	Visual Contrast	
VR9	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR10	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR11	Moderate (2)	Low (1)	Moderate (2)	**MODERATE**
VR45	Low (1)	Low (1)	Moderate (2)	**MODERATE**
VR46	Low (1)	Low (1)	Moderate (2)	**LOW**
VR47	Low (1)	Low (1)	High (3)	**MODERATE**
VR48	Low (1)	Low (1)	High (3)	**MODERATE**
VR49	High (3)	Moderate (2)	High (3)	**HIGH**
VR51	Low (1)	Moderate (2)	Moderate (2)	**MODERATE**
VR52 – Middelburg Hang-gliding	Low (1)	High (3)	Moderate (2)	**MODERATE**

With regards to Preferred Power Line Corridor Alternative, as indicated above, the proposed development would result in a moderate visual impact on majority of the potentially sensitive visual receptor locations with the study area / visual assessment zone (8 in total). It must be noted that the proposed development would result in a high visual impact on only one (1) of the potentially sensitive visual receptors, namely VR 49. In addition, the proposed development is also expected to have a low visual impact on only one (1) of the potentially sensitive visual receptors, namely VR 46. As previously mentioned, corridors were assessed with regards to the proposed 132kV power line and the final power line placement can be positioned away from any of the identified sensitive and/or potentially sensitive receptor locations and any other dwellings. In light of the above, the Preferred Power Line Corridor Alternative is expected to have an overall moderate visual impact.

Power Line Corridor Alternative 2:

Table 9: Visual impact of Power Line Corridor Alternative 2 on sensitive and potentially sensitive visual receptors within the study area / visual assessment zone

Receptor Location	Corridor Option 2			OVERALL IMPACT RATING
	Distance	Screening	Visual Contrast	
VR9	Moderate (2)	Low (1)	Moderate (2)	**MODERATE**
VR10	Moderate (2)	Low (1)	Moderate (2)	**MODERATE**
VR11	Low (1)	Low (1)	Moderate (2)	**LOW**
VR45	Low (1)	Low (1)	Moderate (2)	**LOW**
VR46	Low (1)	Low (1)	Moderate (2)	**LOW**
VR47	Low (1)	Low (1)	High (3)	**MODERATE**
VR48	Low (1)	Low (1)	High (3)	**MODERATE**
VR49	High (3)	Moderate (2)	High (3)	**HIGH**
VR51	Low (1)	Moderate (2)	Moderate (2)	**MODERATE**
VR52 – Middelburg Hang-gliding	Low (1)	High (3)	Moderate (2)	**MODERATE**

With regards to Power Line Corridor Alternative 2, as indicated above, the proposed development would result in a moderate visual impact on majority of the potentially sensitive visual receptor locations with the study area / visual assessment zone (6 in total). It must be noted that the proposed development would result in a high visual impact on only one (1) of the potentially sensitive visual receptors, namely VR 49. In addition, the proposed development is expected to have a low visual impact on three (3) of the potentially sensitive visual receptors, namely VR 11, VR 45 and VR 46. As previously mentioned, corridors were assessed with regards to the proposed 132kV power line and the final power line placement can be positioned well away from any of the identified sensitive and/or potentially sensitive receptor locations and any other dwellings. In light of the above, Power Line Corridor Alternative 2 is expected to have an overall moderate visual impact.

Power Line Corridor Alternative 1:

Table 10: Visual impact of Power Line Corridor Alternative 1 on sensitive and potentially sensitive visual receptors within the study area / visual assessment zone

Receptor Location	Corridor Option 3			OVERALL IMPACT RATING
	Distance	Screening	Visual Contrast	
VR9	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR10	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR11	High (3)	Low (1)	Moderate (2)	**MODERATE**
VR45	Low (1)	Low (1)	Moderate (2)	**LOW**
VR46	Low (1)	Low (1)	Moderate (2)	**LOW**

Receptor Location	Corridor Option 3			OVERALL IMPACT RATING
	Distance	Screening	Visual Contrast	
VR47	Low (1)	Low (1)	High (3)	**MODERATE**
VR48	Low (1)	Low (1)	High (3)	**MODERATE**
VR49	High (3)	Moderate (2)	High (3)	**HIGH**
VR51	Moderate (2)	Moderate (2)	Moderate (2)	**MODERATE**
VR52 – Middelburg Hang-gliding	Moderate (2)	High (3)	Moderate (2)	**MODERATE**

With regards to Power Line Corridor Alternative 1, as indicated above, the proposed development would result in a moderate visual impact on majority of the potentially sensitive visual receptor locations with the study area / visual assessment zone (7 in total). It must be noted that the proposed development would result in a high visual impact on only one (1) of the potentially sensitive visual receptors, namely VR 49. In addition, the proposed development is expected to have a low visual impact on two (2) of the potentially sensitive visual receptors, namely VR 45 and VR 46. As previously mentioned, corridors were assessed with regards to the proposed 132kV power line and the final power line placement can be positioned well away from any of the identified sensitive and/or potentially sensitive receptor locations and any other dwellings. In light of the above, Power Line Corridor Alternative 1 is expected to have an overall moderate visual impact.

7.3 Visual Modelling

In order to provide an indication of what the proposed WEF would look like from some of the sensitive and potentially sensitive receptor locations identified, visual models were created to strengthen the findings of the receptor impact ratings. An indicative range of locations were selected for modelling purposes to provide an indication of the possible impacts from different locations within the study area. The models illustrate how views from the each vantage point will be transformed by the proposed development if the wind turbines are erected on the site as proposed.

As mentioned above, the following assumptions and limitations are of relevance for the visual models:

- The visual models represent a visual environment that assumes all vegetative clearing will be restored to its current state after the construction phase. This is however, is an improbable scenario as some trees and shrubs may be removed which may reduce the accuracy of the models generated.

- At the time of this study the proposed project was still in its early planning stages. Therefore, the layout plans of the turbines, as provided by InnoWind may change. In addition, all infrastructure associated with the wind farm has been excluded from the models.

7.3.1 Vantage Point 1 - View towards the proposed Phezukomoya WEF turbine locations from the centre of the visual assessment zone (within the Phezukomoya WEF application site), within the High Visual Impact Zone

It should be noted that Vantage Point 1 is not considered to be a potentially sensitive receptor as the landowner has a vested interest in the WEF project. The visual model undertaken at this point has however been included in this report to provide an indication of the likely visibility of the proposed development from within 1km of the nearest turbine location.

Figure 54: Existing view (to the north-east) towards the proposed Phezukomoya WEF turbine locations from the centre of the visual assessment zone (within the Phezukomoya WEF application sire), approximately 0.5km from the nearest proposed turbine location

Figure 55: Visually modelled post-construction view (to the north-east) towards the proposed Phezukomoya WEF turbine locations from the centre of the visual assessment zone (within the Phezukomoya WEF application site), approximately 0.5km from the nearest proposed turbine location

As indicated in **Figure 55** above, the lack of vegetative screening factors in the area surrounding this point, as well as the very close proximity of the nearest proposed turbine, are expected to result in the proposed development being highly visible from this location or most locations within 1km of the turbines. The “koppie” / hill found to the north-east of this point is also not expected to provide screening from the proposed development from this location as the turbines will be placed on the top of this “koppie” / hill and will thus be highly visible from this location. The visible wind turbines would contrast moderately with the dominant natural landscape elements as there are existing power lines in view from this point.

7.3.2 Vantage Point 2 – View towards the proposed Phezukomoya WEF turbine locations from the farmstead / homestead at VR 11, within the High Visual Impact Zone

Figure 56: Existing view to the north-west (NW) from the farmstead / homestead at VR 11, towards the proposed Phezukomoya WEF turbine locations (approximately 1.8km from the nearest proposed turbine location).

Figure 57: Visually modelled post-construction view to the north-west (NW) from the farmstead / homestead at VR 11, towards the proposed Phezukomoya WEF turbine locations (approximately 1.8km from the nearest proposed turbine location).

As indicated in **Figure 57** above, the lack of significant screening factors in the area surrounding this point, as well as the very close proximity of the turbines, are expected to result in the proposed development being highly visible. It should however be noted that the farmstead / homestead at VR 11 is surrounded by a significant amount of tall trees and other vegetative screening factors which are expected to partially obscure view towards the turbines. In addition, the “koppie” / hill found to the north-west of this farmstead / homestead is not expected to provide screening from the proposed development as the turbines will be placed on the top of this “koppie” / hill and will thus be highly visible. The visible wind turbines would contrast moderately with the dominant natural landscape elements as there are existing power lines and other tall linear elements in view from this point.

7.3.3 Vantage Point 3 - View towards the proposed Phezukomoya WEF turbine locations from the farmstead / homestead at VR 4, within the Moderate Visual Impact Zone

Figure 58: Existing view to the east (E) from the farmstead / homestead at VR 4, towards the proposed Phezukomoya WEF turbine locations (approximately 4.9km from the nearest proposed turbine location).

Figure 59: Visually modelled post-construction view to the east (E) from the farmstead / homestead at VR 4, towards the proposed Phezukomoya WEF turbine locations (approximately 4.9km from the nearest proposed turbine location).

As indicated in **Figure 59** above, the lack of a significant screening factors in the area surrounding this point, as well as the relatively close proximity of the turbines, are expected to result in the proposed development being highly visible. It should however be noted that the farmstead / homestead at VR 4 is surrounded by a significant number of tall trees and other vegetative screening factors which are expected to partially obscure view towards the turbines. In addition, the "koppie" / hill found to the east of this farmstead / homestead is not expected to provide screening from the proposed development as the turbines will be placed on the top of this "koppie" / hill and will thus be highly visible. The visible wind turbines would contrast highly with the dominant natural landscape elements as there are no tall linear elements in view from this farmstead / homestead except for telephone poles, fence poles and windmills.

7.3.4 Vantage Point 4 - View towards the proposed Phezukomoya WEF turbine locations from VR 36 – Carlton Heights Lodge, within the Low Visual Impact Zone

Figure 60: Existing view to the north north-west (NNW) from VR 36 – Carlton Heights Lodge, towards the proposed Phezukomoya WEF turbine locations (approximately 5.2km from the nearest proposed turbine location).

Figure 61: Visually modelled post-construction view to the north north-west (NNW) from VR 36 – Carlton Heights Lodge, towards the proposed Phezukomoya WEF turbine locations (approximately 5.2km from the nearest proposed turbine location).

As indicated in **Figure 61** above, the general lack of significant screening factors in the area surrounding this point are expected to result in the proposed development highly visible to a degree. In addition, despite the relatively far proximity of the turbines, the proposed development is still expected to be visible to a degree from this sensitive receptor. It should however be noted that a series of tall trees can be to the north-east of the main guesthouse and are expected to provide a moderate amount of screening for views in that direction. These trees would thus partially obscure views towards the proposed development (**Figure 47**). In addition, the hills found to the north / north-west of this sensitive receptor are not expected to provide screening from the proposed development as the turbines will be placed on the top of the hills to the north and north-west and will thus be visible to a degree. The visible wind turbines would contrast moderately with the dominant natural landscape elements as there are existing power lines in view from this point.

7.3.5 Vantage Point 5 - View towards the proposed Phezukomoya WEF turbine locations from VR 28 – The Dairy BnB, within the Moderate Visual Impact Zone

Figure 62: Existing view to the south-west (SW) from VR 28 – The Dairy BnB, towards the proposed Phezukomoya WEF turbine locations (approximately 4.9km from the nearest proposed turbine location)

Figure 63: Visually modelled post-construction view to the south-west (SW) from VR 28 – The Dairy BnB, towards the proposed Phezukomoya WEF turbine locations (approximately 4.9km of the nearest proposed turbine location)

As indicated in **Figure 63** above, the relatively distant location of the turbines is expected to result in the proposed development only being partially visible from this sensitive receptor. In addition, this sensitive receptor is surrounded by a significant number of screening factors (such as tall trees and other vegetation) which are also expected to partially obscure view towards the proposed turbines. It should be noted that the hills found to the south-west / south south-west of this sensitive receptor are not expected to provide screening from the proposed development as the turbines will be placed on the top of these hills and will thus be visible. The visible wind turbines would contrast moderately with the dominant natural landscape elements as this sensitive receptor is located within close proximity to the town of Noupoort and the Noupoort Wind Farm and thus there are existing power lines and other tall linear elements in view from this point.

7.4 Night Time Impacts

The visual impact of lighting on the nightscape is largely dependent on the existing lighting present in the surrounding area at night. The night scene in areas where there are numerous light sources will be visually degraded by the existing light pollution and therefore additional light sources are unlikely to have a significant impact on the nightscape. In contrast, introducing light sources into a

relatively dark night sky will impact on the visual quality of the area at night. It is thus important to identify a night-time visual baseline before exploring the potential visual impact of the proposed WEF at night.

The area surrounding the proposed development site is largely uninhabited and as a result, few light sources are present. At night, much of the study area is characterised by a picturesque dark starry sky and the visual character of the night environment is considered to be mostly 'unpolluted' and pristine. The town of Noupoort is the main source of light within the surrounding area and is situated approximately 4.3km from the proposed development. This town is thus expected to have a limited impact on the night scene and will only impact the parts of the study area which are situated within close proximity to the town. In addition, other prominent light sources within the study area at night include the operational and security lighting at the Noupoort Wind Farm. Permanent aviation lights or hazard lights have been placed on the top of each wind turbine and have created a network of red lights in the dark night-time sky. As such, parts of the study area situated within close proximity to the town of Noupoort and the operational Noupoort Wind Farm have already seen some form of transformation / disturbance of the night environment. The night scene in these areas is thus not expected to be significantly impacted by the presence of the proposed WEF. It must be noted that The Dairy BnB (VR 28) is located within relatively close proximity to the town of Noupoort. The night scene in the vicinity of this receptor has thus already been impacted significantly. In addition, this receptor makes use of lighting at night for security reasons. Alternatively, the area surrounding Carlton Heights Lodge (VR 36) has maintained a largely natural / undisturbed character and is not characterised by a large amount of lighting. As such, the presence of the lighting at the Phezukomoya WEF is expected to significantly impact the night scene at this receptor location. Other sources of light are limited to isolated lighting from the few surrounding farmsteads / homesteads, transient light from trains travelling on the railway line and passing cars travelling along the N9 and N10 national routes and R389 gravel access road.

Operational and security lighting at night will be required for the proposed Phezukomoya WEF. In addition, a permanent aviation light or hazard light will be placed on the top of each wind turbine, which will create a network of red lights in the dark night-time sky. The type and intensity of lighting required was unknown at the time of writing this report and therefore the potential impact of the development at night has been discussed based on the general effect that additional light sources will have on the ambiance of the nightscape.

Although the area is not generally renowned as a tourist destination, the natural dark character of the nightscape will be sensitive to the impact of additional lighting at night. The operational and security lighting required for the proposed WEF is likely to intrude on the nightscape and create glare, which will contrast with the extremely dark backdrop of the surrounding area. In addition, the red hazard lights may be particularly noticeable as their colour will differ from the few lights typically found within the environment and the flashing will draw attention to them. These lights will however have a low intensity and will create less contrast than white lights typically would (Vissering, 2011).

7.5 Visual Impacts of Associated Infrastructure

7.5.1 Access Roads

Internal access roads with a maximum width of 14m are initially being proposed for the construction phase. This is however only temporary as the width of proposed internal access roads will be reduced to approximately 8m for maintenance purposes during the operational phase.

Roads are typically only associated with a visual impact if they traverse sloping ground on an aspect that is visible to the surrounding area. Considering that the proposed access roads are located on relatively flat terrain it is likely that the visual impact associated with upgrading these roads would be minimal. However, if these roads are not maintained correctly during the construction phase, construction vehicles travelling along the gravel access roads could expose surrounding farmsteads / homesteads to dust plumes.

7.5.2 Underground Cabling

As with the internal gravel access roads, the underground cabling (if required) will most likely be positioned to follow the internal access roads. The visual impact of this cabling would be very similar to roads in that the 'scar' associated with the cable could create a visual contrast with the largely natural vegetation on the site. This is due to the fact that vegetation will need to be removed in order to install the underground cabling. In addition, the vegetation which has been removed from these areas is expected to take a significant amount of time to re-establish, thus leaving a 'scar' in the landscape for a period of time. As with the access roads, it is recommended that where possible, all cables should avoid steeper slopes in order to preserve the natural visual integrity of the landscape. It is strongly recommended that all reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid, in order to reduce the potential for creating unnatural linear features in the environment. Local nurseries may need to be commissioned to cultivate the vegetation removed. In addition, erosion control measures should be employed to prevent the scarring from worsening with time.

7.5.3 Power Lines

As previously mentioned, the wind turbines will be connected to the proposed on-site substation using buried medium voltage cables. However, overhead power lines may also be used where a technical assessment of the proposed design suggests that they will be more appropriate, such as over rivers and gullies. It should be noted that two (2) medium voltage overhead power lines (approximately 3km and 5.6km in length) will connect the on-site switching stations with the above-mentioned on-site medium voltage/132kV substation. In addition the electricity generated from the

proposed Phezukomoya WEF will be fed into the national grid at the proposed Umsobomvu Main Transmission Substation (MTS) via a proposed 132kV power line. Power lines consist of a series of tall towers which make them highly visible. Power lines are not features of the natural environment, but are representative of anthropogenic transformation. Thus when placed in largely natural landscapes, they will be perceived to be highly incongruous in this setting. Conversely, the presence of other anthropogenic elements associated with the built environment, especially other power lines, may result in the visual environment being considered to be 'degraded' and thus the introduction of a new power line into this setting may be less of a visual impact than if there was no existing built infrastructure visible. As previously mentioned, there are several high voltage power lines located within study area which would lessen the visual contrast associated with the introduction of a new power line.

Power lines are anthropogenic elements that are typically found in the landscape, both in urban or industrial and in more natural rural settings. The visual impact of a power line would largely be related to the physical characteristics of the area, land use and the spatial distribution of potential receptors. When combining this with the distribution and likely value judgements of visual receptors, the visual impact of the proposed power line can be determined. In areas, where the power line would contrast with the surrounding area it may change the visual character of the landscape and be perceived negatively by visual receptors.

As mentioned above, the presence of other linear structures such as roads, railways and especially other power lines would influence the perception of whether a power line is a visual impact. Where existing power lines are present the visual environment would already be visually 'degraded' and thus the introduction of a new power line in this setting may be considered to be less of a visual impact than if no existing built infrastructure were visible.

7.5.4 On-site Substation

A new medium voltage/132kV on-site substation (approximately 180 000m^2) is being proposed (namely the Phezukomoya Substation) which will supply the generated electricity to the Eskom grid. In addition, two (2) on-site switching stations (approximately 10 000m^2) are also being proposed, along with the Umsobomvu MTS. In isolation, the substations may be considered to be visually intrusive; however, it must be assumed that the substations would be built to serve the needs of the power generated from the proposed WEF. Thus the substations would only be constructed if the proposed WEF was developed as well. The substations would likely form part of the proposed WEF complex, as viewed from the surrounding farmsteads / homesteads. Views of the substations would therefore be dwarfed by the large number of turbines that would be visible. As such, the substations are not expected to be associated with a significant visual impact, or even a measurable cumulative impact.

7.6 Overall Visual Impact Rating

The EIA Regulations (2014) requires that an overall rating for visual impact be provided to allow the visual impact to be assessed alongside other environmental parameters. The tables below present the impact rating for visual impacts associated with the proposed construction and operation of the proposed Phezukomoya WEF and the associated infrastructure (such as the on-site substation and power line). It should be noted that the literature review of the visual impact assessments which have been conducted for other renewable projects in the area was used in order to inform the mitigation measures which were provided in this EIA phase study.

7.6.1 Construction

Table 11: Rating of visual impacts of the proposed Phezukamoya WEF during construction

Impact Phase:							
Potential impact description: During the construction phase, large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to visual impacts associated with construction. The construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed site on gravel access roads are also expected to increase dust emissions. The increased traffic on these roads and the resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Surface disturbance during construction would also expose bare soil which could visually contrast with the surrounding environment. Additionally, temporary stockpiling of soil during construction may alter the landscape. Wind blowing over these disturbed areas could therefore result in dust which would have a visual impact.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	L	M	Negative	M	M	M
With Mitigation	M	L	M	Negative	M	M	M
Can the impact be reversed?			YES – the negative effects of construction will cease once construction is complete				
Will impact cause irreplaceable loss or resources?			YES – there will be marginal loss of resources				
Can impact be avoided, managed or mitigated?			YES – mitigation measures can reduce impacts				
Mitigation measures to reduce residual risk or enhance opportunities: ▪ Carefully plan to reduce the construction period. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.							

- Maintain a neat construction site by removing rubble and waste materials regularly.
- Make use of existing gravel access roads where possible.
- Ensure that dust suppression techniques are implemented on all access roads, especially those leading up steep slopes.

Table 12: Rating of visual impacts of the infrastructure associated with the Phezukamoya WEF during construction

Impact Phase:							
Potential impact description: During the construction of the 132kV overhead power line, underground cables, on-site switching station, access roads and building infrastructure, large construction vehicles and equipment could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptor locations to visual impacts associated with the construction phase. The construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed site on gravel access roads are also expected to increase dust emissions. The increased traffic on the gravel roads and the resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Surface disturbance during construction would also expose bare soil which could visually contrast with the surrounding environment. In addition, temporarily stockpiling soil during construction may alter the landscape and wind blowing over these disturbed areas could result in dust which would have a visual impact.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	L	M	Negative	M	M	M
With Mitigation	M	L	M	Negative	M	M	M
Can the impact be reversed?			YES – the negative effects of construction will cease once construction is complete				
Will impact cause irreplaceable loss or resources?			YES – there will be marginal loss of resources				
Can impact be avoided, managed or mitigated?			YES – mitigation measures can reduce impacts				
Mitigation measures to reduce residual risk or enhance opportunities: ▪ All reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid. ▪ Carefully plan to reduce the construction period. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Maintain a neat construction site by removing rubble and waste materials regularly. ▪ Make use of existing gravel access roads where possible. ▪ Ensure that dust suppression techniques are implemented on all access roads							

Table 13: Rating of cumulative visual impacts as a result of the Phezukomoya WEF in addition to the other renewable energy developments (including associated infrastructure) proposed nearby during construction

Impact Phase:							
Potential impact description: Cumulative visual impacts as a result of the construction of the Phezukomoya WEF in addition to the other renewable energy developments within a 35km radius of the Phezukomoya WEF. Large construction vehicles and equipment during the construction phase of the Phezukomoya WEF will contribute further to the alteration of the natural character of the study area and will also expose a greater number of visual receptors to visual impacts associated with the construction phase. The construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed Phezukomoya development site on gravel access roads are also expected to result in an increase in dust emissions in the greater area. The increased traffic on these roads and the dust plumes could create a greater visual impact within the greater area and may evoke more negative sentiments from surrounding viewers. Surface disturbance during construction of the Phezukomoya WEF would also result in a greater amount of bare soil being exposed which could result in a greater visual contrast with the surrounding environment. In addition, temporary stockpiling of soil during construction may alter the landscape further. Wind blowing over these disturbed areas could result in a greater amount of dust which would have a visual impact.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	H	Negative	M	H	M
With Mitigation	M	M	M	Negative	M	M	M
Can the impact be reversed?			YES – The impact is partly reversible. The negative effects of construction will cease once construction is complete				
Will impact cause irreplaceable loss or resources?			YES – there will be significant loss of resources				
Can impact be avoided, managed or mitigated?			YES – mitigation measures can reduce impacts				
Mitigation measures to reduce residual risk or enhance opportunities: ▪ Carefully plan to reduce the construction period. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Vegetation clearing should take place in a phased manner. ▪ Maintain a neat construction site by removing rubble and waste materials regularly. ▪ Make use of existing gravel access roads, where possible. ▪ Limit the number of vehicles and trucks travelling to and from the proposed Phezukomoya development site, where possible. ▪ Ensure that dust suppression techniques are implemented on all access roads.							

- Ensure that dust suppression is implemented in all areas where vegetation clearing has taken place.
- Ensure that dust suppression techniques are implemented on all soil stockpiles.
- Temporarily fence-off the construction sites (for the duration of the construction period).
- All reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid, where possible.
- It is not realistic to attempt to screen wind farms visually. Providing a means whereby they can be absorbed into the landscape is more feasible. This can be approached by making use of certain materials and finishes and by presenting the scheme to I&APs.
- Institute a rigorous planting regime around certain boundaries of the project site, the proposed substation, ancillary buildings, N10 and N9 transportation routes.
- Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism (namely sense of place, sense of history, sense of nature, sense of craft and sense of limits).

7.6.2 Operation

Table 14: Rating of visual impacts of the proposed Phezukamoya WEF during operation

Impact Phase:							
Potential impact description: During the operation phase, the proposed Phezukamoya WEF could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptor roads and locations, such as farmsteads / homesteads to visual impacts. The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Maintenance vehicles may need to access the WEF via gravel access roads and are expected to increase dust emissions in doing so. The increased traffic on these roads and the dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Security and operational lighting at the proposed WEF could result in light pollution and glare, which could be an annoyance to surrounding viewers							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	H	Negative	M	H	M
With Mitigation	M	M	M	Negative	M	H	M
Can the impact be reversed?	YES – if the WEF is decommissioned						
Will impact cause irreplaceable loss or resources?	YES – there will be marginal loss of resources						
Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts						

Mitigation measures to reduce residual risk or enhance opportunities:

- Medium-high visual impact zones should be viewed as zones where the number of turbines should be limited, where possible.
- No turbines should be placed within 500m of the N9, N10 and R389 provincial road.
- Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity.
- Turbines should be painted plain white, as this is a less industrial colour (Vissering, 2011). Bright colours or obvious logos should not be permitted.
- Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011).
- If required, turbines should be replaced with the same model, or one of equal height and scale. Repeating elements of the same height, scale and form can result in unity and lessen the visual impact that would typically be experienced in a chaotic landscapes made up of diverse colours, textures and patterns (Vissering, 2011).
- Light fittings for security at night should reflect the light toward the ground and prevent light spill.
- Ensure that dust suppression techniques are implemented on all access roads.

Table 15: Rating of visual impacts of the infrastructure associated with the Phezukomoya WEF during operation

Impact Phase:							
Potential impact description: The 132kV overhead power line, underground cables, on-site switching station, access roads and building infrastructure could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptors and roads to visual impacts. The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Maintenance vehicles may need to access the infrastructure associated with the WEF via gravel access roads and are expected to increase dust emissions in doing so. The increased traffic on these roads and the resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Security and operational lighting at the associated infrastructure could result in light pollution and glare, which could be an annoyance to surrounding viewers.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	M	Negative	M	H	M
With Mitigation	M	M	M	Negative	M	H	M
Can the impact be reversed?			YES – if the WEF and power lines and other infrastructure are decommissioned				
Will impact cause irreplaceable loss or resources?			YES – there will be marginal loss of resources				

Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts

Mitigation measures to reduce residual risk or enhance opportunities:

- Light fittings for security at the on-site switching station at night should reflect the light toward the ground and prevent light spill.
- Where practically possible, the operations and maintenance buildings should not be illuminated at night.
- Power lines should be aligned to run parallel to existing power lines and other linear infrastructure, if possible.
- Power lines should be aligned to avoid ridgelines and steep slopes, if possible.
- Cables should be buried underground where possible.
- The operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible.
- Ensure that dust suppression techniques are implemented on all access roads.
- Select the alternatives that will have the least impact on visual receptors.

Table 16: Rating of cumulative visual impacts of the Phezukomoya WEF in addition to the other renewable energy developments (including associated infrastructure) proposed nearby during operation

Impact Phase:

Potential impact description:

Cumulative visual impacts as a result of the operation of the Phezukomoya WEF in addition to the other renewable energy developments within a 35km radius of the Phezukomoya WEF. The Phezukomoya WEF development and its associated infrastructure could exert a visual impact by further altering the visual character of the surrounding area and exposing a greater number of sensitive visual receptor locations to visual impacts. The operation of the Phezukomoya WEF in addition to the other nearby renewable energy developments may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Maintenance vehicles may need to access the Phezukomoya WEF development and its associated infrastructure via gravel access roads and are expected to increase dust emissions in the surrounding area in doing so. The increased traffic on the gravel roads and the dust plumes could create a greater visual impact within the surrounding area and may evoke more negative sentiments from surrounding viewers. It should however be noted that the existing roads which can be found around the project site also appear to be gravel. As such, the gravel access roads are not expected to contribute significantly to the overall cumulative visual impact. Security and operational lighting at the Phezukomoya WEF development and its associated infrastructure could result in a greater amount of light pollution and glare within the surrounding area, which could be a significant annoyance to surrounding viewers.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	M	Negative	M	H	M

With Mitigation	M	M	M	Negative	M	H	M
Can the impact be reversed?			YES – if the WEF and power lines and other infrastructure are decommissioned				
Will impact cause irreplaceable loss or resources?			YES – there will be marginal loss of resources				
Can impact be avoided, managed or mitigated?			YES – mitigation measures can reduce impacts				

Mitigation measures to reduce residual risk or enhance opportunities:

- Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity.
- Medium-high visual impact zones should be viewed as zones where the number of turbines should be limited, where possible.
- Light fittings for security at night should reflect the light toward the ground (except for aviation lighting) and prevent light spill.
- The operations and maintenance buildings should not be illuminated at night, if possible.
- Turbines should be painted plain white, as this is a less industrial colour (Vissering, 2011). Bright colours or obvious logos should not be permitted.
- Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011).
- The operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible.
- If required, turbines should be replaced with the same model, or one of equal height and scale. Repeating elements of the same height, scale and form can result in unity and lessen the visual impact that would typically be experienced in a chaotic landscapes made up of diverse colours, textures and patterns (Vissering, 2011).
- As far as possible, limit the number of maintenance vehicles, which are allowed to access the sites.
- Bury cables under the ground where possible.
- Ensure that dust suppression techniques are implemented on all access roads.
- Select the alternatives that will have the least impact on visual receptors.
- It is not realistic to attempt to screen wind farms visually. Providing a means whereby they can be absorbed into the landscape is more feasible. This can be approached by making use of certain materials and finishes and by presenting the scheme to I&APs.
- Institute a rigorous planting regime around certain boundaries of the project site, the proposed substation, ancillary buildings, N10 and N9 transportation routes.
- Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism (namely sense of place, sense of history, sense of nature, sense of craft and sense of limits).

7.6.3 Decommissioning

Visual impacts during the decommissioning phase are potentially similar to those during the construction phase.

8 CUMULATIVE IMPACTS

Although it is important to assess the visual impacts of the proposed WEF itself, it is equally important to assess the cumulative visual impact that would materialise in the area as a result of the construction of the Phezukomoya WEF development in addition to the other renewable energy developments in the surrounding area. Cumulative impacts are the combined impacts from different developments / facilities which, in combination, result in significant impacts that may be larger than the sum of all the impacts combined. The addition of the Phezukomoya WEF is not expected to contribute to a greater visual impact than all of the other renewable energy developments combined and thus the construction of this WEF is not expected to result in an unacceptable overall visual impact. It should be noted that for the purpose of this cumulative impact assessment, it has been assumed that all of the other proposed renewable energy developments have already been constructed. This forms the cumulative baseline, against which the cumulative impact of the construction of the Phezukomoya WEF was assessed.

The relatively large number of renewable energy facilities within the surrounding area and their potential for large scale visual impacts could significantly alter the sense of place and visual character in the study area, as well as exacerbate the visual impacts on surrounding receptors. As previously mentioned, the height of the proposed development in combination with distance are critical factors when assessing visual impacts. It must be noted that for the purpose of this study, renewable energy developments within a 35km radius of the Phezukomoya WEF were identified and mapped (**Figure 64**).

The other proposed renewable energy developments identified are indicated in **Table 17** and **Figure 64** below. It should be noted that the South African Renewable Energy EIA Application Database (2017), as provided by Arcus, was used in order to source the information provided in the table below.

Table 17: Renewable energy developments proposed within a 35km radius of the Phezukomoya WEF

Development	Current status of EIA/development	Proponent	Capacity	Farm details
Sankraal Wind Energy Facility	EIA underway	Innowind (Pty) Ltd	390MW	▪ Remainder of the Farm Holbrook No. 181;

				▪ Portion 1 of the Farm Tweefontein No. 11; ▪ Remainder of Portion 13 the Farm Tweefontein No. 11; ▪ Portion 15 of the Farm Hartebeest Hoek No. 182; ▪ Portion 3 of the Farm Hartebeest Hoek No. 182; ▪ Portion 14 of the Farm Hartebeest Hoek No. 182; and ▪ Portion 46 of the Farm Hartebeest Hoek No. 182.
Umsobomvu Wind Energy Facility	EIA Approved	Innowind (Pty) Ltd	140MW	▪ Portion 1 of the Farm Klip Krands No. 60; ▪ Remainder of the Farm Holle Fountain No. 133; ▪ Portion 1 of the Farm Holle Fountain No. 133; ▪ Portion 3 of the Farm Holle Fountain No. 133; ▪ Remainder of the Farm Leeuw Hoek No. 61; ▪ Portion 2 of the Farm Leeuw Hoek No. 61; ▪ Portion 4 of the Farm Leeuw Hoek No. 61; ▪ Portion 6 of the Farm Leeuw Hoek No. 61; ▪ Portion 1 of the Farm Elands Kloof No. 135; ▪ Remainder of the Farm Elands Kloof No. 135; ▪ Remainder of the Farm Uitzicht No. 3;

				▪ Portion 2 of the Farm Uitzicht No. 3; ▪ Portion 3 of the Farm Uitzicht No. 3; ▪ Portion 4 of the Farm Utzicht No. 3; ▪ Portion 7 of the Farm Uitzicht No. 3; ▪ Portion 8 of the Farm Uitzicht No. 3; ▪ Remainder of the Farm Leuwe Kop No. 120; and ▪ Remainder of the Farm Winterhoek No. 136.
Noupoort Wind Farm	EIA Approved	Mainstream Renewable Power Noupoort (Pty) Ltd	214MW	▪ Remainder of the Farm No.168; ▪ Portion 1 of the Farm No. 181; and ▪ Portion 21 of the Farm No. 182.
De Aar Wind Energy Facility	EIA Approved	Mulilo Renewable Energy (Pty) Ltd	139MW	▪ Remainder of Portion 2 of the Farm Slingers Hoek No. 2; ▪ Remainder of the Farm Slingers Hoek No. 2; ▪ Portion 4 of the Farm Slingers Hoek No. 2; ▪ Portion 1 of the Farm Knapdaar No. 8; ▪ Portion 5 of the Farm Maatjes Fontain No. 1; ▪ Remainder of Portion 2 of the Farm Vendussie Kui No. 165; ▪ Portion 11 of the Farm Vedussie Kuil No. 165; and ▪ Remainder of the Farm Vendussie Kuil No. 165.

Naauw Poort Solar Energy Facility	EIA Approved	Naauw Poort Solar Energy (Pty) Ltd	75MW	▪ Remainder of Portion 1 of the Farm Naauw Poort No. 1.
Collet Solar PV Power Plant	EIA Approved	UNKNOWN	75MW	▪ The Farm Harmsfontein No. 335; ▪ The Farm Buffelspoort No. 33; and ▪ Remainder of the Farm Brakke Kuilen No. 180.
ACED Middelburg PV Solar Energy Facility (Middelburg Solar Park 1 and Middelburg Solar Park 2)	EIA Approved	African Clean Energy Developments (Pty) Ltd (ACED)	150MW (2 developments generating up to 75MW each)	▪ Remainder of the Farm Tweefontein No. 11; and ▪ Portion 4 of the Farm Tweefontein No. 11.
Klip Gat Solar Energy Facility	EIA Approved	Klip Gat Solar Energy (Pty) Ltd	75MW	▪ Portion 2 of the Farm Klip Gat No. 80.
Allemans Fontein Solar Energy Facility	EIA Approved	Allemans Fontein Solar Energy (Pty) Ltd	20MW	▪ The Farm Allemans Fontein No. 83.
PV Farms in Northern Cape	EIA Approved	Scatec Solar SA (Pty) Ltd	Between 10MW and 100MW	▪ The Farm Van der Linderskraal No. 79; ▪ The Farm New Kalkbult No. 181; ▪ Remainder of the Farm Taaiboschfontein No. 41; ▪ Remainder of Portion 1 of the Farm Van der Linderskraal; and ▪ Portion 3 of the Remainder of the Farm

				Van der Linderskraal No. 79.
Toitdale Solar Energy Facility	EIA Approved	UNKNOWN	10MW	▪ Portion 1 Of The Farm Caroluspoort No. 167
Kleinfontein Solar Energy Facility	EIA Approved	UNKNOWN	10MW	▪ Portion 4 Of The Farm Caroluspoort No. 167
Expansion of the PV Solar Facility in the Emthanjemi Local Municipality	EIA Approved	Simacel (Pty) Ltd	UNKNOWN	UNKNOWN
Baduflash Solar Project	EIA in Process	UNKNOWN	20MW	UNKNOWN
Aggeneys PV Solar Power Plant	EIA Approved	Orlight SA (Pty) Ltd	70MW	▪ Portion 1 of the Farm Aroams No. 57 RD
Inkululeko Solar Energy Facility	EIA Approved	UNKNOWN	20MW	▪ Portion 2 of The Farm Carolus Poort No. 167
19MW Solar Energy Facility on Remainder of the Farm Carolus Poort No. 207	EIA Approved	UNKNOWN	20MW	▪ Remainder of the Farm Carolus Poort No. 207
Dida Solar Energy Facility	EIA Approved	Dida Solar Energy (Pty) Ltd	20MW	▪ Portion 3 of the Farm Rietfontein No. 140.
Noupoort CSP Project	UNKNOWN	CRESCO Energy (Pty) Ltd	150MW	▪ Remainder of the Farm No. 207; ▪ Portion 1 of the Farm Carolus Poort No. 167; and ▪ Portion 4 of the Farm Carolus Poort No. 167.

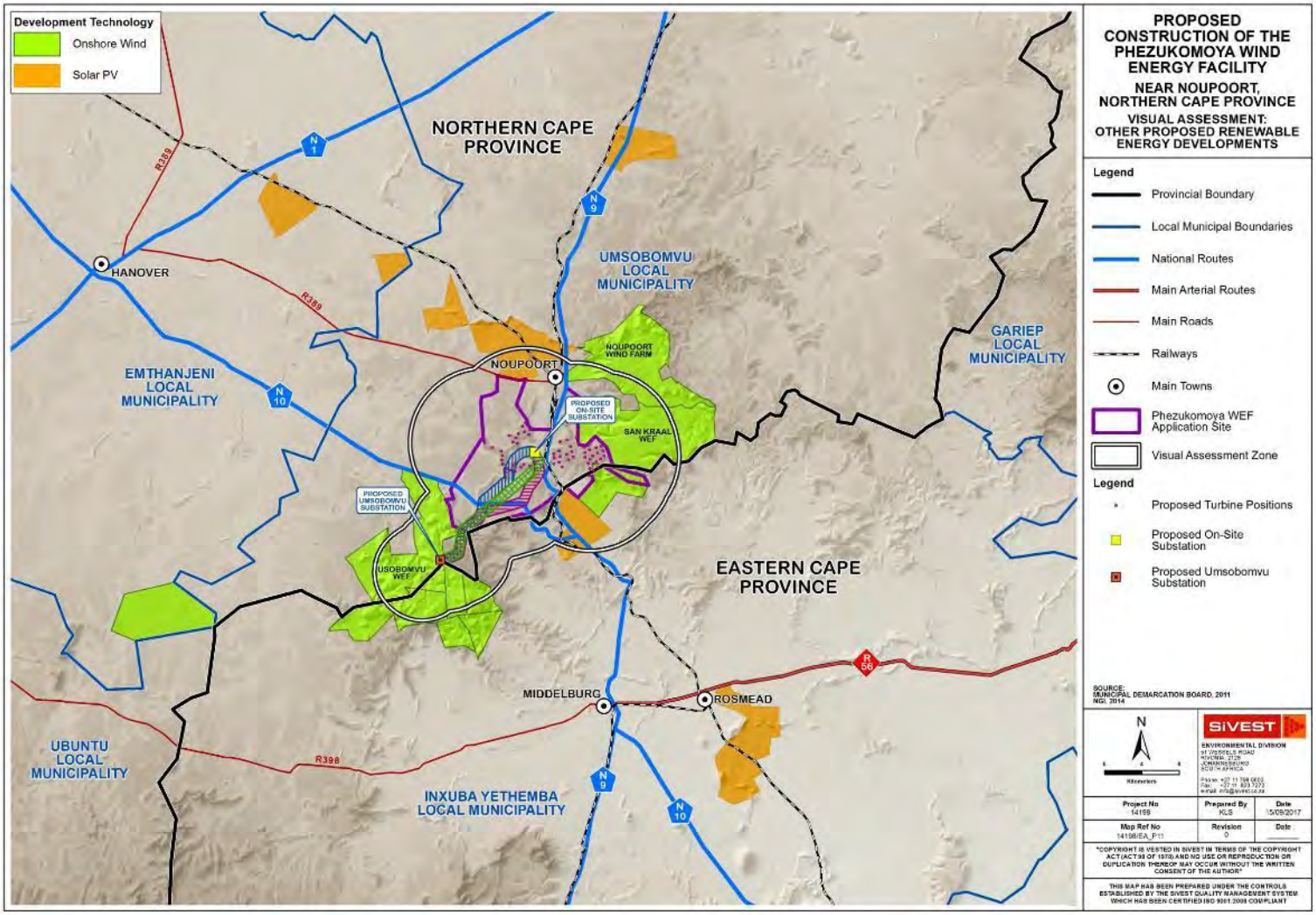


Figure 64: Renewable energy facilities proposed within a 35km radius of the Phezukomoya WEF

As indicated in **Figure 64,** the already operational Noupoort Wind Farm, two (2) proposed WEFs and two (2) proposed solar photovoltaic (PV) energy facilities are located with the visual assessment zone. The identified receptors will therefore experience visual impacts from the already operational Noupoort Wind Farm as well as further medium to low impacts should the Phezukomoya WEF also be constructed. Although the degree of visual impact would be considered to be insignificant from approximately 5km away from the proposed solar PV facilities these facilities would still impact cumulatively on some receptors as the solar PV facilities are located on the southern and northern boundary of the Phezukomoya WEF application site.

In addition to the cumulative impact that would be experienced by receptors in the area, the renewable energy facilities in the surrounding area will also impact on the pastoral visual character of the study area. The proposed Phezukomoya WEF, in combination with the already operational Noupoort Wind Farm and additional two (2) WEFs proposed within the study area, could therefore potentially be viewed as one (1) very large development which significantly alters the character of the area and impacts on receptors. However, as mentioned above, the newly established Noupoort Wind Farm has already introduced industrial-type elements into the landscape making the area less sensitive to change as a result of introducing further renewable energy facilities into the area.

The cumulative impacts anticipated as a result of the construction and operation of the proposed Phezukomoya WEF include visual impacts on users of arterial and secondary roads, the visual impacts on residents of farmsteads / homesteads and settlements, the visual impacts of shadow flicker on sensitive and potentially sensitive visual receptors, the visual impacts of lighting at night on sensitive and potentially sensitive visual receptors, the visual impacts of construction and operation on sensitive and potentially sensitive visual receptors and the visual impacts on the visual quality of the landscape and sense of place. In addition to the other renewable energy developments in the surrounding area, the Phezukomoya WEF development and its associated infrastructure could exert a greater visual impact within the surrounding area by further altering the visual character, thereby exposing a greater number of sensitive visual receptor locations to visual impacts. The operation of the Phezukomoya WEF in addition to the other nearby renewable energy developments may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Large construction vehicles and equipment during the construction phase of the Phezukomoya WEF will contribute further to the alteration of the natural character of the study area and will also expose a greater number of visual receptors to visual impacts associated with the construction phase. The construction activities may thus also be perceived as a further unwelcome visual intrusion, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed Phezukomoya development site on gravel access roads are also expected to result in an increase in dust emissions in the greater area. The increased traffic on these roads and the dust plumes could create a greater visual impact within the greater area and may evoke more negative sentiments from surrounding viewers. It should however be noted that the existing roads which can be found around the project site also appear to be gravel. As such, the gravel access roads are not expected to contribute significantly to the overall cumulative visual impact. Surface disturbance during construction of the Phezukomoya WEF would also result

in a greater amount of bare soil being exposed which could result in a greater visual contrast with the surrounding environment. In addition, temporary stockpiling of soil during construction may alter the landscape further. Wind blowing over these disturbed areas could result in a greater amount of dust which would have a visual impact. It should however be noted that mitigation measures will be put in place during the construction and operation phases respectively in order to control dust and thus this is not expected to have a significant visual impact. Security and operational lighting at the Phezukomoya WEF development and its associated infrastructure could also result in a greater amount of light pollution and glare within the surrounding area, which could be a significant annoyance to surrounding viewers. The significance of the above-mentioned visual impacts were however only found to range from medium to low and thus the impact of the Phezukomoya WEF, in addition to the other renewable energy developments in the surrounding area, is not significant enough to result in the cumulative visual impact being considered unacceptable. Additionally, mitigation measures will be put in place during the construction and operations phases respectively in order to ensure that the proposed development will not result in significant visual impacts.

Table 13 and **Table 16** in **Section 7.6** detail the significance of the anticipated cumulative impacts during the construction and operation of the proposed Phezukomoya WEF. Mitigation measures have also been proposed in order to reduce the anticipated cumulative visual impacts to acceptable levels.

It should be noted that a literature review of visual impact assessments / studies for the other renewable energy developments (both solar and wind) proposed within a 35km radius of the proposed Phezukomoya WEF was undertaken to assist in determining the impact of adding the proposed development to the cumulative baseline. Some of the application sites are at a very advanced stage, and the initial studies were undertaken in 2012 and are therefore no longer publically available. In addition, visual impact assessments / studies could not be sourced for all of the other nearby renewable energy developments proposed and thus some visual studies were omitted from the literature review. The information (including visual impact specialist studies, EIA / Scoping and EMPr Reports) that could be obtained for the surrounding proposed renewable energy sites that were taken into account are shown in **Table 18** below.

Table 18 is however only a summary table which details the final significance ratings of the visual impact assessments / studies which were undertaken for the other nearby renewable energy developments. A more detailed table (i.e. **Table 20**), which includes the relevant impacts which were taken into consideration, proposed mitigation measures and significance rating of the impacts after mitigation, has been provided in **Appendix C** of this VIA and can be used should more information be required about the other renewable energy developments being proposed nearby.

Table 18: Literature Review - Summary of Final Significance Ratings of Other Visual Impact Assessments / Studies Undertaken for the Other nearby Proposed Renewable Energy Developments

Project	EAP / VIA Specialist / Company that completed Impact Assessment	Impacts Significance Rating after Mitigation
Sankraal Wind Energy Facility	Andrea Gibb, Stephan Jacobs and Kerry Schwartz of SiVEST Environmental Division	1) Medium negative; 2) Medium negative; 3) Medium negative; 4) Medium negative; 5) Medium negative; and 6) Medium negative.
Umsobomvu Wind Energy Facility	Rosalie Evans of EOH Coastal & Environmental Services	▪ **Visual Assessment Point 1** = Low; ▪ **Visual Assessment Point 2** = Moderate; ▪ **Visual Assessment Point 3** = Low; ▪ **Visual Assessment Point 4** = Low; ▪ **Visual Assessment Point 5** = Low; ▪ **Visual Assessment Point 6** = Low; and ▪ **Visual Assessment Point 7** = Low. Overall, it is concluded that for all view points, the impact is: ▪ LOW, where the impact should have an influence on the decision unless it is mitigated.
Noupoort Wind Farm	Paul da Cruz of SiVEST Environmental Division	1) Low negative.
De Aar Wind Energy Facility	Karen Hansen (Landscape Architect)	**1) <u>Construction Phase:</u>** ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ Low;

		▪ Low; ▪ Low; ▪ Low; ▪ Low; and ▪ Moderate. **2) <u>Operational Phase:</u>** ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ High; ▪ High; and ▪ Moderate. **3)** The cumulative visual impact is assessed as **<u>MEDIUM</u>**.
75MW Naauw Poort Solar Energy Facility	Jacques Louis Volschenk of Zone Land Solutions	1) Low; 2) Low; 3) Low; 4) Low; and 5) Low.
Klip Gat Solar Energy Facility	Nkosinathi Tomose of Zone Land Solutions	1) Low; 2) Medium; 3) Low; 4) Low; and 5) Low.
Allemans Fontein Solar Energy Facility	Johan Claassen of Zone Land Solutions	1) Low; 2) Low; and 3) Medium.
Aggeneys PV Solar Power Plant	UNKNOWN	1) Medium-low
Dida Solar Energy Facility	GCS	1) Low; 2) Low; 3) Low; and 4) Low.
Noupoort CSP Project	Jon Marshall of Afzelia Environmental Consultants and Environmental Planning and Design	1) Low (neutral or negative); 2) Low (neutral); 3) Low (neutral); 4) Medium (negative to neutral); 5) Medium (neutral); 6) Low (negative to neutral); 7) Low (negative to neutral);

		8) Low (neutral. If the lights are generally not visible then the occasional light is unlikely to be seen as negative); 9) Low (negative); 10) Low (negative); 11) Low (neutral); 12) Low (neutral); 13) Medium (negative to neutral); 14) Medium (neutral); 15) Medium (negative to neutral); 16) Medium (negative to neutral); 17) Low (neutral); and 18) Low (negative).

In terms of the literature review undertaken on the above visual specialist reports, it can be noted that almost all of the specialist studies found the renewable energy facilities to result in low to medium visual impacts. The only exception is for the De Aar Wind Energy Facility, which identified high visual impacts for the operational phase. This is however the only high visual impact which was identified in the review specialist studies. As such, the findings of the other specialist studies identified similar visual impacts for each of the other nearby renewable energy developments mentioned above. In addition, the visual impact assessment undertaken for the proposed Phezukomoya WEF has provided recommendations and/or mitigation measures which are similar or in-line with those recommended in the other visual specialist studies and which will aid in reducing the significance of the anticipated visual impacts (including cumulative visual impacts). The other visual impact assessments which were reviewed have also provided similar recommendations and/or mitigation measures to this report (refer to **Table 20** in **Appendix C**). As such, the addition of the Phezukomoya WEF is not expected to contribute to a greater visual impact than all of the other renewable energy developments combined and the recommendations and/or mitigation measures provided in this VIA report are considered to be sufficient to reduce the visual impacts experienced within the study area. It should be noted that specific recommendations and/or mitigation measures which have not been considered in this VIA will be considered and implemented in this report accordingly, should they be deemed necessary. Should all of the suggested recommendations and/or mitigation measures be implemented, it is anticipated that the visual impacts associated with the renewable energy developments within the surrounding area could be mitigated to acceptable levels. This will also reduce the significance of the identified visual impacts and will aid in reducing the cumulative impacts experienced. With the correct mitigation and integrating planning, the significance rating of the cumulative impacts will be moderate to low due to the nature of the study area. It is important to note that it was not possible to quantify and indicate the size of the identified cumulative impacts from a visual perspective as visual impacts extend beyond the boundaries of the site and are also largely subjective, based on the viewer's perceptions. Despite this, this VIA is deemed to have adequately defined, identified and assessed

the cumulative visual impacts which could arise as a result of the development of the other renewable energy developments (both wind and solar) being proposed and/or constructed within a 35km radius of the Phezukomoya WEF.

Based on the literature review of the other visual specialist studies, some additional recommendations and/or mitigation measures should be considered for the proposed Phzekomoya WEF. With regards to the VIA undertaken for the Noupoort Wind Farm, it was recommended that the areas on the site associated with the greatest potential visual exposure be maintained as exclusion zones in which no turbines or as few turbines as possible are placed. Turbines placed in these buffer zones will be responsible for the most significant visual impacts associated with the proposed development. It was thus recommended that consideration be given to removing turbines from these buffer zones. Based on the findings of the field-based investigation for this VIA, it was advised that none of the proposed turbines preferably be placed within the "medium-high" visual impact zones and that these areas be avoided as far as practically possible. However, as the study area as a whole is rated as having a moderately-low visual sensitivity, these zones are not considered areas of high visual sensitivity or no go areas, but rather should be viewed as zones where the number of turbines should be limited, where possible as the turbines will still be highly visible. As such, this recommendation / mitigation measure is considered to have been adequately addressed. According to the VIA undertaken for the De Aar WEF, it is not realistic to attempt to screen wind farms visually and providing a means whereby they can be absorbed into the landscape is more feasible. This can be approached by making use of certain materials and finishes and by presenting the scheme to Interested and Affected Parties (I&APs). Additionally, the VIA undertaken for the 75MW Naauw Poort Solar Energy Facility recommended the institution of a rigorous planting regime around certain boundaries of the project site, the proposed substation, ancillary buildings, N10 and N9 transportation routes. It was also recommended that buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism (namely sense of place, sense of history, sense of nature, sense of craft and sense of limits). In light of the above, the above-mentioned mitigation measure/recommendation should also be considered for the proposed Phezukomoya WEF as this will aid in reducing the visual impact (including cumulative visual impact) of the proposed development.

Based on the literature review, this VIA is deemed to have clearly defined the identified cumulative impacts, and has indicated how the recommendations, mitigation measures and conclusions of the other visual impact specialist reports have been taken into consideration when drafting this VIA report. Additionally, the cumulative impact assessment found that the cumulative impact of the proposed Phezukomoya WEF would not significantly affect the surrounding area from a visual perspective. The anticipated cumulative impact could also be reduced to a medium significance after the implementation of appropriate mitigation measures. As such, the addition of the Phezukomoya WEF is not expected to contribute to a greater visual impact than all of the other renewable energy developments combined and therefore the construction of this WEF is not expected to result in an unacceptable overall visual impact.

9 COMPARATIVE ASSESSMENT OF ALTERNATIVES

As previously mentioned, three (3) power line route alternatives are being assessed during the EIA phase of the proposed development.

The preference rating for each alternative is provided in **Table 19** 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 a relatively high visual impact / increase the visual impact), favourable (the visual impact will be relatively insignificant) and no-preference (each alternative would result in an equal visual impact).

The degree of visual impact of each alternative has been determined based on the following factors:

- The location of the power line in relation to areas of high elevation, especially ridges, koppies or hills;
- The location of the power line in relation to sensitive receptor locations; and
- The location of the power line in relation to areas of natural vegetation (clearing a strip of vegetation under the power line servitude worsens the visibility).

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Table 19: Comparative Assessment of Alternatives

Alternative	Preference	Reasons (incl. potential issues)
132KV ON-SITE IPP SUBSTATION ALTERNATIVES		
Preferred Alternative	Not preferred	No sensitive visual receptor locations can be found within 5km of this power line corridor alternative. Ten (10) potentially sensitive receptor locations can however be fund within 5km of this power line alternative). Three (3) of the potentially sensitive visual receptor locations (namely VR 9, VR 10 and VR 49) can be found within 500m of this power line corridor alternative, within the high impact zone. In addition, one (1) potentially sensitive

Alternative	Preference	Reasons (incl. potential issues)
		receptor locations (namely VR 11) can be found within 2km of this alternative, within the moderate impact zone. The remaining six (6) potentially sensitive visual receptor locations can be found within 5km of this alternative, within the low impact zone. According to the receptor impact rating which was undertaken for this power line corridor alternative (**section 7.2.5**), majority of the potentially sensitive receptor locations (8 in total) will have a moderate overall impact rating. Only VR 49 is expected to have a high overall impact rating, while VR 46 will have a low overall impact rating. Due to the fact that Preferred Alternative is located within 500m of three (3) potentially sensitive receptor locations and will result in a moderate overall impact rating on eight (8) of the potentially sensitive receptor locations, this power line corridor alternative is not preferred from a visual perspective. It should be noted that corridors were assessed with regards to the proposed 132kV power line and the final power line placement can be positioned well away from any of the identified sensitive and/or potentially sensitive receptor locations and any other dwellings, according to building restrictions and Eskom setbacks for such lines.

Alternative	Preference	Reasons (incl. potential issues)
Alternative 1	Not preferred	No sensitive visual receptor locations can be found within 5km of this power line corridor alternative. Ten (10) potentially sensitive receptor locations can however be fund within 5km of this power line alternative). Four (4) of the potentially sensitive visual receptor locations (namely VR 9, VR 10, VR 11 and VR 49) can be found within 500m of this power line corridor alternative, within the high impact zone. In addition, two (2) potentially sensitive receptor locations (namely VR 51 and VR 52) can be found within 2km of this alternative, within the moderate impact zone. The remaining four (4) potentially sensitive visual receptor locations can be found within 5km of this alternative, within the low impact zone. According to the receptor impact rating which was undertaken for this power line corridor alternative (**section 7.2.5**), majority of the potentially sensitive receptor locations (7 in total) will have a moderate overall impact rating. Only VR 49 is expected to have a high overall impact rating, while two (2) of the potentially sensitive receptor locations (namely VR 45 and VR 46) will have a low overall impact rating. Due to the fact that Alternative 1 is located within 500m of four (4) potentially sensitive receptor locations and will result in a moderate overall impact rating on

Alternative	Preference	Reasons (incl. potential issues)
		seven (7) of the potentially sensitive receptor locations, this power line corridor alternative is not preferred from a visual perspective. It should be noted that corridors were assessed with regards to the proposed 132kV power line and the final power line placement can be positioned well away from any of the identified sensitive and/or potentially sensitive receptor locations and any other dwellings, according to building restrictions and Eskom setbacks for such lines.
Alternative 2	Preferred	No sensitive visual receptor locations can be found within 5km of this power line corridor alternative. Ten (10) potentially sensitive receptor locations can however be found within 5km of this power line alternative). Only one (1) of the potentially sensitive visual receptor locations (namely VR 49) can be found within 500m of this power line corridor alternative, within the high impact zone. In addition, two (2) potentially sensitive receptor locations (namely VR 9 and VR 10) can be found within 2km of this alternative, within the moderate impact zone. The remaining seven (7) potentially sensitive visual receptor locations can be found within 5km of this alternative, within the low impact zone. According to the receptor impact rating which was undertaken for this power line corridor alternative (**section 7.2.5**), majority of the

Alternative	Preference	Reasons (incl. potential issues)
		potentially sensitive receptor locations (6 in total) will have a moderate overall impact rating. Only VR 49 is expected to have a high overall impact rating, while three (3) of the potentially sensitive receptor locations (namely VR 11, VR 45 and VR 46) will have a low overall impact rating. Due to the fact that Alternative 2 is located within 500m of only one (1) potentially sensitive receptor location and will result in a moderate overall impact rating on only (6) of the potentially sensitive receptor locations, this power line corridor alternative is the preferred option from a visual perspective. It should be noted that corridors were assessed with regards to the proposed 132kV power line and the final power line placement can be positioned well away from any of the identified sensitive and/or potentially sensitive receptor locations and any other dwellings, according to building restrictions and Eskom setbacks for such lines.

10 CONCLUSION

An EIA-level study has been conducted in order to identify the potential visual impact and issues related to the development of the proposed Phezukomoya WEF near Noupoort in the Northern Cape Province, as well as to assess the magnitude and significance of the visual impacts associated with the development of the Phezukomoya WEF. Although majority of the study area has a largely rural or pastoral, untransformed visual character, it is characterised by the presence of typical rural / pastoral infrastructure and is not typically valued or utilised for its tourism

significance. In addition, the study area is characterised by the presence of human transformation / disturbance in the vicinity of the town of Noupoort. The areas surrounding this town are considered to have an urban / built up / industrial visual character and have seen a significant amount of transformation / disturbance over the years. These areas will thus not be significantly impacted by the visual impacts associated with the proposed Phezukomoya WEF. In addition, the presence of the Noupoort Wind Farm (which is currently operational) has also already brought an element of transformation / disturbance to the surrounding area and has altered the visual character and baseline in the study area to some degree. The rest of the study area / visual assessment zone has seen limited transformation / disturbance and is considered to be largely natural / scenic. These undisturbed / natural areas will therefore be impacted to a degree from a visual perspective as a result of the development of the proposed WEF. It should also be noted that there are several renewable energy developments (solar and wind) being proposed and/or constructed within relatively close proximity of the proposed WEF. These facilities and their associated infrastructure, will significantly alter the visual character and baseline in the study area once constructed and make it appear to have a more industrial-type visual character. Due to the dominant livestock rearing practices and relatively limited human habitation in the surrounding area, only two (2) sensitive visual receptors were identified within the study area, namely VR 28 – The Dairy BnB and VR 36 – Carlton Heights Lodge. It was however ascertained that the proposed WEF development is likely to visually impact twenty-three (23) farmsteads / homesteads identified within the visual assessment zone. These farmsteads / homesteads are used to house the local farmers as well as their farm workers and are thus regarded as potentially sensitive visual receptor locations, as the impact on them would be subjective and is relative to the perceptions of the viewer. In many cases, roads along which people travel, are regarded as sensitive receptors. Potentially sensitive receptor roads which were identified within the study area include the N9 national route, the N10 national route and the R389 provincial (un-surfaced) road that runs from Noupoort in a westerly direction providing a link to the N1 and the town of Hanover.

Upon further investigation, it was established that the proposed Phezukomoya WEF would have a moderate visual impact on thirteen (13) of the potentially sensitive visual receptor locations. The proposed development would also result in a moderate visual impact on both of the sensitive visual receptors, namely VR 28 – The Dairy BnB and VR 36 – Carlton Heights Lodge. It must be noted that the proposed development would not result in a high visual impact on any of the potentially sensitive visual receptor locations. In addition, the proposed development is expected to have a low visual impact on nine (9) of the potentially sensitive visual receptors. The proposed development would however result in a negligible visual impact on one (1) of the potentially sensitive receptors, namely VR 51.

An overall impact rating was also conducted in order to allow the visual impact to be assessed alongside other environmental parameters. The impact rating revealed that overall the proposed Phezukomoya WEF is expected to have a **medium negative** visual impact rating during both construction and operation, with relatively few mitigation measures available. In addition, the infrastructure associated with the proposed Phezukomoya WEF would also have a medium

negative visual impact rating during both construction and operation. The significance of the cumulative impacts associated with the proposed Phezukomoya WEF in addition to the other renewable energy developments proposed nearby were also rated according to the significance rating methodology. The impact assessment revealed that the cumulative visual impacts of the Phezukomoya WEF in addition to the other renewable energy developments (including associated infrastructure) proposed nearby would have a **medium negative** visual impact rating during both construction and operation.

As part of the VIA, the three (3) proposed power line corridor alternatives were comparatively assessed. The comparative assessment of alternatives subsequently revealed that Power Line Corridor Alternative 2 is the preferred option from a visual perspective. This is due to the fact that it is located within 500m of only one (1) potentially sensitive receptor location and will result in a moderate overall impact rating on only (6) of the potentially sensitive receptor locations.

Overall it can be concluded that the visual impact of the proposed Phezukomoya WEF would not be significant enough to prevent the project from proceeding due to the lack of sensitive visual receptors present. However, it is expected that the proposed development would alter the largely natural / scenic character of the study area and contrast moderately with the typical land use and/or pattern and form of human elements present. As previously mentioned, several renewable energy developments (both wind and solar) are being proposed within a 35km radius of the proposed Phezukomoya WEF. These renewable energy developments would reduce the overall natural / scenic character of the study area, however they would increase the cumulative visual impacts, should some or all of these developments be constructed. A cumulative impact assessment, including a literature review of other other visual impact assessments / studies conducted for the other renewable energy developments being proposed and/or constructed in the area, was undertaken. The cumulative impact assessment found that the proposed Phezukomoya WEF would not significantly affect the surrounding area from a visual perspective. The anticipated cumulative impact could also be reduced to either a **medium or low significance** after the implementation of appropriate mitigation measures. As such, the addition of the Phezukomoya WEF is not expected to contribute to a greater visual impact than all of the other renewable energy developments combined and therefore the construction of this WEF is not expected to result in an unacceptable overall visual impact. The literature review revealed that the findings of the other specialist studies identified similar visual impacts for each of the other nearby renewable energy developments mentioned above. In addition, the mitigation measures and recommendations provided in this report are similar to those identified in the other visual impact assessments / studies and are therefore deemed to be acceptable. A few additional recommendations and/or mitigation measures included in the other visual specialist assessments have been considered and implemented in this report in order to ensure that all visual impacts are adequately investigated and addressed.

10.1 Visual Impact Statement

It is SiVEST's opinion that the visual impacts identified in this VIA are not significant enough to prevent the project from proceeding and that an EA should be granted. From a visual impact perspective, only two (2) visually sensitive receptors with tourism significance have been identified within the study area, namely VR 28 – The Dairy BnB and VR 36 – Carlton Heights Lodge. A total number of twenty-three (23) potentially sensitive visual receptors were however identified. These included scattered farmsteads / homesteads which house the local farmers as well as their farm workers. These dwellings are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these dwellings. In addition, the proposed development is expected to alter the largely natural / scenic character of the study area and contrast moderately with the typical land use and/or pattern and form of human elements present as the study area is largely natural / scenic and untransformed. This is however not true for the areas within close proximity of the town of Noupoort and the operational Noupoort Wind Farm. These areas have seen a significant amount of transformation / disturbance over the years and are considered to have an urban / built up / industrial visual character. The visual impact of the proposed development on the sensitive visual receptor locations identified (namely VR 28 and VR 36) was rated as being moderate. In addition, the proposed Phezukomoya WEF would have a moderate visual impact on thirteen (13) of the potentially sensitive visual receptor locations, a low visual impact on nine (9) of the potentially sensitive visual receptors and a negligible visual impact on one (1) of the potentially sensitive visual receptors. In light of the above, SiVEST is of the opinion that the impacts associated with the construction and operation phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented. It is therefore recommended that all mitigation measures provided in **Section 7.6** should be included in the EMPr.

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Appendix A

IMPACT RATING METHODOLOGY

AN INNOVATIVE APPROACH TO STRUCTURING ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

Part 2: Ranking the Significance of Environmental Aspects and Impacts

By: T. Hacking

Anglo American plc

(Currently Environmental Manager at Konkola Copper Mines plc, Zambia)

Abstract

This paper (Part 2) describes a qualitative/ semi-quantitative approach to assessing the significance of environmental aspects and environmental impacts. The approach is intended as a tool for use together with the general framework presented in Part 1.

INTRODUCTION

Owing to the complexity of many of the systems that need to be considered when undertaking an Environmental Impact Assessment (EIA), it is not always possible to obtain quantitative data on which to base the impact assessment. Therefore, it is often necessary to use qualitative or semi-quantitative methods to determine the significance of environmental impacts.

The significance ranking approach presented in this paper is intended as a tool for use together with the general framework presented in Part 1 and is the final step in completing the structured and systematic approach. In Part 1 it was shown how environmental impacts can be linked to the project activities via the responsible "mechanisms", which are defined as *environmental aspects* in the ISO 14 000 series of standards. It was explained that significant impacts would only be present if significant aspects are present. Hence, a method for ranking the significance of aspects is required. Once the significance aspects have been identified, it is necessary to rank the significance of the impacts that could result form them.

SIGNIFICANCE OF ENVIRONMENTAL ASPECTS

The significance of environmental aspects can be determined and ranked by considering the criteria presented in Table 1. In some cases it may be necessary to undertake the impact assessment to determine whether a particular aspect is significant. Therefore, a fair degree of iteration is unavoidable during the assessment process.

Table 1 – Criteria used to determine the significance of environmental aspects

Significance Ranking	Negative Aspects	Positive Aspects
H (High)	Will always/often exceed legislation or standards. Has characteristics that could cause significant negative impacts.	Compliance with all legislation and standards. Has characteristics that could cause significant positive impacts.
M (Moderate)	Has characteristics that could cause negative impacts.	Has characteristics that could cause positive impacts.
L (Low)	Will never exceed legislation or standards. Unlikely to cause significant negative impacts.	Will always comply with all legislation and standards. Unlikely to cause significant positive impacts.

The aspect identification and ranking process is largely a screening exercise whereby the aspects that do not have the potential to cause significant impacts are eliminated. Aspects ranked "high" and "moderate" are significant and the possible impacts associated with their presence will need to be determined. Aspects ranked "low" do not warrant further attention.

The significance of the aspects should be ranked on the assumption that the management recommended in the EIA will be in place i.e. *with management*. This represents the scenario that the proponent wishes to have considered for approval. The environmental aspects associated with the proposed project activities during the construction, operational, closure phases (where appropriate) need to be identified. The influence of various project alternatives on the significance of the aspects must also be considered.

It may be desirable to also undertake a *without management* aspect ranking, since this highlights the sensitivity of the key risk areas to management and, hence, the management priorities. However, the dilemma in such an exercise is deciding on how much management to include. In the case of a mining project, for example, does one assume that the tailings dam will be completely absent or merely operated poorly? A useful rule of thumb is to assume that all the management required for operational reasons will be in place, but that any management specifically for environmental control will be absent. The danger in presenting *without management* ranking scenario in an EIA report is that it does not represent the scenario that the proponent wishes to have approved.

SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

Where significant environmental aspects are present ("high" or "moderate"), significant environmental impacts ***may*** result. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

Severity of Impacts

Table 2 presents the ranking criteria that can used to determine the severity of impacts on the bio-physical and socio-economic environment. Table 3 provides additional ranking criteria for determining the severity of negative impacts on the bio-physical environment.

Table 2 – Criteria for ranking the *Severity* of environmental impacts

Type of Criteria	Negative			Positive		
	H-	M-	L-	L+	M+	H+
Qualitative	Substantial deterioration. Death, illness or injury.	Moderate deterioration. Discomfort.	Minor deterioration. Nuisance or minor irritation.	Minor improvement.	Moderate improvement.	Substantial improvement.
Quantitative	Measurable deterioration.		Change not measurable i.e. will remain within current range.		Measurable improvement.	
	Recommended level will often be violated.	Recommended level will occasionally be violated.	Recommended level will never be violated.		Will be within or better than recommended level.	
Community Response	Vigorous community action.	Widespread complaints.	Sporadic complaints.		No observed reaction.	Favourable publicity

Table 3 – Criteria for ranking the *Severity* of negative impacts on the bio-physical environment

Environment	Ranking Criteria		
	Low (L-)	Medium (M-)	High (H-)
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments (e.g. ecology).	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g. ecology).
Ecology (Plant and animal life)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or prevalence.	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or prevalence.	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or endangered species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

Spatial Extent and Duration of Impacts

The duration and spatial scale of impacts can be ranked using the following criteria:

Table 4 – Ranking the *Duration* and *Spatial Scale* of impacts

	Ranking Criteria		
	L	**M**	**H**
Duration	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
Spatial Scale	Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national

Where the severity of an impact varies with distance, the severity should be determined at the point of compliance or the point at which sensitive receptors will be encountered. This position corresponds to the spatial extent of the impact.

Consequence of Impacts

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the following qualitative guidelines:

Table 5 – Ranking the *Consequence* of an impact

SEVERITY = L

DURATION	Long-term	**H**			
	Medium-term	**M**			**MEDIUM**
	Short-term	**L**	**LOW**		

SEVERITY = M

DURATION	Long-term	**H**			**HIGH**
	Medium-term	**M**		**MEDIUM**	
	Short-term	**L**	**LOW**		

SEVERITY = H

DURATION	Long-term	**H**			
	Medium-term	**M**			**HIGH**
	Short-term	**L**	**MEDIUM**		
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national
			SPATIAL SCALE		

To use Table 5, firstly go to one of the three "layers" based on the severity ranking obtained from Table 2 and/ or Table 3. Thereafter determine the consequence ranking by locating the intersection of the appropriate duration and spatial scale rankings.

Overall Significance of Impacts

Combining the consequence of the impact and the probability of occurrence, as shown by Table 6, provides the overall significance (risk) of impacts.

Table 6 – Ranking the *Overall Significance* of impacts

PROBABILITY	Definite Continuous	**H**	**MEDIUM**		**HIGH**
	Possible Frequent	**M**		**MEDIUM**	
	Unlikely Seldom	**L**	**LOW**		**MEDIUM**
			L	**M**	**H**
			CONSEQUENCE (from Table 5)		

The overall significance ranking of the negative environmental impacts provides the following guidelines for decision making:

Table 7 – Guidelines for decision-making

Overall Significance Ranking	Nature of Impact	Decision Guideline
High	Unacceptable impacts.	Likely to be a fatal flaw.
Moderate	Noticeable impact.	These are unavoidable consequence, which will need to be accepted if the project is allowed to proceed.
Low	Minor impacts.	These impacts are not likely to affect the project decision.

Priority of Primary Impacts

In some cases environmental aspects could result in impacts on a number of environments. For example, the release of contaminated runoff could pollute surface water, which in turn could adversely impact on the ecology. In such cases the impact on the environment in which the first or primary impact occurs should be considered first. In the example "surface water" is the environment on which the primary impact occurs. If it can be shown that the impact on the primary environment will be insignificant, then secondary impacts need not be considered.

CONCLUSIONS

While the significance ranking methodology presented in above is not a substitute for more sophisticated qualitative methods, it is a step forward from the arbitrary methods that are often used to determine the significance of environmental impacts. In many instances it is impractical or prohibitively costly to source the data required to undertake a fully quantitative assessment and, hence, a qualitative or semi-quantities approach is the best option available. If used in conjunction with the general framework outlined in Part 1, it provides a systematic and structured approach to undertaking an EIA.

Appendix B

SPECIALIST CV’s

CURRICULUM VITAE

Name	Andrea Gibb
Profession	Environmental Practitioner
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Environmental Practitioner and Visual Specialist: Environmental Division
Years with Firm	6 Years
Date of Birth	29 January 1985
ID Number	8501290020089
Nationality	South African

Education

Matriculated 2003, Full Academic Colours, Northcliff High School, Johannesburg, South Africa

Professional Qualifications

BSc (Hons) Environmental Management (University of South Africa 2008-2010)
Coursework**:** Project Management, Environmental Risk Assessment and Management, Ecological and Social Impact Assessment, Fundamentals of Environmental Science, Impact Mitigation and Management, Integrated Environmental Management Systems & Auditing, Integrated Environmental Management, Research Methodology.
Research Proposal**:** Golf Courses and the Environment

BSc Landscape Architecture (with distinction) (University of Pretoria 2004-2007)
Coursework: Core modules focused on; design, construction, environmental science, applied sustainability, shifts in world paradigms and ideologies, soil and plant science, environmental history, business law and project management.
Awards: Cave Klapwijk prize for highest average in all modules in the Landscape Architecture programme, ILASA book prize for the best Landscape Architecture student in third year design, Johan Barnard planting design prize for the highest distinction average in any module of plant science.

ArcGIS Desktop 1 (ESRI South Africa December 2010)
Environmental Impact Assessment (EIA) 2014 Legal Regime Workshop (Imbewu 2015)

Employment Record

Aug 2010 – to date	SiVEST SA (Pty) Ltd: Environmental Practitioner
Jan 2008 – July 2010	Cave Klapwijk and Associates: Environmental Assistant and Landscape Architectural Technologist
Feb 2006 – Dec 2006	Cave Klapwijk and Associates: Part time student

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent

Key Experience

Specialising in the field of Environmental Management and Visual Assessment.

Andrea joined SiVEST in August 2010 and holds the position of Environmental Practitioner in the Johannesburg Office. She has 8.5 years' work experience and specialises in managing large scale multifaceted EIAs and Basic Assessment (BAs), primarily related to renewable energy generation and electrical distribution. She also specialises in undertaking visual impact and landscape assessments. She has extensive experience in overseeing public participation and stakeholder engagement processes and has been involved in environmental baseline assessments, fatal flaw / feasibility assessments and environmental negative mapping / sensitivity analyses. From a business and administrative side, Andrea is actively involved in maintaining good client relationships, mentoring junior staff and maintaining the financial performance of the projects she leads.

Skills include:

- Project Management (MS Project)
- Environmental Impact Assessment (EIA)
- Basic Assessment (BA)
- Public Participation Management
- Visual Impact Assessment (VIA)
- Landscape Assessment
- Strategic Environmental Planning
- Documentation / Quality Control
- Project Level Financial Management

Projects Experience

Aug 2010 – to date

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) / BASIC ASSESSMENT (BA)

- EIA for the proposed development of the Tlisitseng 1 and 2 75MW Solar Photovoltaic (PV) Energy Facilities near Lichtenburg, North West Province.
- EIAs for the proposed development of the Sendawo 1, 2, and 3 75MW Solar PV Energy Facilities near Vryburg, North West Province.
- EIA for the proposed construction of the Sendawo Common Collector Substation and power line near Vryburg, North West Province.
- EIA for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
- Application for an Amendment of the Environmental Authorisation (EA) for the proposed construction of the 100MW Limestone Solar Thermal Power Project near Danielskuil, Northern Cape Province.
- Applications for the Amendment of the EAs for the proposed construction of three 75MW solar PV facilities near Prieska, Northern Cape Province.
- Applications for the Amendment of the EAs for the proposed construction of the 75MW Arriesfontein and Wilger Solar Power Plants near Danielskuil, Northern Cape Province.
- Completion and submission of the final EIA report for the proposed Rooipunt PV Solar Power Park Phase 1 and proposed Rooipunt PV Solar Power Park Phase 2 near Upington, Northern Cape Province.
- EIAs for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- EIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province.
- EIA for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.

- BA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.
- BA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.
- BA for the proposed Construction of the SSS1 5MW Solar PV Plant on the Western Part of Portion 6 (Portion of Portion 5) of Farm Spes Bona 2355 near Bloemfontein, Free State Province.
- BA for the proposed Construction of the SSS2 5MW Solar PV Plant on the Eastern Part of Portion 6 (Portion of Portion 5) of Farm Spes Bona 2355 near Bloemfontein, Free State Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of a 132kV power line from the proposed Bophirima Substation to the existing Schweizer-Reneke Substation, North West Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of a 132kV power line from the Mookodi Substation to the existing Magopela Substation, North West Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province.
- Amendment of the Final Environmental Impact Report for the Proposed Mookodi 1 Integration Project near Vryburg, North West Province.
- BA for the proposed 132kV power line and associated infrastructure for the proposed Redstone Solar Thermal Energy Plant near Lime Acres, Northern Cape Province.
- BA for the proposed construction of a 132kV power line and substation associated with the 75MW PV Plant on the Farm Droogfontein (PV 3) in Kimberley, Northern Cape Province.
- BA for the proposed establishment of a Learning and Development Retreat and an Executive Staff and Client Lodge at Mogale's Gate, Gauteng Province.
- Application for an Amendment of the EA to increase the output of the proposed 40MW PV Facility on the farm Mierdam to 75MW, Northern Cape Province.
- BA for the proposed construction of a power line and substation near Postmasburg, Northern Cape Province.
- BA for the proposed West Rand Strengthening Project – 400kV double circuit power line and substation extension in the West Rand, Gauteng.
- EIA for the proposed construction of a wind farm and PV plant near Prieska, Northern Cape Province.
- Public Participation assistance as part of the EIA for the proposed Thyspunt Transmission Lines Integration Project – EIA for the proposed construction of 5 x 400kV transmission power lines between Thyspunt to Port Elizabeth, Eastern Cape Province.
- EIA assistance for the proposed construction of three Solar Power Plants in the Northern Cape Province.
- Public Participation as part of the EIA for the proposed Delareyille Kopela Power Line and Substation, North West Province.
- Public Participation as part of the EIA for the Middelburg Water Reclamation Project, Mpumalanga Province.

VISUAL IMPACT ASSESSMENT (VIA)

- VIA (Scoping Phase) for the proposed construction of a 3000MW Wind Farm and associated infrastructure near Richmond, Northern Cape Province.
- VIA for the proposed construction of a power line and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces.
- VIA for the proposed construction of a power line and associated infrastructure for the proposed Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province.
- VIAs (Impact Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.

- VIA (Impact Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
- VIAs (Impact Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province.
- VIA for the proposed construction of the Tlisitseng substation and associated 132kV power line near Lichtenburg, North West Province.
- VIA (Scoping Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
- VIA (Scoping Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.
- VIA (Scoping Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province.
- Visual recommendations for Phase 1 of the proposed Renishaw Estate Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed Tinley Manor South Banks Development, KwaZulu-Natal Province.
- VIAs (Impact Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- VIA (Scoping Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- Visual Due Diligence Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
- Visual Status Quo and Constraints Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
- VIA for the proposed agricultural components of the Integrated Sugar Project in Nsoko, Swaziland.
- VIA for the proposed Tweespruit to Welroux power lines and substation, Free State Province.
- VIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province.
- VIA (Impact Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed amendment to the authorised power line route from Hera Substation to Westgate Substation, Gauteng Province.
- VIA (Impact Phase) for the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province.
- VIA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.
- VIA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.
- VIA (Scoping Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed Rorqual Estate Development near Park Rynie on the South Coast of KwaZulu Natal.
- VIA (Scoping Phase) for the proposed construction of a Coal-fired Power Station, Coal Mine and Associated Infrastructure near Colenso, KwaZulu-Natal Province.
- VIA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province.
- VIA for the proposed construction of the Duma transmission substation and associated Eskom power lines, KwaZulu-Natal Province.
- VIA for the proposed construction of the Madlanzini transmission substation and associated Eskom power lines, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Normandie substation to Hlungwane substation, Mpumalanga and KwaZulu-Natal Provinces.
- VIA for the proposed construction of the Nzalo transmission substation and associated Eskom power lines, KwaZulu-Natal Province.

- VIA for the proposed construction of the Sheepmoor traction substation with two 20MVA transformer bays and a new associated 88kV turn-in power line, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Uitkoms substation to Antra T-off, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Umfolozi substation to Eqwasha traction substation including an 88kV turn-in power line to Dabula traction substation, Kwazulu-Natal Province.
- VIA for the proposed construction of the new 88/25kV Vryheid traction substation with two 20MVA transforma bays and a new associated 88kV turn-in power line, KwaZulu-Natal Province.
- VIA for the proposed construction of a 132kV power line and substation associated with the 75MW PV Plant on the Farm Droogfontein (PV 3) in Kimberley, Northern Cape Province.
- VIA (Impact Phase) for the proposed Construction of a Solar PV Power Plant near De Aar, Northern Cape Province.
- VIA for the (Impact Phase) proposed Construction of the Renosterberg Wind Farm near De Aar, Northern Cape Province.
- VIA for the (Impact Phase) proposed Construction of the Renosterberg Solar PV Power Plant near De Aar, Northern Cape Province.
- VIA for the proposed construction of a 132kV power line for the Redstone Thermal Energy Plant near Lime Acres, Northern Cape Province.
- VIA for the proposed Mookodi Integration phase 2 132kV power lines and Ganyesa substation near Vryburg, North West Province.
- VIA for the proposed 132kV power lines associated with the PV Plants on Droogfontein Farm near Kimberley, Northern Cape Province.
- VIA (Scoping phase) for the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province.
- VIA for the proposed development of a learning and development retreat and an executive and staff lodge at Mogale's Gate, Gauteng Province.
- VIA for the proposed construction of a substation and 88kV power line between Heilbron (via Frankfort) and Villiers, Free State Province.
- Visual Status Quo Assessment for the Moloto Development Corridor Feasibility Study in the Gauteng Province, Limpopo Province and Mpumalanga Province.
- VIA the West Rand Strengthening Project – 400kV double circuit power line and substation extension in the West Rand, Gauteng.
- VIA for the proposed construction of a wind farm and solar photovoltaic plant near Loeriesfontein, Northern Cape Province.
- Visual sensitivity mapping exercise for the proposed Mogale's Gate Expansion, Gauteng.
- VIA (Scoping Phase) for the proposed Renosterberg Solar PV Power Plant and Wind Farm near De Aar, Northern Cape Province.
- Scoping level VIAs for the proposed construction of three Solar Power Plants in the Northern Cape Province.
- VIAs for the Spoornet Coallink Powerline Projects in KZN and Mpumalanga.
- Visual Constraints Analysis for the proposed establishment of four Wind Farms in the Eastern and Northern Cape Province.
- VIA (Scoping Phase) for the proposed development of a solar energy facility in De Aar, Northern Cape.
- VIA (Scoping Phase) for the proposed development of a solar energy facility in Kimberley, Northern Cape.

STRATEGIC ENVIRONMENTAL PLANNING

- Assistance with the Draft Environmental Management Framework for the Mogale City Local Municipality, Gauteng Province.
- Sensitivity Negative Mapping Analysis for the proposed Mogale's Gate Development, Gauteng Province.

OTHER

Jan 2008 – July 2010

Environmental management, research, report writing, and landscape design for several development projects:

- Report writing, coordination and public participation for several BAs.
- Planting design (including rehabilitation) in accordance with natural ecological processes, endemic species and appropriate techniques.
- Graphic presentations and mapping for several VIAs and landscape architectural designs, including three-dimensional imagery.

Feb 2006 – Dec 2006

Landscape Architectural drafting, rendering and planting design for a variety of projects including the Oprah Winfrey Academy for girls and the New UNISA Student Entrance Building.

CURRICULUM VITAE

Stephan Hendrik Jacobs

Name	Stephan Hendrik Jacobs
Profession	Environmentalist
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Graduate Environmental Consultant
Years with Firm	Joined May 2015
Date of Birth	28 May 1991
ID Number	9105285065080
Nationality	South African

Education

Pretoria Boys High, Pretoria, South Africa, Matriculated 2009.

Professional Qualification

- BSc Hons Environmental Management and Analysis, (Post Graduate) University Of Pretoria Honours (2014).
- BSc Environmental Sciences (Undergraduate) University Of Pretoria (2012-2013)

Employment Record

May 2015 – current	SiVEST SA (Pty) Ltd – Graduate Environmental Consultant
Nov 2014 – Feb 2015	Sodwana Bay Fishing Charters – Assistant Manager
Oct 2014 – Mar 2015	Ufudu Turtle Tours – Tour Guide

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Excellent	Excellent	Excellent
Afrikaans	Good	Good	Good

Key Experience

Stephan joined SiVEST in May 2015 and holds the position of Graduate Environmental Consultant in the Johannesburg office.

Stephan specialises in the field of Environmental Management and has been involved in the compilation of Environmental Impact Assessments (EIAs) and Basic Assessments (BAs). Stephan has also assisted extensively in the undertaking of field work and the compilation of reports for specialist studies such as surface water and visual impact assessments. Stephan also has experience in Environmental Compliance and Auditing and has acted as an Environmental Control Officer (ECO) for several infrastructure projects.

Stephan has been educated and achieved his degrees (BSc and BSc Hons) at the University of Pretoria in Environmental Sciences (Environmental Management & Analysis).

Throughout his time at SiVEST, Stephan has acquired the following skills:

- Strong computer skills (Work, excel, powerpoint etc);
- Strong Proposal and report writing skills;
- Report compilation skills for Environmental Impact Assessments (EIAs) and Basic Assessments (BAs);

- Report compilation skills for Environmental Management Plans/Programmes (EMPr);
- Compilation and conducting Visual Impact Assessments;
- Assisting in Surface Water / Wetland Delineations and Assessments.

Key experience includes:

- Environmental Impact Assessment (EIA) of small, medium and large-scale infrastructure projects,
- Basic Assessment (BA), of small, medium and large-scale infrastructure projects,
- Environmental Management Plans (EMPr), of small, medium and large-scale infrastructure projects,
- Proposal and tender compilation,
- Environmental Compliance and Auditing (ECO);
- Various site inspections, and
- Visual Impact Assessments (Field work and report compilation).

Projects Experience

Stephan is responsible for the following activities: report writing, proposal writing, assisting in specialist surface water delineation and functional assessments, assisting in visual impact assessments and environmental compliance and auditing procedures. Current and completed projects / activities are outlined in detail below:

- Environmental Control Officer (ECO) for the Polokwane Integrated Rapid Public Transport System (IRPTS), Limpopo Province.

- Basic Assessment (BA) for the construction of a Non-Motorised Transport (NMT) Training and Recreational Park adjacent to the Peter Mokaba Stadium in Polokwane, Limpopo Province.

- Basic Assessment (BA) for the Proposed Expansion of the Tissue Manufacturing Capacity at the Twinsaver Kliprivier Operations Base, Gauteng Province.

- Environmental Control Officer (ECO) for Phase 1 and Phase 2 of the Newmarket Retail Development, Gauteng Province.

- Environmental Review of the Xakwa Coal Operations, adjacent to the proposed Eastside Junction Development.

- Environmental Due Diligence for the Woodlands and Harrowdene Office Parks in Woodmead, Gauteng Province.

- Visual Impact Assessment for the Helena Solar PV Plant, Northern Cape Province.

- Visual Impact Assessment for the Nsoko Msele Integrated Sugar Project, Swaziland.

- Visual Impact Assessments for the proposed construction of the Sendawo Solar 1, Sendawo Solar 2 and Sendawo Solar 3 Photovoltaic (PV) Energy Facilities near Vryburg, North West Province.

- Visual Impact Assessments for the proposed construction of the Sendawo Substation and Associated 400kV Power Line near Vryburg, North West Province.

- Visual Impact Assessments for the proposed construction of the Tlisitseng Solar 1 and Tlisitseng Solar 2 Photovoltaic (PV) Energy Facilities near Lichtenburg, North West Province.

- Visual Impact Assessment for the proposed construction of the 3000MW PhilCo Green Energy Wind Farm and Associated Infrastructure near Richmond, Northern Cape Province.

- Visual Impact Assessment for the proposed construction of the Aletta 140MW Wind Energy Facility neat Copperton, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Eureka 140MW Wind Energy Facility and associated Infrastructure near Copperton, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Eureka 400kV Substation and 400kV Power Line neat Copperton, Northern Cape Province.
- Basic Visual Impact Assessments for the proposed construction of the Tlisitseng 1 and Tlisitseng 2 Substations and Associated 132kV Power Lines near Lichtenburg, North West Province.
- Basic Visual Impact Assessment for the proposed construction of up to a 132kV Power Line and Associated Infrastructure for the Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province.
- Basic Visual Impact Assessment for the proposed construction of up to a 132kV Power Line and Associated Infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberly, Free State and Northern Cape Provinces.
- Surface Water Assessment for the Steve Thswete Local Municipality, Mpumalanga Province.
- Surface Water Delineation and Assessment for the proposed coal Railway Siding at the Welgedacht Marshalling Yard and associated Milner Road Upgrade near Springs, Ekurhuleni Metropolitan Municipality.

CURRICULUM VITAE

Name	Kerry Lianne Schwartz
Profession	GIS Specialist
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Senior GIS Consultant: Environmental Division
Years with Firm	24 Years
Date of Birth	21 October 1960
ID No.	6010210231083
Nationality	South African

Professional Qualifications

BA (Geography), University of Leeds 1982

Employment Record

1994 – Present	SiVEST SA (Pty) Ltd - Environmental Division: GIS/Database Specialist.
1988 - 1994	SiVEST (formerly Scott Wilson Kirkpatrick): Town Planning Technician.
1984 – 1988	Development and Services Board, Pietermaritzburg: Town Planning Technician.

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent

Key Experience

Kerry is a GIS specialist with more than 20 years' experience in the application of GIS technology in various environmental, regional planning and infrastructural projects undertaken by SiVEST.

Kerry's GIS skills have been extensively utilised in projects throughout South Africa in other Southern African Countries. These projects have involved a range of GIS work, including:

- Design, compilation and management of a demographic, socio-economic, land use, environmental and infrastructural databases.
- Collection, collation and integration of data from a variety of sources for use on specific projects.
- Manipulation and interpretation of both spatial and alphanumeric data to provide meaningful inputs for a variety of projects.
- Production of thematic maps and graphics.
- Spatial analysis and 3D modelling, including visual and landscape assessments.

Projects Experience

STRATEGIC PLANNING PROJECTS

Provision of database, analysis and GIS mapping support for the following:

- Water Plan 2025: Socio-economic, Land Use and Demographic Update – Umgeni Water (KwaZulu-Natal).
- Eskom Strategic Plan – Eskom (KwaZulu-Natal).
- Umgeni Water Quality Management Plan – Department of Water Affairs and Umgeni Water (KwaZulu-Natal).
- KwaZulu-Natal Development Perspective – Department of Economic Affairs (KwaZulu-Natal).
- Indlovu Regional Integrated Plan – Department of Local Government and Housing (KwaZulu-Natal).
- Umgeni Water and Sanitation Needs Analysis – Umgeni Water (KwaZulu-Natal).
- Metro Waste Water Management Plan – Durban Waste Water management, City of Durban (KwaZulu-Natal).
- KwaZulu-Natal Electrification Prioritisation Model – Eskom (KwaZulu-Natal).
- Umzinyathi Regional Development Plan – Umzinyathi Regional Council (KwaZulu-Natal).
- GIS driven model to assess future population growth in quaternary catchments under different growth scenarios – Umgeni Water (KwaZulu-Natal).
- Ubombo Master Water Plan Study – Mhlathuze Water Board (KwaZulu-Natal).
- Development strategy for local economic development and social reconstruction of the Germiston-Daveyton Activity Corridor – Eastern Gauteng Services Council (Gauteng).
- Structure Plan for the Cities of Beira and Dondo in Mozambique – World Bank.
- Land identification study for low cost housing in the Indlovu Region – Indlovu Regional Council (KwaZulu-Natal).
- Local Development Plan for Manzini – Manzini Town Council (Swaziland).
- Indlovu Project Prioritisation Model – Indlovu Regional Council (KwaZulu-Natal).
- Structure Plans for the Cities of Ndola and Luanshya - Ministry of Local Government and Housing (Zambia).
- Database development for socio-economic and health indicators arising from Social Impact Assessments conducted for the Lesotho Highlands Development Association – Lesotho.
- Development Plan for the adjacent towns of Kasane and Kazungula - Ministry of Local Government, Land and Housing (Botswana).
- Development Plan for the rural village of Hukuntsi - Ministry of Local Government, Land and Housing (Botswana).
- Provision of data platform for the spatial analysis of water supply, demand and affordability in Bulawayo – City of Bulawayo and NORAID (Zimbabwe).
- Integrated Development Plans for various District and Local Municipalities including:
  - Nquthu Local Municipality (KwaZulu-Natal)
  - Newcastle Local Municipality (KwaZulu-Natal)
  - Amajuba District Municipality (KwaZulu-Natal)
  - Jozini Local Municipality (KwaZulu-Natal)
  - Umhlabuyalingana Local Municipality (KwaZulu-Natal)
- uMhlathuze Rural Development Initiative – uMhlathuze Local Municipality (KwaZulu-Natal).
- Rural roads identification – uMhlathuze Local Municipality (KwaZulu-Natal).
- Mapungubwe Tourism Initiative – Development Bank (Limpopo Province).
- Northern Cape Tourism Master Plan – Department of Economic Affairs and Tourism (Northern Cape Province).

- Spatial Development Framework for Gert Sibande District Municipality (Mpumalanga) in conjunction with more detailed spatial development frameworks for the 7 Local Municipalities in the District, namely:
  - Albert Luthuli Local Municipality
  - Msukaligwa Local Municipality
  - Mkhondo Local Municpality
  - Pixley Ka Seme Local Municipality
  - Dipaleseng Local Municipality
  - Govan Mbeki Local Municipality
  - Lekwa Local Municipality
- Land Use Management Plans/Systems (LUMS) for various Local Municipalities including:
  - Nkandla Local Municipality (KwaZulu-Natal)
  - Hlabisa Local Municipality (KwaZulu-Natal)
  - uPhongolo Local Municipality (KwaZulu-Natal)
  - uMshwathi Local Municipality
- Spatial Development Framework for uMhlathuze Local Municipality (KwaZulu-Natal).
- Spatial Development Framework for Greater Clarens – Maloti-Drakensberg Transfrontier Park (Free State).
- Land use study for the Johannesburg Inner City Summit and Charter – City of Johannesburg (Gauteng).
- Port of Richards Bay Due Diligence Investigation – Transnet
- Jozini Sustainable Development Plan – Jozini Local Municipality (KwaZulu-Natal)
- Spatial Development Framework for Umhlabuyalingana Local Municipality (KwaZulu-Natal)

BUILT INFRASTRUCTURE

- EIA and EMP for a 9km railway line and water pipeline for manganese mine – Kalagadi Manganese (Northern Cape Province).
- EIA and EMP for 5x 440kV Transmission Lines between Thyspunt (proposed nuclear power station site) and several substations in the Port Elizabeth area – Eskom (Eastern Cape Province).
- Initial Scoping for the proposed 750km multi petroleum products pipeline from Durban to Gauteng/Mpumalanga – Transnet Pipelines.
- Detailed EIA for multi petroleum products pipeline from Kendall Waltloo, and from Jameson Park to Langtaagte Tanks farms –Transnet Pipelines.
- Environmental Management Plan (operational management plan) including visual impact assessment, noise impact assessment and flight path determination for the commercialization of Skukuza Airport – SANParks (Mpumalaga Province).
- Environmental Management Plan for copper and cobalt mine (Democratic Republic of Congo).
- EIA and Agricultural Feasibility study for Miwani Sugar Mill (Kenya).
- EIAs for Concentrated Solar and Photovoltaic power plants and associated infrastructure (Northern Cape, Free State, Limpopo and North West Province).
- EIAs for Wind Farms and associated infrastructure (Northern Cape and Western Cape).
- Basic Assessments for 132kV Distribution Lines (Free State, KwaZulu-Natal, Mpumalanga and North West Province).
- Environmental Assessment for the proposed Moloto Development Corridor (Limpopo).
- Environmental Advisory Services for the Gauteng Rapid Rail Extensions Feasibility Project.
- Environmental Screening for the Strategic Logistics and Industrial Corridor Plan for Strategic Infrastructure Project 2, Durban-Free State-Gauteng Development Region.

STATE OF THE ENVIRONMENT REPORTING

- 2008 State of the Environment Report for City of Johannesburg.
- Biodiversity Assessment – City of Johannesburg.

STRATEGIC ENVIRONMENTAL ASSESSMENTS AND ENVIRONMENTAL MANAGEMENT FRAMEWORKS

- SEA for Greater Clarens – Maloti-Drakensberg Transfrontier Park (Free State).
- SEA for the Marula Region of the Kruger National Park, SANParks.
- SEA for Thanda Private Game Reserve (KwaZulu-Natal).
- SEA for KwaDukuza Local Municipality (KwaZulu-Natal).
- EMF for proposed Renishaw Estate (KwaZulu-Natal).
- EMF for Mogale City Local Municipality, Mogale City Local Municipality (Gauteng).
- SEA for Molemole Local Municipality, Capricorn District Municipality (Limpopo).
- SEA for Blouberg Local Municipality, Capricorn District Municipality (Limpopo).

WETLAND STUDIES

- Rehabilitation Planning for the Upper Klip River and Klipspruit Catchments, City of Johannesburg (Gauteng).
- Wetland assessments for various Concentrated Solar and Photovoltaic power plants and associated infrastructure (Limpopo, Northern Cape, North West Province and Western Cape).
- Wetland assessments for Wind Farms and associated infrastructure (Northern Cape and Western Cape).
- Wetland assessments for various 132kV Distribution Lines (Free State, KwaZulu-Natal, Mpumalanga and North West Province).

VISUAL IMPACT ASSESSMENTS

- Visual Impact Assessment for the proposed relocation of the Skukuza Conference Centre, SANParks.
- Visual Impact Assessment for the proposed re-commercialisation of the Skukuza Airport.
- Visual Impact Assessment for the redevelopment of the Newmarket Racecourse, Alberton, Gauteng
- Visual Impact Assessment for the Thyspunt Transmission Lines Integration Project
- Visual Impact Assessments for various Solar Power Plants in the Northern Cape
- Visual Impact Assessments for various Wind Farms in the Northern Cape
- Visual Impact Assessments for various 132kV Distribution Lines (Free State, KwaZulu-Natal, Mpumalanga and North West Province).
- Landscape Character Assessment for Mogale City Environmental Management Framework

Appendix C

TABLE 20: LITERATURE REVIEW – DETAILED TABLE WITH IMPACTS WHICH WERE TAKEN INTO CONSIDERATION, PROPOSED MITIGATION MEASURES AND SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION

Table 20: Literature Review - Detailed Table with Visual Impacts taken into Consideration, Proposed Mitigation Measures and Significance Rating of Visual Impacts after Mitigation for Nearby Proposed Renewable Energy Developments

Project	Relevant Impacts to be Taken into Consideration from a Visual Perspective	Proposed Mitigation Measures	Impacts Significance Rating after Mitigation
Sankraal Wind Energy Facility	**1) <u>Visual Impacts of proposed Sankraal WEF infrastructure during construction:</u>** ▪ During the construction phase, large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to visual impacts associated with construction. The construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed site on gravel access roads are also expected to increase dust emissions. The increased traffic on these roads and the resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Surface disturbance during construction would also expose bare soil which could visually contrast with the surrounding environment. Additionally, temporary stockpiling of soil during construction may alter the landscape. Wind blowing over these disturbed areas could therefore result in dust which would have a visual impact.	**1) <u>Proposed Mitigation Measures for Sankraal WEF infrastructure during construction:</u>** ▪ Carefully plan to reduce the construction period. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Maintain a neat construction site by removing rubble and waste materials regularly. ▪ Make use of existing gravel access roads where possible. ▪ Ensure that dust suppression techniques are implemented on all access roads, especially those leading up steep slopes. **2) <u>Proposed Mitigation Measures for infrastructure associated with Sankraal WEF during construction:</u>** ▪ All reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid. ▪ Carefully plan to reduce the construction period. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Maintain a neat construction site by removing rubble and waste materials regularly.	1) Medium negative; 2) Medium negative; 3) Medium negative; 4) Medium negative; 5) Medium negative; and 6) Medium negative.

	2) <u>Visual impacts of the infrastructure associated with the Sankraal WEF during construction:</u> ▪ During the construction of the 132kV overhead power line, underground cables, on-site switching station, access roads and building infrastructure, large construction vehicles and equipment could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptor locations to visual impacts associated with the construction phase. The construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed site on gravel access roads are also expected to increase dust emissions. The increased traffic on the gravel roads and the resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Surface disturbance during construction would also expose bare soil which could visually contrast with the surrounding environment. In addition, temporarily stockpiling soil during construction may alter the landscape and wind blowing over these disturbed areas could result in dust which would have a visual impact.	▪ Make use of existing gravel access roads where possible. ▪ Ensure that dust suppression techniques are implemented on all access roads. **3) <u>Proposed Mitigation Measures for cumulative visual impacts as a result of the other renewable energy developments (including associated infrastructure) proposed nearby during construction:</u>** ▪ Carefully plan to reduce the construction period. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Vegetation clearing should take place in a phased manner. ▪ Maintain a neat construction site by removing rubble and waste materials regularly. ▪ Make use of existing gravel access roads, where possible. ▪ Limit the number of vehicles and trucks travelling to and from the proposed sites, where possible. ▪ Ensure that dust suppression techniques are implemented on all access roads. ▪ Ensure that dust suppression is implemented in all areas where vegetation clearing has taken place.	

	3) <u>Cumulative Visual Impacts as a result of the other renewable energy developments (including associated infrastructure) proposed nearby during construction:</u> ▪ Large construction vehicles and equipment during the construction phase of the other renewable energy developments and their associated infrastructure proposed nearby will alter the natural character of the study area further and expose a greater number of visual receptors to visual impacts associated with the construction phase. The construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from all of the proposed sites on gravel access roads are also expected to increase dust emissions. The increased traffic on these roads and the dust plumes could create a greater visual impact and may evoke more negative sentiments from surrounding viewers. Surface disturbance during construction of the other renewable energy facilities proposed nearby would also expose a greater amount of bare soil which could result in a greater visual contrast with the surrounding environment. In addition, temporary stockpiling of soil during construction may alter the landscape further.	▪ Ensure that dust suppression techniques are implemented on all soil stockpiles. ▪ Temporarily fence-off the construction sites (for the duration of the construction period). ▪ All reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid, where possible. **4) <u>Proposed mitigation measures for Sankraal WEF infrastructure during operation:</u>** ▪ Areas of 'High Sensitivity' should preferably be precluded from the turbine development. ▪ No turbines should be placed within 500m of the N9, N10 and R389 provincial road. ▪ Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity. ▪ Turbines should be painted plain white, as this is a less industrial colour (Vissering, 2011). Bright colours or obvious logos should not be permitted. ▪ Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011). ▪ If required, turbines should be replaced with the same model, or one of equal height and scale.	

	Wind blowing over these disturbed areas could result in a greater amount of dust which would have a visual impact. **4) <u>Visual impacts of proposed Sankraal WEF infrastructure during operation:</u>** ▪ During the operation phase, the proposed Sankraal WEF could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptor roads and locations, such as farmsteads / homesteads to visual impacts. The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Maintenance vehicles may need to access the WEF via gravel access roads and are expected to increase dust emissions in doing so. The increased traffic on these roads and the dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Security and operational lighting at the proposed WEF could result in light pollution and glare, which could be an annoyance to surrounding viewers **5) <u>Visual impacts of infrastructure associated with Sankraal WEF during operation:</u>**	Repeating elements of the same height, scale and form can result in unity and lessen the visual impact that would typically be experienced in a chaotic landscapes made up of diverse colours, textures and patterns (Vissering, 2011). ▪ Light fittings for security at night should reflect the light toward the ground and prevent light spill. ▪ Ensure that dust suppression techniques are implemented on all access roads. **5) <u>Proposed Mitigation Measures for infrastructure associated with Sankraal WEF during operation:</u>** ▪ Light fittings for security at the on-site switching station at night should reflect the light toward the ground and prevent light spill. ▪ Where practically possible, the operations and maintenance buildings should not be illuminated at night. ▪ Power lines should be aligned to run parallel to existing power lines and other linear infrastructure, if possible. ▪ Power lines should be aligned to avoid ridgelines and steep slopes, if possible. ▪ Cables should be buried underground where possible.	

	▪ The 132kV overhead power line, underground cables, on-site switching station, access roads and building infrastructure could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptors and roads to visual impacts. The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Maintenance vehicles may need to access the infrastructure associated with the WEF via gravel access roads and are expected to increase dust emissions in doing so. The increased traffic on these roads and the resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Security and operational lighting at the associated infrastructure could result in light pollution and glare, which could be an annoyance to surrounding viewers. **6) <u>Cumulative visual impacts as a result of the other renewable energy developments (including associated infrastructure) proposed nearby during operation:</u>** ▪ The renewable energy development and their associated infrastructure proposed nearby could exert a visual impact by altering the visual	▪ The operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible. ▪ Ensure that dust suppression techniques are implemented on all access roads. ▪ Select the alternatives that will have the least impact on visual receptors. **6) <u>Proposed Mitigation Measures for cumulative visual impacts as a result of the other renewable energy developments (including associated infrastructure) proposed nearby during operation:</u>** ▪ Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity. ▪ Light fittings for security at the proposed renewable energy developments and their associated infrastructure at night should reflect the light toward the ground (except for aviation lighting) and prevent light spill. ▪ The operations and maintenance buildings should not be illuminated at night, if possible. ▪ Turbines should be painted plain white, as this is a less industrial colour (Vissering, 2011).	

	character of the surrounding area further and exposing a greater number of sensitive visual receptor locations to visual impacts. The nearby renewable energy developments may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Maintenance vehicles may need to access the renewable energy developments and their associated infrastructure proposed nearby via gravel access roads and are expected to increase dust emissions in doing so. The increased traffic on the gravel roads and the dust plumes could create a greater visual impact and may evoke more negative sentiments from surrounding viewers. It should however be noted that the existing roads which can be found around these project sites also appear to be gravel. As such, the gravel access roads are not expected to contribute significantly to the overall cumulative visual impact. Security and operational lighting at the renewable energy developments and their associated infrastructure proposed nearby could result in a greater amount of light pollution and glare, which could be a significant annoyance to surrounding viewers.	Bright colours or obvious logos should not be permitted. ▪ Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011). ▪ The operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible. ▪ If required, turbines should be replaced with the same model, or one of equal height and scale. Repeating elements of the same height, scale and form can result in unity and lessen the visual impact that would typically be experienced in a chaotic landscapes made up of diverse colours, textures and patterns (Vissering, 2011). ▪ As far as possible, limit the number of maintenance vehicles, which are allowed to access the sites. ▪ Bury cables under the ground where possible. ▪ Ensure that dust suppression techniques are implemented on all access roads. ▪ Select the alternatives that will have the least impact on visual receptors.	

Umsobomvu Wind Energy Facility	The main issues relating to visual and aesthetic impacts can be summarised as follows: 1) **<u>Impacts of design and built-form (e.g. use of building materials, height of structures, incongruence with surrounding buildings) on aesthetic character of the area:</u>** ▪ The establishment of wind turbines introduces very large structures of unprecedented height and form. **2) <u>Impacts of the overall development on sense of place and sense of privacy of the area</u>** **3) <u>Impacts on road users due to distraction:</u>** ▪ The cumulative impact due to an existing WEF in the area reduces this impact significantly **4) <u>Impacts of lighting:</u>** ▪ The proposed facility may be a (cumulative) source of light pollution. Sources include security lighting at substations and other important infrastructural elements, after hour operational lighting, and aircraft warning lights mounted on the hub of the turbines.	**1) <u>Mitigation against lighting:</u>** ▪ <u>*Security and Operational Lighting*</u>: o Sub-stations and other facilities, where practical, should be situated off the ridgelines so as to minimise the view catchment of associated lighting; and o All lighting should be fitted with deflectors to avoid light spillage and minimise visual impact of lights at night. The developer should specifically plan the type, placement and direction of lighting to ensure that light pollution is minimised. **2) <u>Mitigation against visual intrusion in the landscape:</u>** ▪ The proposed facility is large and could dominate the landscape for those in close proximity to the development. Considering the size and extent of the facility, the options for "concealing" the development are limited. Recommended mitigation measures may include: - Increase the visual absorption capacity of the landscape around farm houses and roads in close proximity (<2.5kms) to the development by supporting tree-planting programmes.	▪ **Visual Assessment Point 1** = Low; ▪ **Visual Assessment Point 2** = Moderate; ▪ **Visual Assessment Point 3** = Low; ▪ **Visual Assessment Point 4** = Low; ▪ **Visual Assessment Point 5** = Low; ▪ **Visual Assessment Point 6** = Low; and ▪ **Visual Assessment Point 7** = Low. Overall, it is concluded that for all view points, the impact is: ▪ LOW, where the impact should have an influence on the decision unless it is mitigated.

Noupoort Wind Farm	**1) <u>Overall Visual Impact (construction and operation):</u>** ▪ The proposed wind farm could create a visual impact on sensitive receptors in the study area by creating visual change and visual intrusion	**1) <u>Proposed Mitigation Measures and infrastructure location / placement recommendation for overall visual impact:</u>** ▪ The areas on the site associated with the greatest potential visual exposure to the areas surrounding the site include: o the area to the west of the 'escarpment edge' – i.e. the part of the site on the rising ground to the east of Noupoort and the N9 highway; o a buffer of 1km east of this 'escarpment edge'; and o A buffer 1km into the site from the Oorlogspoort Road on the southern boundary of the site. ▪ It is very important that the areas on the site associated with the greatest potential visual exposure be maintained as exclusion zones in which no turbines or as few turbines as possible are placed. Turbines placed in these buffer zones (as per the final draft layout), will be responsible for the most significant visual impacts associated with the proposed development. It is thus recommended that consideration be given to removing the turbines from these buffer zones that would further	1) Low negative.

		reduce the visual impacts on certain areas surrounding the site.	
De Aar Wind Energy Facility	**1) <u>The following potential visual impacts are expected during the construction phase:</u>** ▪ Location of the construction roads, off existing roads, (access widening etc.); ▪ Upgrading existing local roads to turbines; ▪ Establishment of construction camps; ▪ Provision of new roads through the site to link infrastructure for construction and maintenance; ▪ Movements of construction vehicles around the site, with lights; ▪ Dust generation, due to movement of construction vehicles; ▪ Construction of 11.25km 22kV line from south project to existing t/l line; ▪ Substations; ▪ Construction of the concrete footings, for each turbine; ▪ Buildings; and ▪ The installation of the turbines on site. **2) <u>The following potential visual impacts are expected during the operational phase:</u>** ▪ Maintenance visits by the maintenance crew, using the existing and upgraded gravel roads; ▪ Concrete footings for each turbine; ▪ Impact of the new transmission line;	**1) <u>Construction Phase Mitigation Measures:</u>** ▪ An environmental management plan should be drawn up to set out principles for the implementation of the visual mitigation measures. Construction impacts can be limited generally by keeping the contract time to the minimum. ▪ Access roads to be kept clean and storage of materials to be screened from public view. Storage of builders' rubble to be controlled. ▪ Site offices should be limited to single storey and they should be sited carefully using temporary screen fencing to screen from the wider landscape. ▪ All site operatives to receive training in awareness of issues pertaining to fires, litter and contaminants. ▪ No fires to be allowed. ▪ Litter to be regarded as a serious offence and no contaminants to be allowed to enter the environment by any means. These substances may include amongst other things, diesel, curing compounds, shutter oil and cement. Utilisation of such substances should be controlled on site, especially in close proximity to the aquatic environment and should be	**1) <u>Construction Phase:</u>** ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ Low; and ▪ Moderate. **2) <u>Operational Phase:</u>** ▪ Low; ▪ Low; ▪ Low; ▪ Low; ▪ High; ▪ High; and ▪ Moderate. **3)** The cumulative visual impact is assessed as **<u>MEDIUM</u>**.

	▪ Substations and buildings; ▪ Grouping of the turbines on site seen from population centres; ▪ Turbine grouping and their operation seen by receptors; ▪ Colour finish of the turbines; **3) <u>Potential Cumulative Visual Impacts:</u>** ▪ The construction period would have an increased impact due to longer timeframes; road access junctions would be more impacted upon and lay-down areas would be more visible. ▪ There would be additional new transmission lines crossing the landscape but these are typical in this locality. ▪ In a very populated area, with complex landscape patterns, the number of proposed developments could result in a high visual impact. In this context, the long views, exposed sites, roads with little traffic, small to medium sized towns, all combine to rate this cumulative impact as medium. The local landscape character would be changed and made more industrial, but the scale of the landscape can absorb both of these currently assessed developments, and this cumulative impact is assessed as medium for both magnitude and significance.	included in the Environmental Management Plan. **2) <u>Mitigation Measures proposed for infrastructure:</u>** ▪ The existing roads will be upgraded; and should be gravel roads if appropriate to the needs of construction traffic. The new road(s) that will connect the turbines and permit free access for maintenance and inspection vehicles in the site should also be gravel. ▪ Roadways should be low key in appearance; gravel is the most appropriate surface material locally. Careful consideration of horizontal and vertical curves is required in order to minimise cut and fill and, therefore, disturbance of the ground with resultant visible scarring. Likewise, careful siting is required to have road alignments lie with the contour. ▪ The developer will be asked to consider hard-standings for the crane(s), which could be re-vegetated after installation completion. ▪ Retention of the first 50-100mm of naturally occurring substrate, conserving it, and then using it for rehabilitation purpose should occur. The developer would be required to ensure that all excess material is not left around in piles, and	

		the ground is returned as far as possible to original levels/gradients. **3) <u>Mitigation Measures proposed for visibility of buildings and ancillary infrastructure:</u>** ▪ These should be sited in places where they would be least visible and where topography can offer shielding to potential receptors. Their cladding should be in materials sympathetic to those of surrounding lands. ▪ The aircraft warning lights required by CAA should be fitted with shields so that they are only visible to aircraft, not to receptors on the ground at lower elevations. **4) <u>Mitigation Measures proposed for Visibility of Transmission pylons:</u>** ▪ The power lines should be buried on the site, where reasonable and feasible. **5) <u>Mitigation Measures proposed for Psychological Effect of Turbines in Landscape:</u>** ▪ It is not practicable to attempt to screen wind farms visually. Providing a means whereby they can be absorbed into the landscape is more feasible. There are several ways in which this can be approached:	

		○ The use of certain materials and finishes; ○ Presenting the scheme to Interested and Affected Parties **6) <u>The following mitigation measures related to the design for the proposed development have been recommended to reduce the visual impacts:</u>** ▪ The alignment of access roads should be carefully considered to minimize visible scarring from cut and fill, and gravel should be used as surface material. Roads alignments should lie with the contour as far as possible; ▪ Consider temporary hard-standings for cranes in place of permanent hard-standings; and ▪ As much as possible, place any new structures where they are least visible to the greatest number of people.	
75MW Naauw Poort Solar Energy Facility	**<u>The following issues relating to Visual Impact are anticipated:</u>** 1) Potential visual impact of the proposed facilities on sensitive receptors beyond 1km from the project site; 2) Change in character of the prevailing use of the area (intrinsic value and sense of place); 3) Introduction of artificial light sources in a rural landscape;	**1) <u>The following mitigation measures have been provided for the potential visual impact of the proposed facilities on sensitive receptors beyond 1km from the project site:</u>** ▪ Keep disturbed areas to a minimum; ▪ No clearing of land to take place outside the demarcated footprint; ▪ Institute a rigorous planting regime around the proposed substation and ancillary buildings.	1) Low; 2) Low; 3) Low; 4) Low; and 5) Low.

	4) Reflection of the PV panels on the sensitive receptors in the region; and 5) Desertification of the area as a result of flash floods and the impact thereof on a newly introduced PV plant.	Only indigenous plant species to be introduced and planted in an organic manner and location; ▪ Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits; and ▪ Utilize existing roads and tracks to the extent possible. Where new roads are required, they should be two-track gravel roads, maintained to prevent dust plumes and erosion. **2) <u>The following mitigation measures have been provided for the change in character of the prevailing use of the area (intrinsic value and sense of place):</u>** ▪ Keep disturbed areas to a minimum; ▪ No clearing of land to take place outside the demarcated footprint; ▪ Institute a rigorous planting regime along the N10 and N9 transportation routes. Also institute a planting regime around the proposed substation and ancillary buildings. Only indigenous plant species to be introduced and planted in an organic manner and location; ▪ Buildings and similar structures must be in keeping with the regional policy documents,	

		especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits; and ▪ Utilise existing roads and tracks to the extent possible. Where new roads are required, they should be two-tracked gravel roads, maintained to prevent dust plumes and erosion. **3) <u>The following mitigation measures have been provided for the introduction of artificial light sources in a rural landscape:</u>** ▪ Outdoor lighting must be strictly controlled so as to prevent light pollution; ▪ All lighting must be installed at downward angles; ▪ Sources of light must as far as possible be shielded by physical barriers such as planted trees and shrubs; ▪ Consider the application of motion detectors to allow the application of lighting only where and when it is required; and ▪ Only minimum wattage light fixtures must be used. **4) <u>The following mitigation measures have been provided for the reflection of the PV panels on the sensitive receptors in the region:</u>**	

		▪ Consider installing anti-reflective coating or glass to reduce the sunlight that is reflected and increase the amount of sunlight that is absorbed; ▪ Install all electrical cables underground en-route to the substation; and ▪ Strictly orientate PV panels in a northerly direction to prevent possible reflection on sensitive receptors north-east of the project site. **5) <u>The following mitigation measures have been provided for the desertification of the landscape:</u>** ▪ Keep disturbed areas to a minimum; ▪ Limit the construction of the PV 'strings' to the 1660m contour line to prevent inter alia the possibilities of increasing streamflow associated with steep areas; ▪ No clearing of land to take place outside the demarcated footprint; ▪ Reintroduce suitable grass and shrub species beneath the PV 'strings' to stabilize and cover soils; ▪ Create stormwater channels alongside access roads and divert stormwater in the natural veld at regular intervals along the road; ▪ Consider installing rainwater tanks to save all water from building roofs;	

		▪ Install spreaders at the bottom of all downpipes/outlets to prevent scouring of the land; and ▪ All contractors to adhere to the Environmental Specification report.	
Klip Gat Solar Energy Facility	**<u>The following issues relating to visual impact are anticipated:</u>** 1) Potential visual impact on sensitive receptors in the background; 2) Potential visual impact on the intrinsic value and sense of place of the Noupoort region; 3) Potential visual impact of artificial lighting; 4) Potential visual impact of reflection of the PV panels on the sensitive receptors; and 5) Potential visual impact of desertification of the landscape.	**1) <u>The following mitigation measures have been provided for the potential visual impact on sensitive receptors in the background:</u>** ▪ Keep disturbed areas to a minimum; ▪ No clearing of land to take place outside the demarcated footprint; ▪ Institute a rigorous planting regime around the northern boundary of the project site. Only indigenous plant species to be introduced and planted in an organic manner and location that would not cast shadows on the PV 'strings': ▪ Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits; and ▪ Utilise existing roads and tracks to the extent possible. Where new roads are required, they should be two-track gravel roads, maintained to prevent dust plumes and erosion.	1) Low; 2) Medium; 3) Low; 4) Low; and 5) Low.

		2) <u>The following mitigation measures have been provided for the potential visual impact on the intrinsic value and sense of place of the Noupoort region:</u> ▪ Keep disturbed areas to a minimum; ▪ No clearing of land to take place outside the demarcated footprint; ▪ Institute a rigorous planting regime around the northern boundary of the project site. Only indigenous plant species to be introduced and planted in an organic manner and location that would not cast shadows on the PV 'strings': ▪ Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits; and ▪ Utilise existing roads and tracks to the extent possible. Where new roads are required, they should be two-track gravel roads, maintained to prevent dust plumes and erosion. **3) <u>The following mitigation measures have been provided for the potential visual impact of artificial lighting:</u>** ▪ Outdoor lighting must be strictly controlled so as to prevent light pollution;	

		▪ All lighting must be installed at downward angles; ▪ Sources of light must as far as possible be shielded by physical barriers; ▪ Consider the application of motion detectors to allow the application of lighting only where and when it is required; and ▪ Only minimum wattage light fixtures must be used. 4) **The following mitigation measures have been provided for the potential visual impact of reflection of the PV panels on the sensitive receptors**: ▪ Consider installing anti-reflective coating or glass to reduce the sunlight that is reflected and increase the amount of sunlight that is absorbed; ▪ Install all electrical cables underground en-route to the substation; and ▪ Strictly orientate PV panels in a northerly direction to prevent possible reflection on sensitive receptors north-east of the project site. **5) The following mitigation measures have been provided for the potential visual impact of desertification of the landscape:** ▪ Keep disturbed areas to a minimum;	

		▪ No clearing of land to take place outside the demarcated footprint; ▪ Institute a rigorous planting regime once construction has ceased; ▪ Reintroduce suitable grass and shrub species beneath the PV 'strings' to stabilize and cover soils; ▪ Create stormwater channels alongside access roads and divert stormwater in the natural veld at regular intervals along the roads; ▪ Consider installing rainwater tanks to save all water from building roofs; ▪ Install spreaders at the bottom of all downpipes/outlets to prevent scouring of the land; and ▪ All contractors to adhere to the Environmental Specifications report.	
Allemans Fontein Solar Energy Facility	**1) <u>The following direct visual impacts are anticipated during the construction and operation of the PV array, access roads and associated infrastructure:</u>** ▪ Potential visual impact on the sensitive receptors in the background (i.e. within 3kn of the facility); ▪ Potential visual impact on the intrinsic value and sense of place of the Noupoort region; and ▪ Potential visual impact of artificial lighting as a result of the activity.	**1) <u>The following mitigation measures have been provided for the direct visual impacts anticipated during the construction and operation of the PV array, access roads and associated infrastructure:</u>** ▪ Keep disturbed areas to a minimum; ▪ No clearing of land to take place outside the demarcated footprint; ▪ Institute a planting regime around the boundaries of the project site to shiled the PV plant from any potential views onto it from the	1) Low; 2) Low; and 3) Medium.

	2) <u>The following indirect visual impacts are anticipated during the construction and operation of the PV array, access roads and associated infrastructure:</u> ▪ The proposed infrastructure is of such a nature that the status quo could be regained after decommissioning of the plant. **3) <u>The following cumulative visual impacts are anticipated during the construction and operation of the PV array, access roads and associated infrastructure:</u>** ▪ The introduction of the PV plant, coupled with the transmission lines and proposed substation will contribute to an increased cumulative visual impact.	view corridors. Only indigenous plant species to be introduced and planted in an organic manner and location that would not cast shadows on the PV arrays: ▪ Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits; and ▪ Utilise existing roads and tracks to the extent possible. Where new roads are required, they should be two-track gravel roads, maintained to prevent dust plumes and erosion. **2) <u>The following mitigation measures have been provided for the indirect visual impacts anticipated during the construction and operation of the PV array, access roads and associated infrastructure:</u>** ▪ Providing that the site is rehabilitated to its current state, the visual impact will also be removed. **3) <u>The following mitigation measures have been provided for the cumulative visual impacts anticipated during the construction</u>**	

		and operation of the PV array, access roads and associated infrastructure: ▪ Provided that the footprint of the individual sites is not enlarged and their positions remain as planned, the cumulative impact of the proposed activity is regarded to be insignificant.	
Aggeneys PV Solar Power Plant	The main impacts on the visual environment will occur during the **construction phase** of the proposed project. These impacts were assessed to have **medium-low significance**. Activities that will result in impacts include: ▪ Increase in vehicular and other activity levels during the construction phase; ▪ The clearance of vegetation at the footprint of the construction lay-down yard, substation and each solar PV mounting structure; ▪ Fencing of the project site; ▪ Installation of the solar PV panels and construction of all related project infrastructure; and ▪ Generation of electricity from the PV panels during the operational phase of the project. **1) Change to the existing visual character of the project site during all project phases:** ▪ The largest visual impact will be experience due to the removal of natural vegetation and installation of the solar PV panels and	**1) The following mitigation measures were provided for the change to the existing visual character of the project site:** ▪ No vegetation removal should be allowed outside the designated project development footprint; ▪ A representative sample of indigenous plant species should be selected and relocated to an on-site nursery. During site remediation and rehabilitation, these species should be replanted on disturbed areas as per the rehabilitation plan; ▪ Where possible, the removal and destruction of indigenous vegetation should be avoided (i.e. adhering to the designated internal road network); ▪ An alien invasive and weed control programme should be implemented throughout the project lifetime; ▪ The possible tourism aspect of the solar PV power plant should be explored and promoted; and	1) Medium-low.

	associated infrastructure, since a possible change in the intangible heritage and sense of place landscape will occur. ▪ The construction activities themselves will lead to noise, dust and visual pollution due to the activities and transport requirements associated with labour, machinery and other materials. The pre-existing mining activities that are being carried out in the area will lead to some level of absorption capacity of the visual and sense of place landscape as a whole. ▪ The visual impact from vegetation removal will not be severe since the pre-existing vegetation is low-lying and is not a dominant aspect of the dramatic and stark landscape. However, after installation of the solar PV panels, the impact significance will increase. **2) Cumulative visual impacts:** ▪ The other renewable energy projects being proposed and/or constructed nearby will introduce potentially significant cumulative impacts on receptors traveling on the N14 national road. The solar PV developments will alter the sense of place and sense of remoteness of the visual landscape, since the solar panels of the proposed parks will be new, industrial and dominant structures within the	▪ Exotic tree species have been introduced in the town of Aggeneys along avenues. Planting of fast-growing species between receptors and the proposed Solar PV Power Plant is an option for visual screening; however it is not advised considering water scarcity and the threat of spreading of alien invasive species.	

	scenery. They may however be a good symbol for progress as South Africa taps into its natural legacy of solar power and renewable energy production. ▪ There is already an existing mining operation within the vicinity of the proposed solar plants/parks and there is a possibility that mining activities will expand, introducing additional negative visual impacts.		
Dida Solar Energy Facility	**1) <u>Potential visual impact of construction on observers in close proximity to the proposed solar energy facility:</u>** ▪ There will be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and land owners in the area. Dust from construction work could also result in potential visual impact. **2) <u>Potential visual impact on sensitive visual receptors that reside within 5km of the site during operation:</u>** ▪ The PV facility will consist of PV panels and power lines that will be visible on the site and to the surrounds. The visibility of PV panels may be a negative impact, depending on the people who live near the site or travel past the site on a	**1) <u>The following mitigation measures were provided for the potential visual impact of construction on observers in close proximity to the proposed solar energy facility:</u>** ▪ Retain and maintain natural vegetation in all areas outside of the development footprint; ▪ Proper planning and management of the construction site; ▪ Ensure that vegetation is not cleared unnecessarily during the construction period; and ▪ Rehabilitation of construction areas as soon as possible once construction in an area is complete. **2) <u>The following mitigation measures were provided for the potential visual impact on</u>**	1) Low; 2) Low; 3) Low; and 4) Low.

	regular basis. What is perceived as a negative impact is subject to individual preferences. **3) <u>Lighting Impacts:</u>** ▪ The PV facility will require general lighting for the facility. Therefore the potential for light pollution exists. **4) <u>Impact of the Power line:</u>** ▪ A new 66kV power line which will be 3.2km in length and 3.2km in height, extends from the planned facility to the existing Fontein Substation (located on the same property). The power line will have a visual impact of low significance after the use of mitigation measures. **5) <u>Cumulative visual impacts:</u>** ▪ The construction of the solar energy facility and ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within a fairly rural region. The same developer is proposing another PV facility on the adjacent farm, therefore this will be an additive visual impact. However, it also represent clustering of PV facilities in an area. ▪ This facility, plus the other proposed facility will result in minor cumulative lighting of the site and	**<u>sensitive visual receptors that reside within 5km of the site:</u>** ▪ *<u>Planning</u>*: o Retain and maintain natural vegetation in all areas outside of the development footprint; and o Plan internal roads and ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimized. Consolidate infrastructure as much as possible. ▪ *<u>Construction:</u>* o Rehabilitation of all construction areas; and o Ensure that vegetation is not cleared unnecessarily to make way for the access road and ancillary building. ▪ *<u>Operations:</u>* o Maintain the general appearance of the facility as a whole; and o Maintenance of roads to avoid erosion and suppress dust. ▪ *<u>Decommissioning:</u>* o Remove infrastructure and roads not required for the post-decommissioning use of the site; o Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications; and	

	immediate surrounds. The development of the proposed solar energy facility will contribute to a cumulative lighting impact in a rural region.	○ Monitor rehabilitated areas post-decommissioning and implement remedial actions. **3) <u>The following mitigation measures were provided for lighting impacts:</u>** ▪ *<u>Planning & Operation:</u>* ○ Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights; ○ Utilizing minimum lumen or wattage in fixtures; ○ Utilizing down-lighters, or shielded fixtures; and ○ Utilizing motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. 4) Mitigation measures were not provided for the impact of the power line. **5) <u>The following general mitigation measures were recommended:</u>** ▪ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. This measure will help to	

		soften the appearance of the facility within its context; ▪ Consolidate infrastructure as much as possible and making use of already disturbed areas rather than pristine sites where possible; ▪ Mitigation of lighting impacts include pro-active design, planning and specification lighting for the facility by a lighting engineer. The correct specification and placement of lighting and light fixtures for the Solar facility and the ancillary infrastructure will go far to contain rather than spread the light. Additional mitigation measures include the following: o Making use of Low Pressure Sodium lighting or other types of low impact lighting.	
Noupoort CSP Project	**<u>The following potential visual impacts are anticipated:</u>** 1) Potential impacts on general landscape character of the area during construction and operation; 2) Potential visual impact on users of the N9: 3) Potential visual impact on users of the R389; 4) Potential visual impact on users of three (3) minor roads; 5) Potential visual impact on users of the railway line/s; 6) Potential visual impact on residents of homesteads in close proximity;	**<u>The following mitigation measures have been provided for the potential visual impacts anticipated:</u>** ▪ *<u>Planning:</u>* o Plan levels to minimise earthworks to ensure that levels are not elevated; o Plan to maintain the height of structures as low as possible; o Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;	1) Low (neutral or negative); 2) Low (neutral); 3) Low (neutral); 4) Medium (negative to neutral); 5) Medium (neutral); 6) Low (negative to neutral); 7) Low (negative to neutral); 8) Low (neutral. If the lights are generally not

	7) Potential visual impact on residents of Noupoort particularly on the western edge of the town; 8) Potential lighting impacts; and 9) Ocular impacts associated with glint and glare. **<u>The following potential cumulative visual impacts are anticipated:</u>** 10) Cumulative visual impact of landscape change; 11) Cumulative visual impact on users of the N9: 12) Cumulative visual impact on users of the R389; 13) Cumulative visual impact on users of the other minor roads; 14) Cumulative visual impact on users of the railway line/s; 15) Cumulative visual impact on residents of homesteads; 16) Cumulative visual impact on residents of Noupoort particularly on the western edge of the town; 17) Cumulative lighting impacts associated with night time operation and security light; and 18) Cumulative impact of glint and glare.	○ Treat the back face of trough plant and structures to merge the development into its background; ○ Plan to utilize infra-red security systems or motion sensor triggered lighting; ○ Ensure that lighting is focused on the development with no light spillage outside the site; and ○ Keep lighting low, no tall mast lighting should be used. ▪ *<u>Operations:</u>* ○ Reinstate any areas of vegetation that have been disturbed during construction; ○ Remove all temporary works; ○ Monitor rehabilitated areas post-decommissioning and implement remedial actions; ○ Minimize disturbance and maintain existing vegetation as far as possible both within and surrounding the development area; ○ Treatment of trough plant backs; ○ Monitoring the occurrence or otherwise of glare impacts particularly during early morning and late afternoon; ○ Screening with opaque fencing / earth berms; and ○ Careful operation of solar collectors turning mirrors away from the sun during time	visible then the occasional light is unlikely to be seen as negative); 9) Low (negative); 10) Low (negative); 11) Low (neutral); 12) Low (neutral); 13) Medium (negative to neutral); 14) Medium (neutral); 15) Medium (negative to neutral); 16) Medium (negative to neutral); 17) Low (neutral); and 18) Low (negative).

		period when glare impacts are significantly adverse man substantially reduce or avoid visual impacts from offsite glare. ▪ *Decommissioning:* o Remove infrastructure not required for the post-decommissioning use of the site; o Return all affected areas to productive agricultural use; and o Monitor rehabilitated areas post-decommissioning and implement remedial actions.	

Appendix D

CORRESPONDENCE / FEEDBACK REGARDING THE VISUAL ENVIRONMENT RECEIVED TO DATE

- It should be noted that feedback regarding the visual environment has been received from a local landowner (i.e. Mr. Neil Miller from the Farm Landia near the town of Middelburg). A meeting was held with Mr. Miller on the 14th of September 2017 (during the time of the site visit) during which time his concerns regarding the visual impacts associated with the proposed development were noted. Mr. Miller's main concern is that the value of his property will decrease due to the presence of wind turbines and associated infrastructure (such as power lines) near to and in sight of his property. Mr. Miller's property (The Farm Landia) is however situated well outside of the visual assessment zone for the proposed development, and as such it is anticipated that the visual impact experienced form his property will be negligible.

  Following further consultation / correspondence with the above-mentioned landowner, it was confirmed that there was a misunderstanding regarding the extent of the proposed Phezukomoya WEF. It was confirmed that the Umsobomvu WEF is in actual fact the project which is being proposed adjacent to his property and will be in direct view from some parts the property. As such, it has been confirmed that the proposed Phezukomoya WEF is indeed situated well outside of the visual assessment zone and that the visual impact experienced from his property will be negligible.

  Copies of Mr. Miller's emails regarding his concerns about the visual environment, as well as the confirmation that the Umsobomvu WEF is in actual fact the project which is being proposed adjacent to his property, is provided below.

Stephan Jacobs

From: lilah@mweb.co.za
Sent: Tuesday, September 26, 2017 11:33 AM
To: Stephan Jacobs
Subject: Fwd: Wind farms

Follow Up Flag: Follow up
Flag Status: Completed

Hi Stephan,

Please find attached below e-mail from Neil Miller.

I'm afraid not much more info besides stating the concern again.

In the meantime I have e-mailed Mr Miller, stating that as the concern is essentially visual in nature, our assessment would be based on the findings of the VIA.

Regards,
Schalk

From: "neilm0664" <neilm0664@gmail.com>
To: lilah@mweb.co.za
Sent: Thursday, September 21, 2017 4:15:43 PM
Subject: RE: Wind farms

Hi Schalk

We met and I showed him more or less where the proposed sites are going to be placed if Eskom and who ever must sign signs.

Our main concern is that if we do not get Turbines allocated to be placed on our farms, our land prices will fall due to the turbines on our boundaries and in sight. I have suggested to Arcus that some sort of compensation system be implemented to adjoining farms.

I look forward to meeting with you when next you are in our area.

Thanks & Kind Regards

Landia Farming Middelburg Eastern Cape.
Neil & Laurraine Miller
Residential address Landia Farm Groothoek Road
PO Box 548
Middelburg 5900
072 3211884 082 842008
neilm0664@gmail.com

From: lilah@mweb.co.za [mailto:lilah@mweb.co.za]
Sent: 13 September 2017 02:53 PM
To: neilm0664@gmail.com
Subject: Windfarms

Dear Mr Miller,

Stephen Jacobs has informed me that you will meet on site tomorrow to look at potential visual impacts.

It seems like a good idea to postpone our conversation until the two of you had met, so I will give you a call tomorrow afternoon or on Friday.

Kind regards,
Schalk

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Stephan Jacobs

From: lilah@mweb.co.za
Sent: Wednesday, October 4, 2017 12:19 PM
To: Stephan Jacobs
Subject: Fwd: Wind farms

Hi Stephan,

Hope you are well.

Your assumption was correct: Mr Miller had confused San Kraal and Phezukomoya with Umsobomvu - see below.

Regards,
Schalk

From: "neilm0664" <neilm0664@gmail.com>
To: lilah@mweb.co.za
Sent: Wednesday, October 4, 2017 9:01:35 AM
Subject: RE: Wind farms

Good morning Schalk.

Thanks for your reply. San Kraal and Phezukamoya are both far from our farm. None of them will affect us at all. I think there is a misunderstanding about the extent of Phezukamoya. Umsobomvu is the project which is adjacent to us and will be in direct view from some parts of our farm. Inowind is in the process of negotiating possible sites for Turbines on Merinodale, Greyskop and Landia. We hope to know shortly if they would like to use these farms. They would have to use all three to achieve the power generation required to make it a viable project. Do you have a copy of the proposed placing of the towers? I had a copy but my computer crashed and I lost most of my Data.

Do you know who the project manager/managers is for the Umsobomvu project and how far the process is?

Thank you and your team for the very professional way you handled my query.

Landia Farming
Neil & Laurraine Miller
PO Box 548
Middelburg Karoo
072 3211884-0828420008
neilm0664@gmail.com

From: lilah@mweb.co.za [mailto:lilah@mweb.co.za]
Sent: Friday, 29 September 2017 13:12
To: neilm0664
Subject: Re: Wind farms

Hi Neil,

I have spoken to Stephan Jacobs, the Visual specialist you met with.

We are somewhat puzzled by your comments regarding proposed turbines in proximity to your property.

Both wind projects - San Kraal and Phezukamoya) we are working on in Noupoort/ Middelburg are located to the north of your property, closer to Noupoort. The nearest proposed turbines for these projects are 11-13 km from Landia farmstead. - See attached map: pink outline = San Kraal WEF; blue outline = Phezukamoya WEF; small circles are proposed turbines, and red circle indicates 10 km radius from Landia farmstead.

Is it possible that you may be confusing San Kraal and Phezukamoya with another proposed wind farm, namely the Umsobomvu wind farm directly adjacent to your west? - Find attached map indicating Umsobomvu wind farm (dark blue shaded area) in relation to Landia.

If so, note that the Umsobomvu wind farm does not form part of this application. The proponent (Innowind) is the same as for San Kraal and Phezukomya, but it is an entirely different project and application process (and not managed by Arcus).

Please let me know if this addresses your concerns with regard to the proposed San Kraal and Phezukamoya windfarms.

Kind regards,
Schalk van der Merwe

From: "neilm0664" <neilm0664@gmail.com>
To: lilah@mweb.co.za
Sent: Thursday, September 21, 2017 4:15:43 PM
Subject: RE: Wind farms

Hi Schalk

We met and I showed him more or less where the proposed sites are going to be placed if Eskom and who ever must sign signs.

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Thanks & Kind Regards

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Kind regards,
Schalk

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Stephan Jacobs

From: lilah@mweb.co.za
Sent: Tuesday, September 12, 2017 1:35 PM
To: neilm0664@gmail.com
Cc: Tony Barbour; anjaa@arcusconsulting.co.za; Stephan Jacobs
Subject: Phezukamoya and San Kraal wind farms - Social Study
Attachments: Landia in context of Phezukamoya WEF.jpg; Landia in context of San Kraal WEF.jpg

Dear Mr Miller,

I was referred to you by Anja Albertyn of Arcus, who has also forwarded your previous e-mail comments to Arcus regarding the proposed Phezukamoya and San Kraal wind farms.

Unfortunately I was only in Noupoort for two days last week, and could not meet with all potentially affected adjacent land owners.

I attach the latest layouts of the 2 proposed winf farms. The pink (San Kraal) and blue (Phezukamoya) indicate proposed turbine locations; the green (Alt 1), blue (Alt 2) and purple (Alt 3) indicates the proposed 132 kV powerline route alternatives from the resepctive wind farms to the envisaged Umsobomvu substation on Rietpoort. The orange lines indicate exising 132 kV Eskom lines.

If I have identified the right Landia, the nearest turbine on Phezukomoya would be around 11 km, and that on San Kraal around 14 km from the Landia farmstead (but I am uncertain to where Landia's boundary stretch). The three Transmission line Alternatives would be around 7 km NE of th Landia farmhouse; again I am unclear about Landia's boundaries.

I will give you a call tomorrow to discuss any comments and concerns in the light of the latest layouts.

If your concerns are mainly of a visual (sense of place) nature, I suggest you also give Mr Stephan Jacobs, the Visual Impact Assessment specialist, a call. He is currently on site in Noupoort. His number is: 072 737 2114. I have cc-ed him in on this e-mail.

Kind regards,
Schalk van der Merwe
082 0800 521
Tony Barbour Environmental Consulting

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