VISUAL IMPACT ASSESSMENT (VIA):

Basic Assessment for the Proposed Development of the 325MW Kudusberg Wind Energy Facility and associated infrastructure, between Matjiesfontein and Sutherland in the Western and Northern Cape Provinces: BA REPORT

Report prepared for:

CSIR – Environmental Management Services

P O Box 320

Stellenbosch, 7599

South Africa

Report prepared by:

SiVEST SA (Pty) Ltd

51 Wessel Road

Rivonia, Johannesburg, 2128

South Africa

16 September 2018

SPECIALIST EXPERTISE

CURRICULUM VITAE OF VISUAL SPECIALIST – ANDREA GIBB

Name	Andrea Gibb
Profession	Environmental Practitioner / Visual Specialist
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Senior Manager Environmental Division
Years with Firm	7 Years
Date of Birth	29 January 1985
Place of Birth	South Africa
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.

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

Key Experience

Specialising in the field of Environmental Management and Visual Assessment.

Andrea has 10 years' work experience and is employed by SiVEST Environmental as the Senior Manager heading up the Johannesburg office. She is primarily involved with managing large scale multifaceted Environmental Impact Assessments (EIAs) and Basic Assessments (BAs) (incl.

Amendment Applications), undertaken according to International Finance Corporation (IFC) standards and Equator Principles, within the renewable energy generation and electrical distribution sectors. Andrea has extensive experience in overseeing public participation and stakeholder engagement processes and has also been involved in environmental feasibility and sensitivity analyses. She further specialises in undertaking and overseeing visual impact and landscape character assessments.

Key Visual Impact Assessment Experience

Aug 2010 – to date

- VIAs for the proposed development of the Kuruman Phase 1 and Kuruman Phase 2 Wind Energy Facilities (WEFs) near Kuruman, Northern Cape Province.
- VIAs for the proposed construction of the Grasskoppies, Hartebeest Leegte, Ithemba and !Xha Boom Wind Farms near Loeriesfontein, Northern Cape Province.
- VIAs for the proposed Phezukomoya and San Kraal Wind Energy Facilities near Noupoort, Northern Cape Province.
- VIAs for the proposed Assagay Valley and Kassier Road North Mixed Use Developments, KwaZulu-Natal Province.
- VIA for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
- VIAs (Scoping and Impact Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.
- VIA (Scoping and Impact Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
- VIAs (Scoping and 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 for the proposed Tinley Manor South Banks Development, KwaZulu-Natal Province.
- VIAs (Scoping and Impact Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- Visual Status Quo and Due Diligence Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
- 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 (Scoping and Impact Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape 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.
- VIAs for the Spoornet Coallink Powerline Projects in KZN and Mpumalanga.
- VIA for the (Scoping and Impact Phase) proposed Construction of the Renosterberg Wind Farm near De Aar, Northern Cape Province.
- VIA for the (Scoping and Impact Phase) proposed Construction of the Renosterberg Solar PV Power Plant near De Aar, 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 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.

SPECIALIST DECLARATION

I, **Andrea Gibb**, as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I 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;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- 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 have no vested interest in the proposed activity proceeding;
- 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;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study 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:

Name of Specialist: **Andrea Gibb**

Date: **31 July 2018**

EXECUTIVE SUMMARY

Although the study area has a largely natural, untransformed visual character with some elements of rural / pastoral infrastructure, it is not typically valued or utilised for its tourism significance. The study area has however seen very limited transformation / disturbance and is considered to be largely natural / scenic. As such the proposed development is expected to alter the visual character
of the area and contrast significantly with the typical land use and / or pattern and form of human elements present.

Due to the low levels of leisure-based or nature-based tourism activities in the assessment area, only two (2) sensitive visual receptors were originally identified. These receptors were later eliminated from the assessment due to the fact that the owner of both properties has a vested interest in the proposed development and would not therefore perceive the WEF in a negative light. It was further ascertained that, although fifty two (52) potentially sensitive receptors were identified within the visual assessment zone, the proposed WEF development is likely to visually impact only twenty-three (23) of these receptors. Overall it can therefore be concluded that the visual impact of the proposed WEF would be reduced due to the lack of sensitive visual receptors present. In addition, the perception of the viewer/receptor is highly subjective, and as such, not all of these receptors would necessarily consider a WEF to be a negative visual impact. Therefore, tourist facilities and parties that have stated that they are opposed to the wind energy facility would be considered to be particularly sensitive, and to date, no such feedback has been received from interested and affected parties. Landowners that form part of the wind farm are expected to have a positive or neutral opinion to wind farms as they would not have consented to a wind farm on their property, if they were opposed to it.

The visual impact of the proposed development on the majority of the potentially sensitive visual receptors was rated as being negligible (28 in total). This is due to the fact that these receptor locations are either located outside of the proposed WEF development's viewshed or are situated further than 8 km from the nearest proposed wind turbine. Impacts on twenty-three (23) potentially sensitive receptor locations were rated as medium, while only one receptor location (VR54) would be subjected to high visual impacts. Impacts affecting VR54 are however mitigated somewhat by the fact that this receptor is located on the WEF application site and the owner has consented to the proposed development. It is therefore assumed that the owner of VR54 would not perceive the WEF in a negative light.

The impact rating revealed that overall the proposed WEF is expected to have a moderate negative visual impact rating during both construction and operation, with relatively few mitigation measures available. It could be argued that the key mitigation measure is to cluster wind energy developments in line with the intended outcome of the recently promulgated Komsberg REDZ – one of eight designated zones for renewable energy development. By clustering developments, the visual impacts are contained in one zone instead of sprawling over vast areas. Cumulative impacts associated with the proposed WEF would have a moderate negative visual impact rating during both construction and operation, with relatively few mitigation measures available. These impacts would however remain moderate after the implementation of the relevant mitigation measures, due to the nature of the impacts.

Several renewable energy developments are being proposed within a 50 km radius of the proposed WEF application site. These renewable energy developments would reduce the overall natural / scenic character of the study area, although they would increase the cumulative visual impacts if some or all of these developments are constructed. As mentioned, the cumulative impact assessment has been based solely on the information made available at the time by the EAP, namely the CSIR who source the information on other proposed and authorised wind farms from the DEA[1]. The cumulative impact assessment is thus based on broad assumptions as to the

[1] https://egis.environment.gov.za/

worst case impacts of these developments, assuming all facilities will be constructed and operated at the same time. In reality not all of the authorised projects will be constructed as only a fraction are selected as preferred bidders in terms of the highly competitive renewable energy independent power producer procurement programme. The relatively large number of renewable energy facilities within the surrounding area and their potential for large scale visual impacts could however significantly alter the sense of place and visual character in the study area, as well as exacerbate the visual impacts on surrounding visual receptors.

A comparative assessment of alternatives for the proposed access road, construction camp and substation site was undertaken in order to determine which of the alternatives would be preferred from a visual perspective. No fatal flaws were identified for any of the route, construction camp or substation site alternatives. All the route and substation site alternatives were deemed as favourable, as were construction camp alternatives 2 and 3. Construction camp alternative 1 was however seen as the least preferred option.

From a visual perspective therefore, the project is deemed acceptable and the EA should be granted. SiVEST is of the opinion that the impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

LIST OF ABBREVIATIONS

BA	Basic Assessment
DEA	Department of Environmental Affairs
DEM	Digital Elevation Model
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GIS	Geographic Information System
kV	Kilo Volt
MW	Megawatt
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NGI	National Geospatial Information
OHL	Overhead Line
PPP	Public Participation Process
PV	Photovoltaic
SANBI	South African National Biodiversity Institute
VAZ	Visual Assessment Zone
VIA	Visual Impact Assessment
WEF	Wind Energy Facility

GLOSSARY

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 / visual assessment zone is assumed to encompass a zone of 8km from the outer boundary of the proposed wind energy facility (WEF) application site.
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 geographical area which is visible from a particular location.
Visual Assessment Zone	The visual assessment zone / study area is assumed to encompass a zone of 8km from the outer boundary of the proposed wind farm application site.
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.

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Section of Report
1. (1) A specialist report prepared in terms of these Regulations 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;	**Page 1**. A copy of the Specialist's curriculum vitae (CV) is included in **Appendix C**.
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	**Page 3**
(c) an indication of the scope of, and the purpose for which, the report was prepared;	**Section 1.1**
(cA) an indication of the quality and age of base data used for the specialist report;	**Section 1.1.4** and **Section 1.1.5**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	**Section 1.3**, **Section 1.5**, **Section 1.6** and **Section 1.7**.
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**Section 1.1.3** and **Section 1.1.4**.
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	**Section 1.1.3**, **Section 1.1.4**and **Section 1.1.5**.
(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 1.3**, **Section 1.5**, **Section 1.6**and **Section 1.7**.
(g) an identification of any areas to be avoided, including buffers;	**Section 1.3.6**, **Section 1.6.1**and **Section 1.6.2**.
(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;	The Visual Sensitivity Map has been provided in **Appendix B**.
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Section 1.1.4**
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, **[including identified alternatives on the environment]** or activities;	**Section 1.3**, **Section 1.5**, **Section 1.6** and **Section 1.7**.
(k) any mitigation measures for inclusion in the EMPr;	**Section 1.6**, **Section 1.7** and **Section 1.9**.
(l) any conditions for inclusion in the environmental authorisation;	**N/A.** No specific conditions relating to the visual environment need to be included in the environmental authorisation (EA)
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	**Section 1.7**and **Section 1.9**
(n) a reasoned opinion- (i) **[as to]** whether the proposed activity, activities or portions thereof should be authorised; (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, and where applicable, the	**Section 1.11**

closure plan;	
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	**Section 1.1.3**.
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	**N/A**. No comments have been received to date.
(q) any other information requested by the competent authority.	**N/A**. No information regarding the visual study has been requested from the competent authority to date.
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**

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1 VISUAL IMPACT ASSESSMENT (VIA)

1.1 VISUAL IMPACT ASSESSMENT (VIA) INTRODUCTION AND METHODOLOGY

1.1.1 Scope and Objectives

Kudusberg Wind Farm (Pty) Ltd is proposing to develop a 325 MW Wind Energy Facility (WEF) at Kudusberg, a site approximately 45 km south-west of Sutherland in the Northern and Western Cape Provinces (hereafter referred to as the 'proposed development'). The proposed WEF together with associated infrastructure is referred to as the Kudusberg WEF. The proposed development is located within the Witzenberg and Karoo Hoogland Local Municipalities, which falls within the Cape Winelands and Namakwa District Municipalities respectively.

The proposed development site is located within the Renewable Energy Development Zone 2 (REDZ 2) known as Komsberg, published in terms of Section 24(3) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998) in Government Notice (GN) R. 114 of 16 February 2018. Considering this, a Basic Assessment (BA) Process as contemplated in terms of regulation 19 and 20 of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), is required for the authorisation of this large scale WEF. As part of this BA process, a Visual Impact Assessment (VIA) is required in order to inform the Basic Assessment Report (BAR) and Application for Environmental Authorisation (EA) under NEMA.

The aim of the VIA is to identify potential visual issues associated with the development of the proposed WEF and its associated infrastructure, as well as to determine the potential extent of visual impact. This is done by characterising the visual environment of the area and identifying areas of potential visual sensitivity that may be subject to visual impacts.

1.1.2 Terms of Reference

The Terms of Reference for this VIA include the following:

- A key task for the specialists is to review the existing sensitivity mapping from the SEA for the project area and provide an updated sensitivity map for the Kudusberg WEF project site.
- Adhere to the requirements of specialist studies in terms of Appendix 6 of the NEMA EIA Regulations (2014), as amended.
- Identify and assess the potential impacts of the proposed Kudusberg WEF project and its associated infrastructure by assessing the impacts during the construction, operational and decommissioning phases.
- Identify and assess cumulative impacts from other Wind and Solar PV projects located within a 50 km radius from the Kudusberg WEF that already have received Environmental Authorisation (EA), are preferred bidders and/or may still be identified as having received a positive Environmental Authorisation at the start of this BA process.
- Propose mitigation measures to address possible negative effects and to enhance positive impacts to increase the benefits derived from the project.
- Use the Impact Assessment Methodology as provided by the CSIR.
- Assess the project alternatives and the no-go alternative.
- Provide a recommendation as to whether the project must receive Environmental Authorisation of not and Identify any aspects which are conditional to the findings of the assessment which are to be included as conditions of the Environmental Authorisation.

Specific ToR:

- Describe the visual character of the local area. Any significant visual features or visual disturbances should be identified and mapped, as well as any sensitive visual receptors within the proposed project area or within viewsheds of the project.
- Visual character and visual absorption capacity should be described.
- Viewsheds for various elements of the proposed development should be calculated, defined and presented, and the varying sensitivities of these viewsheds must be highlighted.
- Mapping of visual sensitivity of the site will require consideration of visual receptors outside the site, and sensitivity to development on the site for potentially affected visual receptors of "very high" sensitivity.
- Assessment to be based on findings of the Wind and Solar SEA (CSIR, 2015), a site visit, visual modelling, and a photographic survey of the surrounding region from which the landscape and visual baselines can be prepared.
- Identify and assess potential impacts from the project on the receiving environment. Schematic portrayals of the visual impact of the proposed project infrastructure on the different viewsheds identified must be presented. All impacts should be considered under varying conditions as appropriate to the study i.e. day, night, clear weather, cloudy weather etc. Provide mitigation measures to include in the environmental management plan
- Maps depicting viewsheds/line of sight across the site should be generated and included in the reports. These maps should indicate current viewsheds/visual landscape/obstructions as well as expected visual impacts during the construction, operational and decommissioning phases of the proposed development.
- G7 to provide turbine specifications to model.
- Please include a photomontage from where the R356 crosses the Portion 2 of Farm 80 – GPS coordinates can be provided.

1.1.3 Approach and Methodology

As mentioned above, this VIA is based on a combination of desktop-level assessment as well as field-based observation.

- Physical landscape characteristics

Physical landscape characteristics such as topography, vegetation and land use are important factors influencing the visual character and visual sensitivity of the study area. Baseline information about the physical characteristics of the study area was initially sourced from spatial databases provided by National Geospatial Information (NGI), the South African National Biodiversity Institute (SANBI) and the South African National Land Cover Dataset (Geoterraimage – 2014). The characteristics identified via desktop means were later verified during the site visit.

- Identification of sensitive and potentially sensitive receptor locations

Receptor locations and routes that are sensitive and / or potentially sensitive to the visual intrusion of the proposed development were also identified and assessed to determine the impact of the proposed development on each of the identified receptor locations.

- Fieldwork and photographic review

A three (3) day site visit was undertaken between the 25th and the 27th of July 2018 (winter). The study area was visited to:

- verify the landscape characteristics identified via desktop means;
- capture photos of the proposed study area;

- verify the sensitivity of visual receptor locations identified via desktop means;
- eliminate receptor locations that are unlikely to be influenced by the proposed development;
- identify any additional visually sensitive receptor locations within the study area; and
- assist with the impact rating assessment from visually sensitive receptor locations.

- 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 several different factors including geographical extent, probability, reversibility, irreplaceable loss of resources, duration and cumulative effect in order to assign a level of significance to the visual impact of the project.

A separate rating matrix was used to assess the visual impact of the proposed development on each visual receptor location (both sensitive and potentially sensitive), as identified. This matrix is based on three (3) parameters, namely the distance of an identified visual receptor from the proposed development, the presence of screening factors and the degree to which the proposed development would contrast with the surrounding environment.

- Visualisation Modelling

Visual simulations were produced from specific viewpoints in order to support the findings of the visual assessment. The proposed WEF development 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 likely visibility of the proposed turbines from various locations within the visual assessment zone and to assist with rating the visual impact.

- Consultation with I&APs

Continuous consultation with Interested and Affected Parties (I&APs) undertaken as part of the public participation process for the BA will be used to help establish how the proposed development will be perceived by the various receptor locations and the degree to which the impact will be regarded as negative. Although I&APs other than the landowners whose properties form part of the wind farm have not as yet provided any feedback in this regard, the report will be updated to include relevant information as and when it becomes available.

1.1.4 Assumptions and Limitations

The following assumptions and limitations apply:

- This visual study has been undertaken based on the project description provided by the client and the CSIR at the inception of the project.

- Although photographs were taken during the site visit, these have been supplemented with additional imagery and photographs which were sourced from the internet as photographs could not be taken from certain locations in the study area (such as from all of the accommodation facilities at SR1 and SR2).

- 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 8 km from the proposed WEF – i.e. an area of 8 km from the boundary of the application site. This 8 km limit on the visual assessment zone relates to the importance of distance when assessing visual impacts. Although the WEF may still be visible beyond 8 km, the degree of visual impact would diminish considerably and as such the need to assess the impact on potential receptor locations beyond this distance would not be warranted.

- Despite the fact that the study area or visual assessment zone encompasses a zone of 8 km from the boundary of the application site, the distance from the nearest proposed turbine position was used when determining the zones of visual impact for the identified visual receptor locations (both sensitive and potentially sensitive). As such, even though a receptor location may be located within a negligible visual impact zone, it was still taken into consideration for the purposes of this study.

- The identification of visual receptor locations has been based on a combination of desktop assessment as well as field-based observation. Initially Google Earth imagery, 2018 was used to identify potential visual receptor locations within the study area. Thereafter a three (3) day site visit was undertaken between the 25th and 27th of July 2018 (winter) to verify the sensitive visual receptor locations within the study area and assess the visual impact of the development from these receptor locations. 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 location in an area potentially affected by the proposed development does not therefore necessarily mean that visual impacts will be experienced.

- Due to access limitations during the field investigation and the inaccessible mountainous nature of the study area, the identified potentially sensitive visual receptor locations (such as farmsteads and dwellings) could not be visited and investigated during the field investigation. As such several broad assumptions have been made in terms of the sensitivity of the receptors to the proposed development. All identified receptor locations were regarded as being potentially sensitive to the visual impacts associated with the proposed development and were assessed as part of the VIA.

- Impact rating assessments for the sensitive and potentially sensitive visual receptor locations have been undertaken in this VIA report. A matrix has been developed to assist in the assessment of the potential visual impact at each visual 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 three (3) 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 visual receptor location by the proposed WEF development. The matrix should therefore be seen as a representation of the likely visual impact at a visual receptor location. The results of the matrix should be viewed in conjunction with the visualisation modelling exercise to gain a full understanding of the likely visual impacts associated with the proposed WEF development.

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

- A viewshed analysis was undertaken to identify parts of the study area from where the proposed WEF development would not be visible. Despite the fact that receptor locations situated within these areas are not expected to experience a visual impact as a result of the development of the proposed WEF, these locations were still taken into consideration for the purposed of this study.

- 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 visibility

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.

- The visual sensitivity analysis is based purely on the likely degree of visibility of the wind turbines from the potentially sensitive receptors. This analysis does not therefore 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 sensitive and potentially sensitive receptor locations.

- Due to the varying scales and sources of information as well as the fact that the terrain data available for the study area (NGI 25m DEM) is fairly coarse and somewhat inconsistent; 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 DEM.

- As the study area lies within the Sutherland Central Advantage Area, it is assumed that pilot activated lighting methods, as prescribed by the CAA, will be utilised for obstacle lighting on the turbines and that other lighting on the WEF site will be kept to a minimum. As such, the night-time environment in the study area was not fully investigated and only general measures to mitigate the impact of additional light sources on the ambiance of the nightscape have been provided.

- The visual study has been based on the design and layout information for the proposed development which was made available by the client the CSIR. The potential visual impact of the typical infrastructure associated with a WEF development has also been assessed.

- The assessment of receptor-based impacts has been based on the turbine layout provided by the client and the CSIR. It is however recognised that this is a preliminary layout and is subject to changes based on a number of potential factors, including the findings of the BA studies. The turbine sizes, numbers and/or locations may thus change, which may require a re-assessment of the visual impacts on identified receptor locations.

- The cumulative impact assessment in this VIA has been based on the information made available by the Environmental Assessment Practitioner (EAP), namely the CSIR. In addition, this cumulative impact assessment is based on broad assumptions as to the likely impacts of these developments.

- Visualisation modelling from all sensitive and potentially sensitive receptor locations has not been undertaken. 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 WEF development. The visual models represent a visual environment that assumes that all vegetation cleared during construction will be restored to its current state after the construction phase. This is however an improbable scenario as some vegetation cover may be permanently removed which may reduce the accuracy of the models generated. At the time of this study the proposed project was still in the planning phase and as such the turbine layouts, as provided by the client, may change. Although infrastructure associated with the facility has not been included in the models, this is not considered to be a major limitation as the visual impact of associated infrastructure would be minor when considering the infrastructure next to the wind turbine.

  It should be noted that the fieldwork was undertaken in late July 2018, during late winter. The study area is however typically characterised by low levels of rainfall all year round

and therefore the season is not expected to affect the significance of the visual impact of the proposed development

- The overall weather conditions in the study area have certain visual implications and are expected to affect the visual impact of the proposed development to some degree. Clear weather conditions, as experienced during the field visit, tend to prevail throughout the year in the study area. In these clear conditions, the wind turbines would present a greater contrast with 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 this VIA.

1.1.5 Source of Information

The main sources of information which were utilized for the VIA included:

- Project description for the proposed Kudusberg WEF provided by G7;
- Elevation data from 25m DEM from the NGI;
- 1:50 000 topographical maps of South Africa from the NGI;
- Land cover and land use data extracted from the 2013-2014 South African National Land-Cover Dataset provided by GEOTERRAIMAGE;
- Vegetation classification data extracted from SANBI's VEGMAP 2012 dataset;
- Google Earth Satellite imagery 2018;
- South African Renewable Energy EIA Application Database from Department of Environmental Affairs (incremental release Quarter 2 2018); and
- The findings of the Wind and Solar SEA (CSIR, 2015).

1.2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE VISUAL IMPACT ASSESSMENT (VIA)

In this section, the typical visual issues and impacts related to the establishment of a WEF development are discussed. It is important to note that over the past few years many WEFs have already been constructed in South Africa. The development and associated environmental assessment of WEFs in South Africa is however 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.

Detailed below is a preliminary list of the key components of the proposed development that have visual implications. Although the associated on-site infrastructure has been included here, the visual impact of associated infrastructure is generally far less significant than the visual impact associated with wind turbines. The infrastructure would however, magnify the visual prominence of the proposed development if located on ridge tops or flat sites in natural settings where there is limited tall wooded vegetation present to conceal the impact.

1.2.1 Turbines

Wind turbines proposed for the Kudusberg WEF will have a hub height of up to 140 m, a rotor diameter of up to 180 m and a blade length of up to 90 m (**Figure 1**). Each wind turbine will have a permanent compacted hard standing laydown area (also known as a crane pad) of 90 m x 50 m (total footprint 25.2 ha) which will be required for turbine crane usage during construction and for on-going maintenance purposes for the life span of the WEF. At this stage, it is proposed that up to 56 turbines will be constructed, each with a generation capacity between 3 MW and 6.5 MW in nameplate capacity with a foundation of up to 30 m in diameter and up to 5 m in depth. The height of the turbines and their location on higher lying ridges and plateaus would result in the development typically being visible over a large area.

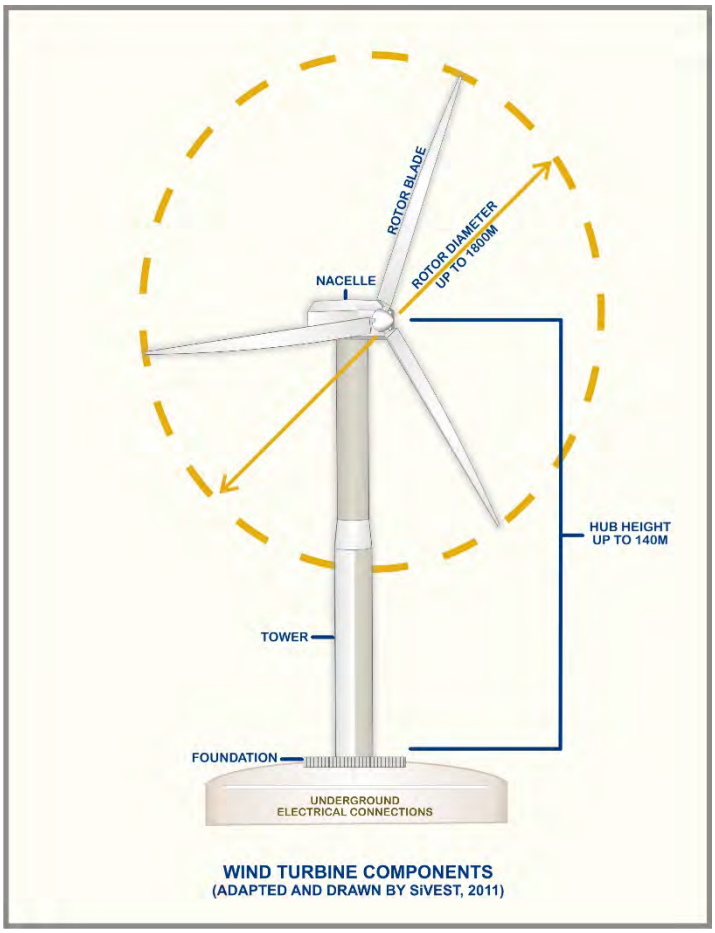
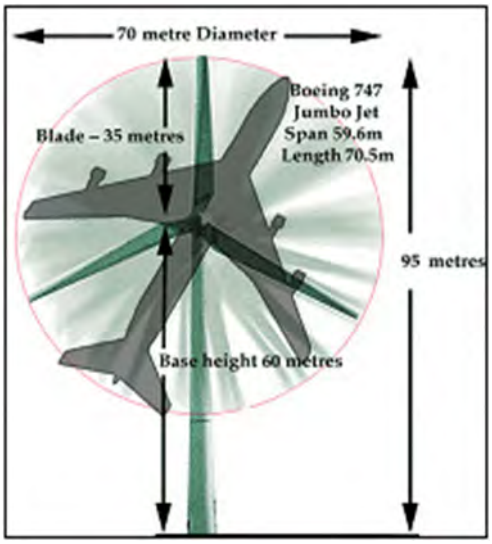


Figure 1: Typical components of a wind farm

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.

- **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 500 m) 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).

- **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 (2) 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.

1.2.2 Electrical Transformers

Electrical transformers with a capacity of 690V/33 kV are required and will be situated adjacent to each of the proposed wind turbines in order to step up the voltage to 33 kV. It should be noted that the typical footprint of such a transformer is approximately 2 m x 2 m but can be up to 10 m x 10 m at certain locations. Due to the small size of these electrical transformers, as well as their close proximity to the wind turbines, the visual impact associated with this infrastructure will be dwarfed by the wind turbines and will this be far less significant than the visual impact associated with the wind turbines. However, this infrastructure would magnify the visual prominence of the proposed development if located on ridge tops or flat sites in natural settings where there is limited tall wooded vegetation present to conceal the impact.

1.2.3 Overhead Power Lines / Underground Cabling

The transformers at the base of each turbine will be connected to a 33/132 kV on-site substation by way of underground cabling or overhead power lines. It should be noted that underground cabling will only be used where it is feasible along the access roads. Outside of the road footprints and where topography and environmental concerns preclude underground cabling, overhead power lines will be used.

Figure 2 below shows the process typically associated with the generation of electricity from WEFs.

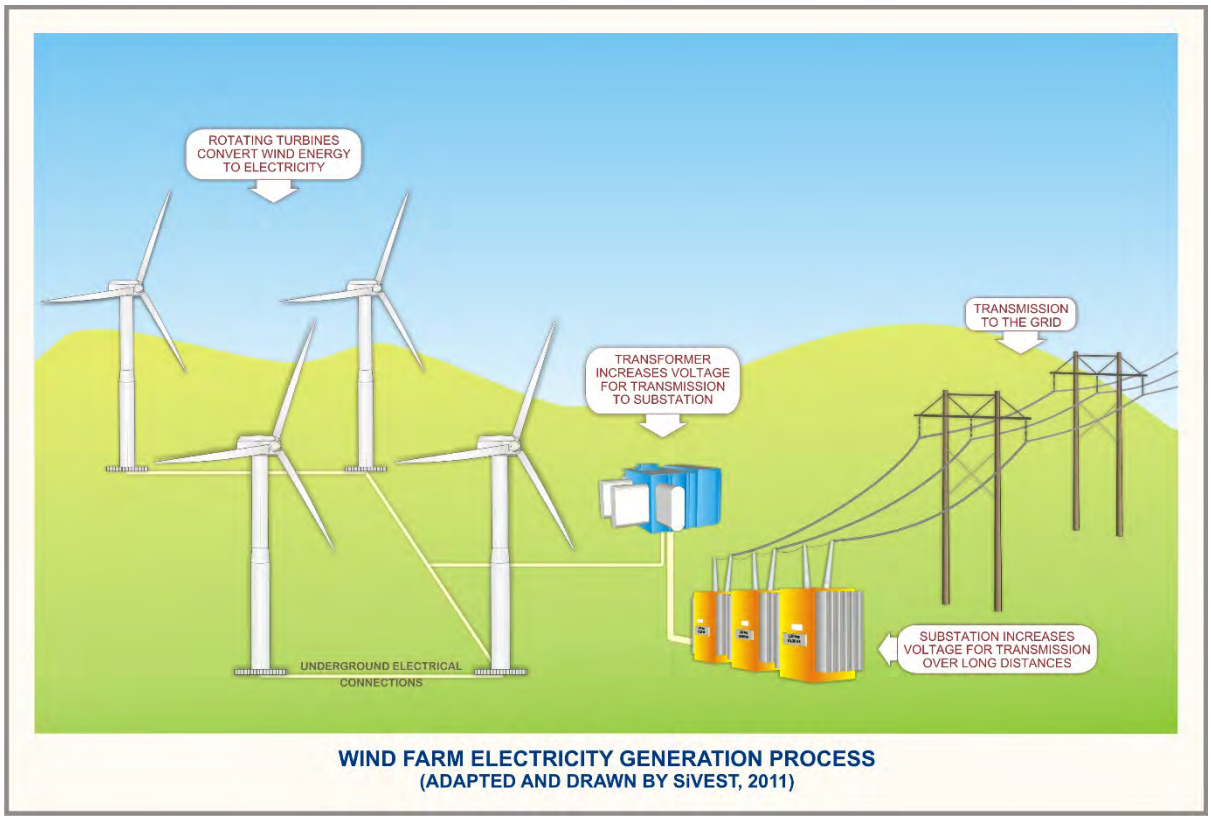


Figure 2: Conceptual wind farm electricity generation process showing electrical connections

Underground cabling could leave a 'scar' in the landscape which would create a visual contrast with the largely natural vegetation on the site. As all the turbines will be placed on high ridges / high points on the proposed WEF site, it is expected that underground cabling will result in some form of a visual impact. It is thus 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. In addition, erosion control measures should be employed to prevent the scarring from worsening with time.

Overhead 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. These power lines 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 ridges and associated sloping ground. Excavations associated with the power lines may become prominent if they create a linear feature that contrasts with the surrounding vegetation. However, when considering the scale of a wind turbine in comparison to a 33 and or 132kV power line, the wind turbine would be the prominent feature.

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. It is important to note that there are several existing high voltage power lines in the southern section of the study area. These include two (2) sets of 400 kV power lines and one (1) set of 765 kV power lines which traverse the southern section of the study area in south-west to north-east alignments respectively (**Figure 19**). The presence of these high voltage power lines is therefore expected to lessen the visual contrast associated with the introduction of a new power line.

1.2.4 On-site Substation

A new 33/132 kV on-site substation, with a footprint of approximately 2.25 hectares (ha) is being proposed which will increase the voltage before feeding the generated electricity to the Eskom grid. It should be noted that the 33 kV footprint of this substation is being assessed as part of this BA process for the WEF, while the 132 kV footprint of the substation is being assessed in a separate BA process. This is due to the fact that the current applicant will remain in control of the low voltage components (33kV yard) of the 33/132 kV on-site substation, whereas the high voltage components (132 kV) will likely be ceded to Eskom shortly after the completion of construction. In isolation, the on-site substation may be considered to be visually intrusive, however, it must be assumed that the substation would be built to serve the needs of the proposed WEF and thus, the substation would only be constructed if the proposed WEF was developed as well.

A substation is by nature a large object which will typically be visible for great distances. In the context of a largely natural landscape, the new on-site substation will be perceived to be highly incongruous. However, the on-site substation would likely form part of the proposed WEF complex, as viewed from the surrounding farmsteads / homesteads. Views of the on-site substation would therefore be dwarfed by the large number of turbines that would be visible. As such, the proposed on-site substation is not expected to be associated with a significant visual impact, or even a measurable cumulative impact. In addition, the presence of other anthropogenic objects associated with the built environment, especially other substations, may result in the visual environment being considered to be 'degraded' and thus the introduction of a new on-site substation into this setting may be less of a visual impact than if there was no existing built infrastructure visible.

1.2.5 Access Roads

Internal access roads of up to 12 m wide and with a total footprint of approximately 82.44 ha (including structures for storm water control) will be required to access each proposed wind turbine as well as the proposed 33/132 kV on-site substation. Where possible, existing roads will be upgraded. Turns will have a radius of up to 50 m for abnormal loads (especially turbine blades) to access the various proposed wind turbine positions. These access roads could be considered a visual intrusion if they traverse sloping ground on an aspect that is visible to the surrounding area or if they are constructed in visible areas of the site. Roads are likely to be wider than cable trenches and could be even more greatly visible than the cable servitude. In addition, the cutting of 'terraces' into a steep sided slope would increase the visibility and contrast of the road against the surrounding vegetation.

Considering that the proposed access roads are located on sloping terrain, it is likely that there will be some form of visual impact associated with the construction of these access roads. Additionally, if these roads are not maintained correctly during the construction phase, vehicles travelling along the gravel access roads could expose surrounding farmsteads / homesteads to dust plumes.

1.2.6 Laydown Areas and Construction Camp Area

Temporary infrastructure in the form of a construction camp will be required for the construction phase of the proposed development. The construction camp will have a footprint of approximately

12.6 ha, which will include an on-site concrete batching plant for use during the construction phase. The site will also accommodate offices, administration, operations and maintenance buildings during the operational phase. From a visual perspective, construction camps / yards could result in visual impacts if they are placed in prominent positions such as on ridge tops. In these locations, buildings may break the natural skyline, drawing the attention of the viewer.

1.2.7 Additional Infrastructure

Fencing will be required for the proposed WEF development. However, this will be limited around the construction camp, substation and batching plant. The entire proposed WEF would not be fenced off. The height of fences around the construction camp is anticipated to be up to 4 m.

In addition, temporary infrastructure to obtain water from available local sources / new or existing boreholes (including a potential temporary above ground pipeline of approximately 35c m diameter) to feed water to the on-site batching plant. Water will potentially be stored in temporary water storage tanks.

As mentioned, the visual impact of this associated infrastructure is generally expected to be far less significant than the visual impact associated with the proposed wind turbines. The infrastructure would however, magnify the visual prominence of the proposed development if located on ridge tops or flat sites in natural settings where there is limited tall wooded vegetation present to conceal the impact. It should also be noted that some of this infrastructure is only temporary and will be removed after the construction phase.

1.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

1.3.1 Site Location

The proposed WEF is located approximately 45 km south-west of Sutherland in the Northern and Western Cape Provinces. In addition, the proposed development is located within the Witzenberg and Karoo Hoogland Local Municipalities, which fall within the Cape Winelands and Namakwa District Municipalities respectively (Refer to ***Regional Context Map*** which has been provided as ***Map 1*** in **Appendix B**).

As shown in the ***Site Locality Map*** which has been provided as ***Map 2*** in **Appendix B**, the application site comprises of sixteen (16) farms and is approximately 29 881 ha in extent, although the actual footprint of the proposed development is only expected to occupy only a portion of this area.

1.3.2 Topography

The study area is largely dominated by a range of high mountains / hills which traverse various parts of the study area (**Figure 3**).

Figure 3: View north-east from the Gatsrivier Road, (approximately 3kms outside the application site) showing a typical view of the range of high mountains / hills which dominate the study area

Much of the study area is therefore dominated by steep slopes and broad ridges of these high mountains and escarpments, while some surrounding parts are characterised by relatively flat plains (**Figure 4**). It should also be noted that several rivers and / or drainage lines traverse various parts the study area.

Figure 4: View eastwards from the R356 main road, (some 5kms north-west of the application site) showing the topography typical of this sector of the study area.

Much of the proposed application site lies within the range of the above-mentioned high mountains / hills and thus the terrain here is characterised by a mix of incised valleys and flatter, higher lying plateaux (**Figure 5**).

Figure 5: View from the Gatsrivier Road, on the western boundary of the application site showing the general topography across the north-western sector of the application site.

The topography and slope of the study area is illustrated in the respective ***Topography*** and ***Slope Classification Maps*** which have been provided as ***Map 3*** and ***Map 4*** in **Appendix B**.

Visual Implications

Areas of flat relief, such as the flat plains and the higher-lying plateaux, are characterised by wide ranging vistas. 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 for example, the vista would be limited (**Figure 6**), whereas a much wider view or vista would be available from the higher-lying ridge tops or slopes (**Figure 7**). Importantly in the context of this study the same is true of objects placed at different elevations and within different landscape settings, with objects placed on high-elevation slopes or ridge tops being highly visible, while those placed within valleys or enclosed plateaux would be far less visible.

Figure 6: View eastwards from the Gatsrivier Road on the western boundary of the application site showing typical limited vistas experienced in the hillier parts of the study area

Figure 7: View south-west from the Gatsrivier Road (approximately 4kms outside the application site) showing typical wide vistas experienced from high-lying areas

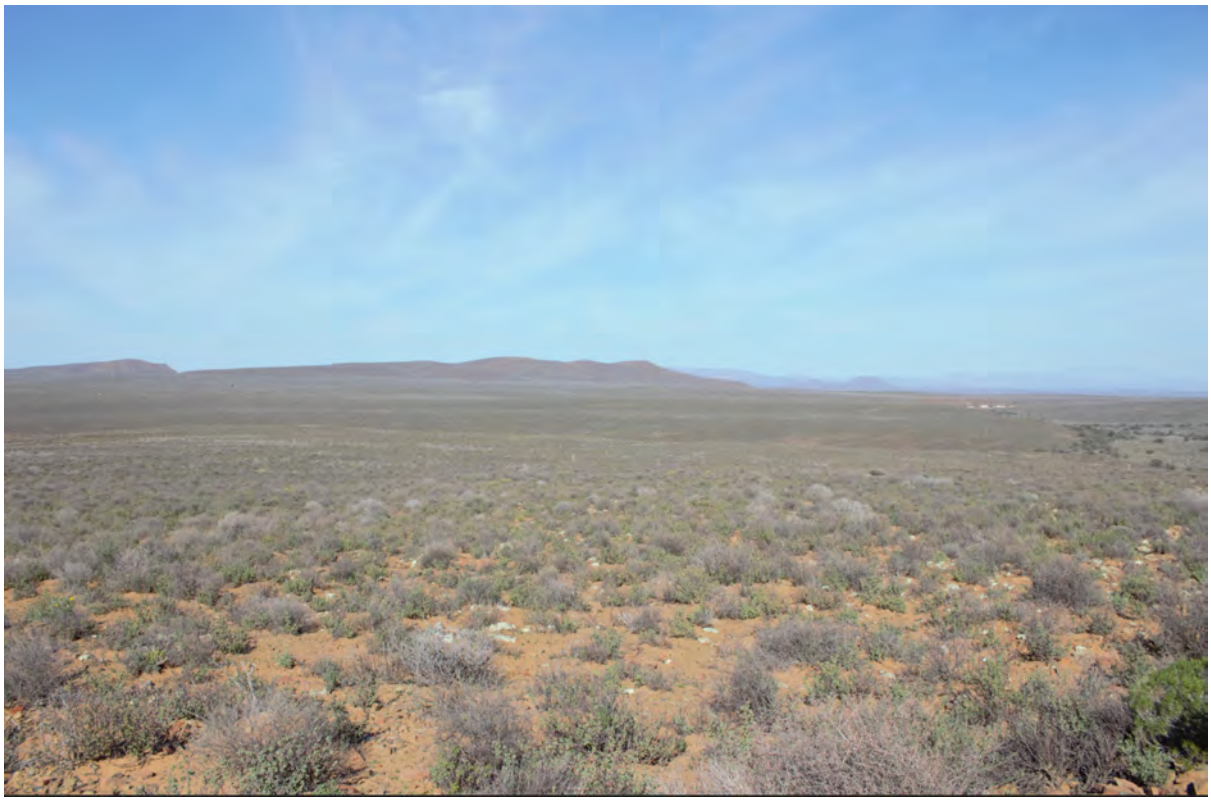


Figure 8: Typical view across the study area

GIS technology was used to undertake a preliminary visibility analysis for the proposed turbine positions. A worst-case scenario was assumed when undertaking the analysis, in which the proposed turbine positions were considered with a maximum height of 230 m. Other infrastructure associated with the proposed WEF was not factored into the visibility 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 turbines 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 WEF development. The viewshed analysis does not consider any existing vegetation cover or built infrastructure which may screen views of the proposed development. This is again to assess the worst-case scenario. In addition, detailed topographic data was not available for the broader study area and as such the visibility 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.

The results of this analysis are shown in the ***Preliminary Visibility Analysis Map*** which has been provided as ***Map 5*** in **Appendix B**. From this it is evident that the proposed wind turbines would be highly visible from large parts of the study area.

1.3.3 Vegetation

According to Mucina and Rutherford (2012), much of the study area is covered by the Koedoesberge – Moordenaars Karoo vegetation type, which tends to occur on slightly undulating hills to hilly landscapes. This vegetation type comprises low succulent scrubs, scattered tall shrubs and patches of “white” grass visible on plains. The dwarf shrubs include *Pteronia*, *Drosanthemum* and *Galenia.* (**Figure 9**).

Figure 9: Typical vegetation cover prevalent in the study area

The central and south-eastern sections of the study area, which are dominated by the high mountains / hills, are however classified as Central Mountain Shale Renosterveld. This vegetation type is typically found on slopes and broad ridges of low mountains and escarpments, with tall shrubland dominated by renosterbos and large areas of mainly non-succulent karoo shrubs and with a rich geophytic flora in the undergrowth or in more open, wetter or rocky habitats (**Figure 10**).

Figure 10: Typical vegetation cover found on slopes and broad ridges of the mountains / hills and escarpments

A few species of relatively small trees can also be found scattered throughout study area, especially where rivers / drainage lines are present (**Figure 11**).

Figure 11: View of the relatively small trees which are scattered throughout the study area, especially at rivers / drainage lines

In certain areas, anthropogenic activities have had an impact on the natural vegetation, especially around farmsteads, where over many years, tall exotic trees and other typical garden vegetation have been established (**Figure 12**). Much of the study area however is still characterised by natural low shrubland with transformation limited to a few isolated areas where pastoral activities such as livestock rearing and / or cultivation are taking place.

Figure 12: Example of the typical tall exotic trees and other garden vegetation which have been established around farmsteads within the study area

A ***Vegetation Classification Map*** has been provided as ***Map 6*** in **Appendix B**.

Visual Implications

The predominant low shrub layer results in wide-open vistas across most of the study area. Additionally, due to the relatively small nature of the trees which can be found scattered throughout the study area, vegetation would only provide significant screening in areas where artificial wooded vegetation has been established around farmhouses (**Figure 11** and **Figure 12**). The relatively low density of human habitation and natural vegetation cover across majority of the study area would give the viewer the general impression of a largely natural rural setting (**Figure 13**).

Figure 13: Typical natural rural visual character prevalent in the study area

1.3.4 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, shrubland Fynbos and woodland / open bush. In addition, small patches of grassland and thicket / dense bush can also be found in isolated parts of the study area (Refer to ***Land Cover* Classification *Map*** which has been provided as ***Map 7*** in **Appendix B**). The arid nature of the local climate has resulted in livestock rearing being the dominant activity within the area (**Figure 14**). Only very small, isolated areas have been cultivated and as such, the natural vegetation has been retained across much of the study area.

Figure 14: Evidence of livestock rearing taking place within the study area

The nature of the climate and corresponding land use has also resulted in low stocking densities and relatively large farm properties across the area. 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 (**Figure 12** and **Figure 13**), gravel access roads (**Figure 15**), ancillary farm buildings (**Figure 17**), telephone lines (**Figure 17**), fences, Eskom power lines, farm workers' dwellings and windmills (**Figure 18)**.

Figure 15: Typical view of a gravel access roads found within the study area

Figure 16: Example of typical ancillary farm buildings found within the study area

Figure 17: Typical view of telephone lines found within the study area

Figure 18: Typical view a windmill in the study area

As previously mentioned, existing high voltage power lines traverse the southern section of the study area. This includes two (2) sets of 400 kV power lines and one (1) set of 765 kV power lines which traverse the southern section of the study area in south-west to north-east alignments respectively (**Figure 19**).

Figure 19: Typical view of some of the existing high voltage power lines which traverse the southern section of the study area

Another prominent man-made feature in the study area is a tall tower, assumed to be a radio or telecommunications tower, which is visible from the Gatsrivier road to the west of the application site (**Figure 20**).

Figure 20: View of a relatively tall tower found within the study area

The closest built-up area is the town of Matjiesfontein which is situated approximately 35 km to the south-west of the proposed application site. In addition, the proposed WEF is located approximately 45 km south-west of the town of Sutherland. These built-up areas are situated far outside of the visual assessment zone and are thus not expected to have an impact on the visual character of the study area. Human influence is visible in the area in the form of the R356 Regional Route which traverses the northern section of the study area in a west to north-east direction to the town of Sutherland. This road is however also gravel and thus conforms to the typical natural rural character of majority of the study area (**Figure 21**).

Figure 21: Typical view of the R356 Regional Route

Visual Implications

As stated above, the sparse human habitation and the predominance of natural vegetation cover across much of the study area would give the viewer the general impression of a largely natural rural setting (**Figure 13**). In addition, there are no built-up areas such as towns present within the visual assessment zone and thus there are very low levels of human transformation and visual degradation within the study area. The only significant elements of human transformation, the existing high voltage power lines which transverse the southern section of the study area, are considered to have degraded the visual character of the study area to some degree.

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

1.3.5 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.

As mentioned above, much of the study area is characterised by rural areas with low densities of human settlement. Agriculture in the form of livestock grazing (**Figure 14**) is the dominant land use, with isolated patches of cultivation also present in small parts of the study area. This has therefore transformed the natural vegetation in some areas.

However, a large portion of the study area has retained a natural appearance due to the presence of the natural vegetation which is dominated by low shrubs. As such, majority of the study area is dominated by largely natural / scenic views (**Figure 13**).

As mentioned, there are no built-up areas present within the visual assessment zone and thus there are very low levels of human transformation and visual degradation. The most prominent anthropogenic elements in the study area include the existing high voltage power lines which traverse the southern section of the study area (**Figure 19**) and other linear elements, such as telephone poles (**Figure 17**), towers (**Figure 20**) and farm boundary fences. The presence of this infrastructure is an important factor in this context, as the introduction of the proposed WEF would result in less visual contrast where other anthropogenic elements are already present. The above-mentioned anthropogenic elements are thus considered to be the only significant elements which would contribute to the degradation of the visual character of the study area to some degree.

The scenic quality of the landscape is also an important factor contributing to the visual character of an area or the inherent sense of place. Visual appeal is often associated with unique natural features or distinct variations in landform. As such, the hilly / mountainous terrain which occurs within the application site and dominates the wider study area is an important feature that would potentially increase the scenic appeal and visual interest in the area.

The greater area surrounding the proposed development site is an important component when assessing visual character. The area can be considered 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. Over the last couple of decades, more tourism routes within the Karoo have been established. 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 “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"; and
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, 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 farmsteads are 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 towns, such as Matjiesfontein, 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 and would fall into the second category of cultural landscape listed above, that of an organically evolved, “continuing” landscape.

Considering this, 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.

1.3.6 Sensitive Visual Receptor Locations

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 WEF into a 'view', which may affect the 'sense of place'. The identification of sensitive receptor locations is typically undertaken based on several 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 setting 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 BA study.

A distinction must be made between a potentially sensitive receptor location and a sensitive receptor location. A potentially sensitive receptor location is a site from where the proposed WEF may be visible, but the receptor may not necessarily be adversely affected by any visual intrusion associated with the development. Potentially sensitive receptor locations include locations such as residential dwellings, farmsteads / homesteads, as well as 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 certain residential dwellings and / or farmsteads / homesteads in natural settings.

Distance bands were used to delineate zones of visual impact from the nearest proposed turbine position, as the visibility of the development would diminish exponentially over distance. As such, the proposed development would be more visible to receptor locations located within a short distance, and these receptor locations would therefore experience greater adverse visual impact than those located further away. Distance from the nearest proposed turbine position was therefore used to determine zones of visual impact. Based on the height and scale of the project, the radii chosen to assign these zones of visual impact are as follows:

- 0 < 2 km (high impact zone);
- 2 < 5 km (moderate impact zone);
- 5 < 8 km (low impact zone); and
- > 8 km (negligible impact zone)

Preliminary desktop assessment of the study area identified several potentially sensitive visual receptor locations. These mostly appear to be existing farmsteads / farm houses / homesteads. However, relatively few leisure-based or nature-based tourism activities were identified in the assessment area and as such, only two (2) sensitive visual receptor locations were identified within the study area, these being tourism facilities at the Gatsrivier Holiday Farm and Bakensriver.
Although the Gatsrivier Holiday Farm is located within the Kudusberg WEF application site, it is known that the owner intends to keep this facility in operation notwithstanding the WEF development. It is also known however that the owner has consented to the proposed development and as such, would not perceive the WEF in a negative light. Accordingly, the holiday farm is no longer considered to be a sensitive or potentially sensitive receptor.

Furthermore, it was established that Bakensriver comprises accommodation facilities that are part of the Gatsrivier Holiday Farm facility, even though these facilities are located on a different farm some distance from the main Gatsrivier farm. As previously mentioned, the owner of Gatsrivier has consented to the proposed WEF development and as such Bakensrivier has been excluded as a sensitive or potentially sensitive receptor.

The remaining farmsteads / farm houses / homesteads identified within the study area have been classified as potentially sensitive receptor locations as the potential visual impact of the proposed development is subjective to the viewer. For example, one owner of a farm house might not consider the impact as a negative impact, while another owner might. As such, these receptors may *potentially* be impacted from a visual perspective as a result of the construction and operation of the proposed WEF.

In many cases, roads, along which people travel, are regarded as sensitive receptor locations. The primary thoroughfare in the study area is the R356 Regional Route which traverses the northern section of the study area (**Figure 21**). The R356 connects the R46 near Ceres with Loxton by way of Sutherland and Fraserburg. This road is used primarily as an access road into Sutherland to the north of the study area by many of the local farmers / landowners. It should be noted that the section of the R356 which traverses the study area is a gravel road. This road is therefore not valued or utilised for its scenic or tourism potential and as a result it is not classed as a sensitive receptor road – i.e. a road along which motorists may object to the potential visual intrusion of the proposed WEF.

Other thoroughfares in the study area include gravel access roads which are primarily used by local farmers when accessing various properties / farms in the study area, as well as when travelling to and from Matjiesfontein and Sutherland. They are therefore not regarded as visually sensitive as they do not form part of any scenic tourist routes and are not specifically valued or utilised for their scenic or tourism potential.

Visual receptor locations are examined in more detail in **Section 1.6.1** and **Section 1.6.3**.

1.3.7 Existing and Proposed Renewable Energy Developments

Several renewable energy developments with similar impacts are being proposed within a 50 km radius of the proposed development. Twenty-two wind energy projects are proposed and 1 solar energy project. two (2) of these are solar photovoltaic (PV) developments which are expected to have different impacts when compared to WEFs. These renewable energy developments are however relevant as they contribute to the alteration of the visual character of the area and as such have been taken into consideration when identifying the cumulative impacts. The existing and proposed developments within a 50km radius of the proposed development are listed in
below and are indicated in **the *Other Proposed Renewable Energy Developments within 50 km Radius Map*** which has been provided as ***Map 8*** in **Appendix B**.

OTHER RENEWABLE ENERGY PROJECTS WITHIN A RADIUS OF 50 KM FROM THE PROPOSED KUDUSBERG WEF SITE

DEA REFERENCE NUMBER	EIA PROCESS	APPLICANT	PROJECT TITLE	EAP	TECHNOLOGY	MEGAWATT	STATUS
WIND PROJECTS							
12/12/20/1966/AM5	Amendment	Witberg Wind Power (Pty) Ltd	Proposed establishment of the Witberg Wind Energy Facility, Laingsburg Local Municipality, Western Cape Province	Environmental Resource Management (Pty) Ltd / Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW	Approved
12/12/20/1783/2/AM1	Scoping and EIA	South Africa Mainstream Renewable Power Perdekraal West (Pty) Ltd	Proposed development of a Renewable Energy Facility (Wind) at the Perdekraal Site 2, Western Cape Province	Environmental Resource Management (Pty) Ltd	Wind	110 MW	Under construction
12/12/20/1783/1	Scoping and EIA	South Africa Mainstream Renewable Power Perdekraal East (Pty) Ltd	Proposed development of a Renewable Energy Facility (Wind) at the Perdekraal Site 2, Western Cape Province	Savannah Environmental Consultants (Pty) Ltd	Wind	150 MW	Approved
14/12/16/3/3/2/899	Scoping and EIA	Rietkloof Wind Farm (Pty) Ltd	Proposed Rietkloof Wind Energy (36 MW) Facility within the Laingsburg Local Municipality in the Western Cape Province	EOH Coastal & Environmental Services	Wind	36 MW	Approved
TBC	BA		Proposed Rietkloof Wind Energy Facility, Western Cape, South Africa	WSP	Wind	140 MW	In progress
14/12/16/3/3/2/826	Scoping and EIA	Gunstfontein Wind Farm (Pty) Ltd	Proposed 200 MW Gunstfontein Wind Energy Facility on the Remainder of Farm Gunstfontein 131	Savannah Environmental Consultants (Pty) Ltd	Wind	200 W	Approved

DEA REFERENCE NUMBER	EIA PROCESS	APPLICANT	PROJECT TITLE	EAP	TECHNOLOGY	MEGAWATT	STATUS
			south of the town of Sutherland within the Karoo Hooglands Local Municipality in the Northern Cape Province, south of Sutherland.				
12/12/20/1782/AM2	Scoping and EIA	Mainstream Power Sutherland	Proposed development of 140 MW Sutherland Wind Energy Facility, Sutherland, Northern and Western Cape Provinces	CSIR	Wind	140 MW	Approved
Karusa - 12/12/20/2370/1 Soetwater -12/12/20/2370/2	Scoping and EIA	African Clean Energy Developments Renewables Hidden Valley (Pty) Ltd	Proposed Hidden Valley Wind Energy Facility on a site south of Sutherland, Northern Cape Provinces (Karusa & Soetwater)	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW each	Preferred bidders. Construction to commence in 2019
12/12/20/2370/3	Scoping and EIA	African Clean Energy Developments Renewables Hidden Valley (Pty) Ltd	Proposed Hidden Valley Wind Energy Facility on a site south of Sutherland, Northern Cape Provinces (Greater Karoo))	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW	Approved
West -14/12/16/3/3/2/856 East - 14/12/16/3/3/2/857	Scoping and EIA	Komsberg Wind Farm (Pty) Ltd	Proposed 275 MW Komsberg West Wind Energy Facility near Sutherland within the Northern and Western Cape Provinces	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW each	Approved
			Proposed 275 MW Komsberg East Wind Energy Facility near Sutherland within the Northern and Western Cape Provinces				

DEA REFERENCE NUMBER	EIA PROCESS	APPLICANT	PROJECT TITLE	EAP	TECHNOLOGY	MEGAWATT	STATUS
12/12/20/1988/1/AM1	Amendment	Roggeveld Wind Power (Pty) Ltd	Proposed Construction of the 140 MW Roggeveld Wind Farm within the Karoo Hoogland Local Municipality and the Laingsburg Local Municipality in the Western and Northern Cape Provinces	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW	Preferred bidders. Construction to commence in 2019.
14/12/16/3/3/2/807/AM1	Scoping and EIA Amendment	Karreebosch Wind Farm (Pty) Ltd	Proposed Karreebosch Wind Farm (Roggeveld Phase 2) and its associated infrastructure within the Karoo Hoogland and Laingsburg Local Municipalities in the Northern and Western Cape Provinces	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW	Approved
West 14/12/16/3/3/2/856 East 14/12/16/3/3/2/857	Scoping and EIA	Komsberg Wind Farms (Pty) Ltd	Komsberg East and West WEF	Arcus Consulting Services (pty) Ltd	Wind	140 MW each	
TBC	BA	ENERTRAG SA (Pty) Ltd	Proposed Development of the Tooverberg Wind Energy Facility and the associated grid connection near Touws River, Wester Cape Province)	SiVEST SA (Pty) Ltd	Wind	140 MW	In process
12/12/20/1787	Scoping and EIA	South Africa Mainstream Renewable Power Development	Proposed renewable energy facility at Konstabel	Environmental Resource Management (Pty) Ltd	Onshore Wind and Solar PV	170 MW	Approved
12/12/20/2394	BAR	To review	Proposed Renewable Energy Project	Jeffares and Green	Solar PV	9 MW	Approved

DEA REFERENCE NUMBER	EIA PROCESS	APPLICANT	PROJECT TITLE	EAP	TECHNOLOGY	MEGAWATT	STATUS
			Approximately 1km Outside Wolseley On Portion 3 Of Farm Goedgevonden 348, Within Witzenberg Municipality	Environmental Consultants P(ty) Ltd			
12/12/20/1583	Scoping and EIA		Proposed establishment of the Suurplaat wind energy facility and associated infrastructure on a site near Sutherland, Western Cape and Northern Cape.	Moyeng Energy (Pty) Ltd	Wind	120 MW	Approved
SOLAR PROJECTS							
12/12/20/2235	BA	Inca Sutherland Solar (Pty) Ltd	Proposed Photovoltaic (PV) Solar Energy Facility on A Site South Of Sutherland, Within The Karoo Hoogland Municipality Of The Namakwa District Municipality, Northern Cape Province	CSIR	Solar	10 MW	Approved

Although it is important to assess the visual impacts of the proposed WEF development 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 proposed 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 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 visual receptors. As mentioned above, renewable energy developments within a 50 km radius of the proposed WEF development were identified and mapped.

As indicated in the ***Other Proposed Renewable Energy Developments within 50km Radius Map*** (***Map 8*** in **Appendix B**), most of the other renewable energy facilities which are being proposed in the surrounding area are situated outside of the 8 km visual assessment zone. These include the Perdekraal East Wind Farm to the south-west which is presently under construction and the Soetwater, Roggeveld and Karusa WEFs to the north-east where construction is scheduled for April 2019. Although the renewable energy facilities being proposed and / or constructed in the surrounding area (i.e. outside of the 8 km visual assessment zone) are expected to impact on the pastoral visual character of the larger area, the visual impacts of these developments on the study area are considered to be insignificant.

There was no evidence of other renewable energy facilities being constructed or currently operational within the 8 km visual assessment zone during the time of the field investigation. As such, the visual character of the study area is considered to be largely undisturbed and has not been altered significantly from a visual perspective. In light of the presence of the other renewable energy facilities within the 8 km visual assessment zone, the visual receptors located within the study area would experience exacerbated visual impacts should these developments receive EA and ultimately be constructed in addition to the proposed 325 MW Kudusberg WEF. The proposed Kudusberg WEF development, in combination with the other renewable energy developments being proposed within the visual assessment zone, could potentially be viewed as one very large development which significantly alters the character of the larger area and impacts on visual receptors.

The cumulative impacts anticipated as a result of the construction and operation of the proposed Kudusberg WEF in combination with the other proposed renewable energy developments 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 Kudusberg 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 visual receptor locations to visual impacts. The operation of the Kudusberg WEF development in addition to the other nearby renewable energy developments may also be perceived as unwelcome visual intrusions, particularly in more natural undisturbed settings. Large construction vehicles and equipment during the construction phases 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 phases. The construction activities may thus also

be perceived as further unwelcome visual intrusions, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed development sites 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 sites 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 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 an increased 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 proposed renewable energy developments and their 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 was however only found to range from moderate to low and thus the impact of the Kudusberg WEF development, 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.

From a visual perspective, the concentration of renewable energy facilities as proposed will inevitably change the visual character of the area and alter the inherent sense of place, introducing an increasingly industrial character into a largely rural area, and thus giving rise to significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures put forward by the visual specialists in their respective reports.

It should be noted however that the study area is located within the Renewable Energy Development Zone 2 (REDZ 2) known as Komsberg, and thus the concentration of renewable energy developments is supported in this area. In addition, it is possible that the proposed WEFs in close proximity to each other could be seen as one large WEF rather than separate developments. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the cumulative impacts on the landscape.

It should be noted that this cumulative impact assessment has been based solely on the information made available at the time by the EAP, namely the CSIR.

1.4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the proposed WEF development are as follows:

In terms of Section 24(3) NEMA in GN R. 114 of 16 February 2018, the proposed development site is located within the REDZ 2 known as Komsberg. In light of this, a BA Process as contemplated in terms of regulation 19 and 20 of the EIA Regulations 2014 (as amended), is required for the authorisation of this large scale WEF. As part of this BA process, the need for a VIA to be undertaken has been identified in order to assess the visual impact of the proposed WEF.

There is currently no legislation within South Africa that explicitly pertains to the assessment of visual impacts, however in addition to NEMA the following legislation has relevance to the protection of scenic resources:

- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003); and

- National Heritage Resources Act, 1999 (Act No. 25 of 1999).

Based on the above Acts protected /conservation areas and sites /routes with cultural or symbolic value have been taken into consideration when identifying sensitive and potentially sensitive receptor locations and rating the sensitivity of the study area.

1.5 IDENTIFICATION OF KEY ISSUES

1.5.1 Key Issues Identified

The potential visual issues / impacts identified during the BA process for the proposed WEF development include:

- Potential visual intrusion resulting from construction vehicles and equipment during construction;
- Potential impacts of increased dust emissions from construction activities and related traffic during construction;
- Potential visual scarring of the landscape as a result of site clearance and earthworks during construction;
- Potential alteration of the visual character of the area during operation;
- Potential visual intrusion resulting from wind turbines located on ridge lines and higher plateaus during operation;
- Potential alteration of the night time visual environment as a result operational and security lighting as well as navigational lighting on top of the wind turbines during operation;
- Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process;
- Potential impacts of increased dust emissions from decommissioning activity activities and related traffic;
- Potential visual intrusion of any remaining infrastructure on the site during decommissioning; and
- Combined visual impacts (i.e. cumulative visual impacts) from several renewable energy facilities in the broader area could potentially alter the sense of place and visual character of the area.

As previously mentioned, no comments and / or feedback regarding the visual environment have been received from the public participation process to date. Should any comments and/or any feedback be received this regard, the report will be updated to include relevant information as and when it becomes available.

1.5.2 Identification of Potential Impacts

Potential visual issues / impacts resulting from the proposed Kudusberg WEF and associated infrastructure are outlined below.

1.5.3 Construction Phase

- Potential visual intrusion resulting from construction vehicles and equipment;
- Potential impacts of increased dust emissions from construction activities and related traffic; and
- Potential visual scarring of the landscape as a result of site clearance and earthworks.

1.5.4 Operational Phase

- Potential alteration of the visual character of the area;
- Potential visual intrusion resulting from wind turbines located on ridge lines and higher plateaus; and

- Potential alteration of the night time visual environment as a result of operational and security lighting as well as navigational lighting on top of the wind turbines.

1.5.5 Decommissioning Phase

- Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process;
- Potential impacts of increased dust emissions from decommissioning activities and related traffic; and
- Potential visual intrusion of any remaining infrastructure on the site.

1.5.6 Cumulative Impacts

- Combined visual impacts from several renewable energy facilities in the broader area could potentially alter the sense of place and visual character of the area; and
- Combined visual impacts from several renewable energy facilities in the broader area could potentially exacerbate visual impacts on visual receptors.

1.5.7 No Go Alternative

- The no-go alternative is considered in the assessment of impacts chapter.

1.6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

1.6.1 Results of the Field Study

As previously stated, the field investigation and photographic review was conducted between the 25th and 27th of July 2018. A summary of the findings of this investigation is provided below.

Visibility

The field investigation confirmed that the range of high mountains / hills which dominate the study area are significant features of the local landscape and as such, wind turbines placed on the ridges and higher lying plateaus of these hills would be highly visible to several identified potentially sensitive receptor locations, sensitive receptor locations and receptor roads as described below.

Sensitive Visual Receptors

The field investigation revealed a total number of two (2) sensitive receptor locations and fifty-two (52) potentially sensitive receptor locations in the visual assessment zone. These receptor locations are shown in the ***Potentially Sensitive Visual Receptor Locations Map*** which has been provided as ***Map 9*** in **Appendix B**.

As previously mentioned however, the sensitive receptor locations identified as Gatsrivier Holiday Farm and Bakenrivier were subsequently removed from the list of sensitive and potentially sensitive receptors due to the fact that the owner has a vested interest in the WEF development and thus would not view the proposed power line in a negative light.

The potentially sensitive receptor locations were identified as scattered farmsteads / homesteads which house the local farmers as well as their farm workers. These dwellings are regarded as potentially sensitive visual receptor locations as they are located within a natural rural setting and the proposed development will likely alter natural vistas experienced from these dwellings, however their sentiments toward the proposed development are unknown.

Details of the potentially sensitive receptor locations are provided in **Table 1** below.

Table 1: Potentially sensitive visual receptor locations in the study area

Name	Details	Approximate distance to nearest proposed turbine	Visual Impact Zone
VR1	Farmstead / Homestead	3.76 km	Moderate
VR3	Farmstead / Homestead	7.16 km	Low
VR4	Farmstead / Homestead	*10.17 km	Negligible
VR5	Farmstead / Homestead	*11.53 km	Negligible
**VR6	Farmstead / Homestead	*9.56 km	Negligible
**VR7	Farmstead / Homestead	6.63 km	Negligible (outside of viewshed)
VR8	Farmstead / Homestead	4.32 km	Moderate
**VR9	Farmstead / Homestead	*12.79 km	Negligible
**VR10	Farmstead / Homestead	*10.53 km	Negligible
**VR11	Farmstead / Homestead	*12.81 km	Negligible
**VR12	Farmstead / Homestead	*12.92 km	Negligible
VR13	Farmstead / Homestead	2.37 km	Moderate
VR14	Farmstead / Homestead	2.58 km	Moderate
VR15	Farmstead / Homestead	2.6 km	Moderate
VR16	Farmstead / Homestead	3.16 km	Moderate
**VR17	Farmstead / Homestead	7.13 km	Negligible
VR18	Farmstead / Homestead	4.77 km	Moderate
VR19	Farmstead / Homestead	*8.08 km	Negligible
VR20	Farmstead / Homestead	*8.79 km	Negligible
VR21	Farmstead / Homestead	*9.28 km	Negligible
VR22	Farmstead / Homestead	*9.18 km	Negligible
VR23	Farmstead / Homestead	3.32 km	Moderate
VR24	Farmstead / Homestead	3.48 km	Moderate
VR25	Farmstead / Homestead	3.76 km	Moderate
VR26	Farmstead / Homestead	3.9 km	Moderate
VR27	Farmstead / Homestead	2.34 km	Moderate
VR28	Farmstead / Homestead	3.96 km	Moderate
VR29	Farmstead / Homestead	3.96 km	Moderate
VR30	Farmstead / Homestead	2.74 km	Moderate
VR31	Farmstead / Homestead	7.09 km	Low
VR32	Farmstead / Homestead	7.75 km	Low
VR33	Farmstead / Homestead	7.88 km	Low
VR34	Farmstead / Homestead	*8.42 km	Negligible
VR35	Farmstead / Homestead	*11.95 km	Negligible
VR36	Farmstead / Homestead	*8.60 km	Negligible
VR37	Farmstead / Homestead	*13.20 km	Negligible
VR38	Farmstead / Homestead	5.02 km	Low
VR39	Farmstead / Homestead	*8.68 km	Negligible
VR40	Farmstead / Homestead	*9.12 km	Negligible

Name	Details	Approximate distance to nearest proposed turbine	Visual Impact Zone
VR41	Farmstead / Homestead	*9.22 km	Negligible
VR42	Farmstead / Homestead	*9.58 km	Negligible
VR43	Farmstead / Homestead	*12.66 km	Negligible
VR44	Farmstead / Homestead	*13.38 km	Negligible
VR45	Farmstead / Homestead	*12.97 km	Negligible
VR46	Farmstead / Homestead	*12.59 km	Negligible
VR47	Farmstead / Homestead	4.44 km	Moderate
VR48	Farmstead / Homestead	4.51 km	Moderate
VR49	Farmstead / Homestead	7.55 km	Low
**VR50	Farmstead / Homestead	*9.70 km	Negligible
VR51	Farmstead / Homestead	*11.16 km	Negligible
VR52	Farmstead / Homestead	*11.51 km	Negligible
#VR53	Farmstead / Homestead	N/A	N/A
VR54	Farmstead / Homestead	1.89 km	High

**As previously mentioned, despite the fact that the study area or visual assessment zone encompasses a zone of 8 km from the boundary of the application site, the distance to the nearest proposed turbine position was used when determining the zones of visual impact for the identified visual receptor locations. As such, even though a receptor location will be located within a negligible visual impact zone (i.e. further than 8 km from the nearest turbine), it was still taken into consideration for the purposed of this study.*

***A viewshed analysis was undertaken to identify parts of the study area where the proposed WEF development would not be visible. Despite the fact that receptor locations situated within these areas are not expected to experience a visual impact as a result of the development of the proposed WEF, these locations were still taken into consideration for the purposed of this study.*

#VR53 – receptor was identified as Bakensrivier and the status was changed to "sensitive receptor", but was later excluded from assessment (see explanation above).

The degree of visual impact experienced will vary from one receptor location 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); and
- Degree to which the viewer will accept a change in the typical Karoo character of the surrounding area.

1.6.2 Environmental Sensitivity Map

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 receptor locations, and the likely value judgements of these receptor locations 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 2**), the visual sensitivity of the area is broken up into a number of categories, as described below:

- **High** - The introduction of a new development such as a WEF would be likely to be perceived negatively by receptor locations in this area; it would be considered to be a visual intrusion and may elicit opposition from these receptor locations.
- **Moderate** - Presence of receptor locations, but due to the nature of the existing visual character of the area and likely value judgements of receptor locations, there would be limited negative perception towards the new development as a source of visual impact.
- **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 2: 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 receptor locations										
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 **moderate visual sensitivity**. This is mainly owing to the highly natural / scenic character of the area. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptor locations that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs. As described above, relatively few sensitive receptors are present in the study area, while many potentially sensitive receptor locations are present. There are however leisure / nature-based tourism activities in the study area, and the area would thus be valued as a typical Karoo cultural landscape.

Although the area is associated with a moderate visual sensitivity, it should be stressed that the concept of visual sensitivity has been utilised indicatively to provide a broad-scale indication of whether the area is likely to be sensitive to visual impacts and is based on the physical characteristics of the study area, economic activities and land use that predominates. This does not mean that high visual impacts could not potentially be experienced in areas of low visual sensitivity. The potential presence and perception of sensitive receptor locations as discussed above must also be considered.

During the BA process, all project specialists were also requested to indicate the 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 sensitive and potentially sensitive visual receptor locations 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 sensitive and potentially sensitive receptor locations in the study area.

Using GIS-based visibility analysis, it was possible to determine which sectors of the site would be visible to the highest numbers of receptor locations in the study area. This analysis took into account all the sensitive and potentially sensitive receptor locations indicated in the ***Potentially Sensitive Receptor Locations Map*** which has been provided as ***Map 9*** in **Appendix B**. Based on this analysis, the areas visible to the highest number of receptor locations were initially rated as areas of 'High Sensitivity'. The resultant sensitivity map is shown in the ***Visual Sensitivity Map*** which has been provided as ***Map 10*** in **Appendix B**. However, as the study area as a whole is rated as having a moderate visual sensitivity, these areas of high sensitivity are not considered to be 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.

It should be noted that this sensitivity rating applies to turbine development only. The visual impacts resulting from the associated infrastructure are considered to have far less significance when viewed in the context of multiple wind turbines and as such the infrastructure has been excluded from the sensitivity analysis.

It should be further 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 sensitive and potentially sensitive receptor locations.

In addition to the sensitivity ratings, the Sensitivity Map shows 500 m exclusion buffers around the farmsteads / farm houses / homesteads located within the proposed application site. It is recommended that no wind turbines should be allowed to be developed within these buffer zones so as to prevent the impact of shadow flicker on these receptor locations.

1.6.3 Receptor Impact Rating

In order to assess the impact of the proposed development on the identified sensitive and potentially sensitive receptor locations listed in **Section 1.6.1**, a matrix that takes into account a number of factors has been developed (**Table 4**), and is applied to each identified visual receptor location.

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

- Distance of a receptor location 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 sensitive and / or 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 several 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 visual receptor location. Part of its limitation lies in the quantitative assessment of what is largely a qualitative or subjective impact.

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. Any visual receptor locations beyond this distance have therefore not been assessed as they fall outside the study area and would not be visually influenced by the proposed development. Where a visual receptor is located within more than one (1) distance band, such as a receptor road, it is assigned a score according to the distance at its closest point to the proposed development (i.e. the highest visual impact experienced).

Based on the height and scale of the proposed WEF development, as well as the investigations undertaken during the fieldwork, the distance categories chosen to assign levels of visual impact are as follows:

- 0 ≤ 2km (high impact);
- 2 km < 5 km (moderate impact);
- 5 km < 8 km (low impact); and
- > 8 km (Negligibly low impact).

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 visual receptor location and an object could completely shield the object from the receptor. Topography (relative elevation and aspect) plays a similar role as a visual 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 visual receptor.

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

It should be noted however that the study area is located within the REDZ 2 known as Komsberg, and thus the concentration of renewable energy developments is supported in this area. This could result in an incremental change in the visual character of the area and in the typical land use patterns over time towards a less rural environment within which a WEF would be less incongruous.

Through the matrix a score for each receptor location (both sensitive and potentially sensitive) is calculated. The range in which the score falls, as listed in **Table 3** below, determines the visual impact rating for each visual receptor location.

Table 3: Ratings scores

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

An explanation of the matrix is provided in **Table 4** below.

Table 4: Visual assessment matrix used to rate the impact of the proposed development on sensitive and potentially sensitive 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 contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 3**	**Moderate contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 2**	**Corresponds** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 1**	

Table 5 below presents a summary of the overall visual impact of the proposed development on each of the potentially sensitive visual receptor locations which were identified within the study area. As previously mentioned, it was not possible to investigate the sensitive receptor locations during the field investigation due to access limitations. These receptor locations were however still regarded as being potentially sensitive to the visual impacts associated with the proposed development and were assessed as part of the VIA.

In addition, even though some of the receptor locations were found to be situated outside of the viewshed of the proposed WEF development and are not expected to experience a visual impact as a result of the development of the proposed WEF, these locations were still taken into consideration for the purposed of this study.

Table 5: Summary - Sensitive and Potentially Sensitive Visual Receptor Rating

Receptor Location	Distance	Screening	Contrast	OVERALL IMPACT RATING
VR 1 – Farmstead / Homestead	Medium (2)	Low (1)	High (3)	**MEDIUM (5)**
VR 3 - Farmstead / Homestead	Low (1)	Medium (2)	High (3)	**MEDIUM (6)**
VR 4 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 5 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 6 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 7 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 8 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 9 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 10 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 11 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 12 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 13 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 14 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 15 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 16 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 17 - Farmstead /	Negligible			**NEGLIGIBLE**

Receptor Location	Distance	Screening	Contrast	OVERALL IMPACT RATING
Homestead				
VR 18 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 19 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 20 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 21 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 22 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 23 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 24 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 25 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 26 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 27 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 28 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 29 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 30 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 31 - Farmstead / Homestead	Low (1)	Medium (2)	High (3)	**MEDIUM (6)**
VR 32 - Farmstead / Homestead	Low (1)	Medium (2)	High (3)	**MEDIUM (6)**
VR 33 - Farmstead / Homestead	Low (1)	Medium (2)	High (3)	**MEDIUM (6)**
VR 34 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 35 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 36 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 37 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**

Receptor Location	Distance	Screening	Contrast	OVERALL IMPACT RATING
VR 38 - Farmstead / Homestead	Low (1)	Medium (2)	High (3)	MEDIUM (6)
VR 39 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 40 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 41 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 42 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 43 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 44 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 45 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 46 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 47 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 48 - Farmstead / Homestead	Medium (2)	Medium (2)	High (3)	**MEDIUM (7)**
VR 49 - Farmstead / Homestead	Low (1)	Medium (2)	High (3)	**MEDIUM (6)**
VR 50 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 51 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 52 - Farmstead / Homestead	Negligible			**NEGLIGIBLE**
VR 54 - Farmstead / Homestead	High (3)	Medium (2)	High (3)	**HIGH (8)**

In terms of the potentially sensitive visual receptor locations, the proposed development would result in a negligible visual impact on the majority of the receptor locations (28 in total). The proposed development would however result in a medium visual impact on twenty-three (23) of the identified potentially sensitive receptor locations. This is since the majority of the potentially sensitive receptor locations are either located outside of the proposed WEF development's viewshed or are situated further than 8 km from the nearest proposed wind turbine. It should however be noted that the proposed development would result in a high visual impact on one (1) of the potentially sensitive receptor locations, namely VR 54 which is located on the application site. Accordingly, it has been assumed that the owner of VR54 has a vested interest in the development and as such would not perceive the WEF in a negative light.

1.6.4 Visual Modelling

In order to provide an indication of what the proposed WEF development would look like from various chosen viewpoints / vantage points, visual models were created to strengthen the findings of the receptor impact ratings (see **Section 1.6.3**). As mentioned, an indicative range of locations (referred to as “vantage points” or “viewpoints”) 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 each selected vantage point will be transformed by the proposed WEF 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 undertaken during construction phase will be restored to its current state after the construction phase. This, 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 the planning phase. Therefore, the layout plans of the turbines, as provided by the applicant and the CSIR, may change. In addition, all infrastructure associated with the proposed WEF has been excluded from the models.

1.6.5 Vantage Point 1 (-32.888868S; 20.247452E): View towards the proposed Kudusberg WEF Turbines from the Western section of the application site, within 2 km of the nearest proposed turbine position

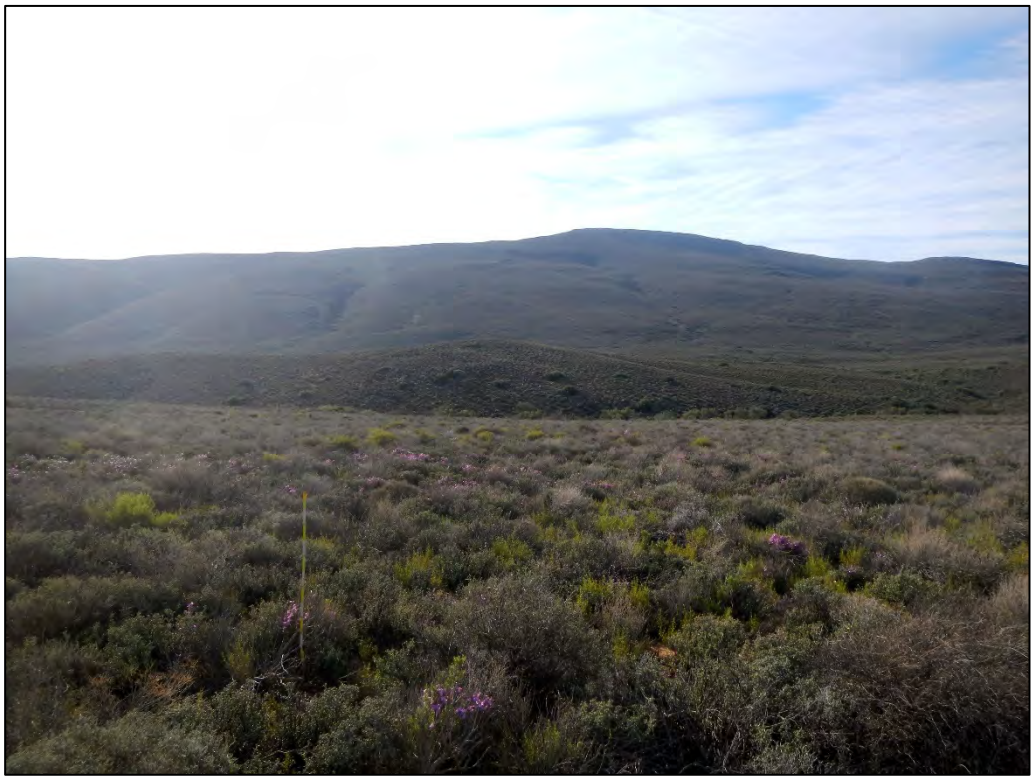


Figure 22: Existing view (to the N) towards the proposed Kudusberg WEF Turbines from the Western section of the application site, within 2 km of the nearest proposed turbine position.

Figure 23: Visually modelled post-construction view (to the N) towards the proposed Kudusberg WEF Turbines from the Western section of the application site, within 2 km of the nearest proposed turbine position.

As indicated in **Figure 23** above, the close proximity of the proposed turbines (i.e. within 2 km) is expected to result in the proposed WEF development being highly visible. In addition, the vegetative screening factors are not significant enough to block out most views of the proposed WEF development and therefore the turbines are expected to be highly visible. The hills found to the north and north-east of this viewpoint are also not expected to aid significantly in screening as the wind turbines will be placed on the higher lying plateaus of hills located within the application site and are thus still expected to be largely 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 viewpoint except for telephone poles and fence poles.

1.6.6 Vantage Point 2 (-32.890652S; 20.282364E): View towards the proposed Kudusberg WEF Turbines from the Western section of the application site (from SR1), within 5 km of the nearest proposed turbine position

Figure 24: Existing view (to the N) towards the proposed Kudusberg WEF turbines from the Western section of the application site (from SR1), within 5 km of the nearest proposed turbine location.

Figure 25: Visually modelled post-construction view (to the N) towards the proposed Kudusberg WEF turbines from the Western section of the application site (from SR1), within 5 km of the nearest proposed turbine location.

As indicated in **Figure 25** above, the close proximity of the proposed turbines (i.e. within 5 km) is expected to result in the proposed WEF development being highly visible. In addition, the vegetative screening factors are not significant enough to block out most views of the proposed WEF development and therefore the turbines are expected to be highly visible. The hills found to the north and north-east of this viewpoint are also not expected to aid significantly in screening as the wind turbines will be placed on the higher lying plateaus of hills located within the application site and are thus still expected to be largely 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 viewpoint except for telephone poles and fence poles.

1.6.7 Vantage Point 3 (-32.958423S; 20.271493E): View towards the proposed Kudusberg WEF Turbines from the South-Western section of the application site (from VR1), within 5 km of the nearest proposed turbine position

Figure 26: Existing view (to the NNE) towards the proposed Kudusberg WEF turbines from the South-Western section of the application site (from VR1), within 5 km of the nearest proposed turbine location.

Figure 27: Visually modelled post-construction view (to the NNE) towards the proposed Kudusberg WEF turbines from the South-Western section of the application site (from VR1), within 5 km of the nearest proposed turbine location.

As indicated in **Figure 27** above, the close proximity of the proposed turbines (i.e. within 5 km) is expected to result in the proposed WEF development being largely visible. In addition, the vegetative screening factors are not significant enough to effectively block out most views of the proposed WEF development and therefore the turbines are expected to be highly visible. It should however ne noted that there are some tall trees and other dense vegetation to the north-east of this viewpoint which are expected to provide some form of screening (**Figure 28**). The hills found to the north and north-east of this viewpoint are not expected to aid significantly in screening as the wind turbines will be placed on the higher lying plateaus of hills located within the application site and are thus still expected to be largely 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 viewpoint except for telephone poles and fence poles.

Figure 28: View of the tall trees and dense vegetation to the north-east which is expected to provide some form of screening.

1.6.8 Vantage Point 4 (-32.803192S; 20.214182E): View towards the proposed Kudusberg WEF application site from the North-Western section of the visual assessment zone (along the R356 road), within 8 km of the nearest proposed turbine position

Figure 29: Existing view (to the SE) towards the proposed Kudusberg WEF application site from the North-Western section of the visual assessment zone (along the R356 road), within 8 km of the nearest proposed turbine location.

Figure 30: Visually modelled post-construction view (to the SE) towards the proposed Kudusberg WEF application site from the North-Western section of the visual assessment zone (along the R356 road), within 8 km of the nearest proposed turbine location.

Despite the fact that the vegetative screening factors are not significant enough to effectively block out most views of the proposed WEF development, **Figure 30** above indicates that the distance of the proposed turbines (i.e. almost 8 km) will result in the proposed WEF development not being highly visible. In addition, the hills directly east and south-east of this viewpoint are expected to aid to some degree in blocking out views of the proposed wind turbines. It should however be noted that since the wind turbines will be placed on the higher lying plateaus of hills located within the application site, the wind turbines are still expected to be visible to some degree. The visible wind turbines would contrast with the dominant natural landscape elements as there are no tall linear elements in view from this viewpoint except for telephone poles and fence poles. Given the distance of the WEF from the viewing point however, the turbines tend to blend in with the fencing in the foreground.

1.6.9 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.

Much of the study area is characterised by natural rural / pastoral areas with low densities of human settlement and as a result, relatively few light sources are present in the area surrounding the proposed development site. As previously mentioned, the closest built-up area is the town of Matjiesfontein which is situated approximately 35 km to the south-west of the proposed application site. In addition, proposed WEF is located approximately 45 km south-west of the town of Sutherland. These built-up areas are thus situated too far away to have significant impacts on the night scene. At night, the study area is characterised by a picturesque dark starry sky and the visual character of the night environment is considered to be ‘unpolluted’ and pristine. The most prominent light sources within the study area at night include isolated lighting from surrounding farmsteads / homesteads and transient light from the passing cars travelling along the R356 and gravel access roads.

Operational and security lighting at night will be required for the proposed WEF. As the study area lies within the Sutherland Central Advantage Area, pilot activated lighting methods, as prescribed by the CAA, will be required for obstacle lighting on the turbines. As a result, impacts from aviation lighting on the WEF will be intermittent and of short duration, thus reducing impacts considerably. The type and intensity of any other 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 development is likely to intrude on the nightscape, and create glare, which will contrast with the dark backdrop of the surrounding area

1.6.10 Overall Visual Impact Rating

1.6.11 Potential Impact 1 (Construction Phase)

Nature of the impact

- Potential visual intrusion resulting from construction vehicles and equipment.
- Potential impacts of increased dust emissions from construction activities and related traffic.
- Potential visual scarring of the landscape as a result of site clearance and earthworks.

Significance of impact without mitigation measures

During the construction phase, large construction vehicles and equipment will alter the natural character of the study area and expose visual receptor locations 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 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. Additionally, temporarily stockpiling soil during construction may alter the landscape. Wind blowing over these disturbed areas could therefore result in dust which would have a visual impact.

The significance of visual impacts without mitigation measures during construction are rated as **moderate**.

Proposed mitigation measures

- Carefully plan to minimise the construction period and avoid construction delays.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- 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.
- Maintain a neat construction site by removing rubble and waste materials regularly.

Significance of impact with mitigation measures

Mitigation measures will result in a reduction of visual impacts during construction from moderate to low.

1.6.12 Potential Impact 2 (Operational Phase)

Nature of the impact

- Potential alteration of the visual character of the area.
- Potential visual intrusion resulting from wind turbines located on ridge lines and higher plateaus.
- Potential alteration of the night time visual environment as a result operational and security lighting as well as navigational lighting on top of the wind turbines.

Significance of impact without mitigation measures

During the operation phase, the proposed Kudusberg WEF could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptor locations 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 the gravel 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.

The significance of visual impacts without mitigation measures during operation are rated as **moderate**.

Proposed mitigation measures

Design Phase:

- In areas of 'High Sensitivity', the number of turbines should be limited, where possible.
- No turbines should be placed within 500 m of the dwellings or farmsteads which are situated within the proposed application (i.e. 500m exclusion buffers – see Section 1.6.2)
- 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.
- Turbine colours should adhere to CAA requirements.

Operational Phase:

- Turbines should be repaired promptly as they are considered more visually appealing when the blades are rotating (Vissering, 2011).
- If required, turbines should be replaced with the same model, or one (1) 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 landscape 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.
- Where practically possible, the operation and maintenance buildings should not be illuminated at night.
- 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.
- Unless there are water shortages, ensure that dust suppression techniques are implemented on all access roads.
- Select the alternatives that will have the least impact on visual receptor locations, as identified in Section 1.8.

Significance of impact with mitigation measures

Mitigation measures will result in a minor reduction of visual impacts during operation, but the impact rating will remain **moderate**.

1.6.13 Potential Impact 3 (Decommissioning Phase)

Nature of the impact

- Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process;
- Potential impacts of increased dust emissions from decommissioning activities and related traffic; and
- Potential visual intrusion on farmsteads / homesteads within the visual assessment zone as a result of decommissioning activities.

Significance of the impact

During the decommissioning phase, large construction vehicles and equipment will alter the natural character of the study area and expose visual receptor locations to visual impacts associated with decommissioning activities. These activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Gravel roads will be used to gain access to the WEF and if these roads are not maintained correctly during the decommissioning phase, vehicles travelling along these roads could increase dust emissions and create dust plumes. The increased traffic and the resultant dust plumes could therefore create a visual impact and may evoke negative

sentiments from surrounding viewers. The visual intrusion of decommissioning activities associated with the proposed WEF could adversely affect farmsteads / homesteads within the visual assessment zone. Decommissioning activities could also result in surface disturbance which could visually contrast with the surrounding environment. Additionally, the temporary stockpiling of soil during decommissioning may alter the landscape and wind blowing over these disturbed areas could result in dust which would have a visual impact. Any vegetation clearance required for the decommissioning activities is expected to increase dust emissions and alter the natural character of the surrounding area, thus creating a visual impact.

The significance of visual impacts without mitigation measures during construction is however rated as moderate.

Proposed mitigation measures

- Carefully plan to reduce the decommissioning period.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Maintain a neat decommissioning site by removing rubble and waste materials regularly.
- Make use of existing gravel access roads where possible.
- Ensure that dust suppression techniques must be implemented on gravel access roads.

Significance of impact with mitigation measures

Mitigation measures will result in some reduction of visual impacts during decommissioning and as a result the impact rating becomes low.

1.6.14 Cumulative Impacts

Nature of the impact

- Combined visual impacts from several renewable energy facilities in the broader area during the construction and operation phases could potentially alter the sense of place and visual character of the area; and
- Combined visual impacts from several renewable energy facilities in the broader area during construction and operations phases could potentially exacerbate visual impacts on visual receptors.

Significance of impact without mitigation measures

The cumulative impacts anticipated as a result of the construction and operation of the proposed WEF include

- visual impacts on users of arterial and secondary roads;
- visual impacts on residents of farmsteads / homesteads and settlements;
- visual impacts of shadow flicker on sensitive and potentially sensitive visual receptor locations;
- visual impacts of lighting at night on sensitive and potentially sensitive visual receptor locations;
- visual impacts of construction and operation on sensitive and potentially sensitive visual receptor locations; and
- the visual impacts on the visual quality of the landscape and sense of place.

Large construction vehicles and equipment used during the construction phase of the surrounding renewable energy facilities will contribute further to the alteration of the natural character of the study area and will also expose a greater number of visual receptor locations to visual impacts associated with the construction phase, especially if some of the construction phases coincide. This is also true

for the operational phase as the surrounding renewable energy facilities and their associated infrastructure would alter the visual character of the surrounding area further and expose a greater number of sensitive and potentially sensitive visual receptor locations to visual impacts. The construction and operational activities may be perceived as unwelcome visual intrusions, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed development sites during the construction phases on gravel access roads are also expected to result in an increase in dust emissions in the greater area. In addition, maintenance vehicles may need to access the surrounding renewable energy facilities and their associated infrastructure via gravel access roads and are also expected to increase dust emissions in the surrounding area in doing so. 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 majority of the existing roads in the vicinity of the project site are also 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 surrounding renewable energy facilities 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. Security and operational lighting will be required for the operation of the surrounding renewable energy facilities and their associated infrastructure. This could therefore 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 cumulative visual impacts without mitigation measures during construction and operation are rated as **moderate**.

Proposed mitigation measures

- 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 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 camps (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, such as monochromatic dull colours as long as it is in line with CAA requirements.
- 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).
- 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.
- Areas of high visual sensitivity 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, where feasible, (except for aviation lighting) and prevent light spill.
- The operations and maintenance buildings should not be illuminated at night, if possible.
- Turbine colours should adhere to CAA requirements.

- Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011).
- If possible and practically feasible, the operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment[2]. In addition, 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 landscape 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.
- Select the alternatives that will have the least impact on visual receptor locations, as identified in **Section 1.8**.

Significance of impact with mitigation measures

Mitigation measures will not result in a reduction of cumulative visual impacts during construction and operation. **Moderate** cumulative visual impacts are still expected during the construction and operational phases.

1.6.15 No Go Impacts

Nature of the impact
The 'No Go' alternative is essentially the option of not developing a WEF in this area. The area would thus retain its visual character and sense of place and there would be no visual impacts.

Significance of impact without mitigation measures

Not applicable.

Significance of impact with mitigation measures

Not applicable***.***

1.7 IMPACT ASSESSMENT SUMMARY

The BA process requires that an overall rating for visual impact be provided to allow the visual impact to be assessed alongside other environmental parameters. The CSIR has developed an impact rating matrix for this purpose. The assessment of impacts and recommendation of mitigation measures as discussed above are collated in **Table 6 to Table 9** below.

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

[2] Depending on the building design, the developer may find it preferable to paint the building white in order to reflect heat and keep the interior of the building cool

Table 6: Impact assessment summary table for the Construction Phase

Impact pathway	Nature of potential impact/risk	Status[3]	Extent[4]	Duration[5]	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
VISUAL															
CONSTRUCTION PHASE															
Direct Impacts															
Construction Activities	Visual intrusion and dust emissions	Negative	Local	Short-Term	Substantial	Very likely	High	Low	Moderate	No	Yes	- Carefully plan to minimise the construction period and avoid construction delays. - Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. - Make use of existing gravel access roads where possible. - Ensure that dust suppression techniques are implemented on all access roads. - Maintain a neat construction site.	Low	4	Medium

[3] Status: Positive (+) ; Negative (-)
[4] Site; Local (<10 km); Regional (<100); National; International
[5] Very short-term (instantaneous); Short-term (<1yr); Medium-term (1-10 years); Long-term (project duration); Permanent (beyond project decommissioning)

Table 7: Impact assessment summary table for the Operational Phase

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
VISUAL															
OPERATIONAL PHASE															
Direct Impacts															
Operational Activities	Visual intrusion, dust emissions and light pollution and glare	Negative	Local	Long Term	Substantial	Very likely	High	Low	Moderate	No	Yes	*Design Phase:* - In areas of 'High Sensitivity', the number of turbines should be limited, where possible. - No turbines should be placed within 500 m of the dwellings or farmsteads which are situated within the proposed application site (i.e. 500 m exclusion buffers – see **Section 1.6.2**) - 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. ▪ Turbine colours should adhere to	Moderate	3	Medium

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												CAA requirements. <u>*Operational Phase:*</u> - 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 landscape 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.			

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												- Unless there are water shortages, ensure that dust suppression techniques are implemented on all access roads where practically possible, the operations and maintenance buildings should not be illuminated at night. - Cables should be buried underground where possible. - If possible, the operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment[6]. In addition, non-reflective surfaces should be utilised where possible. - Select the alternatives that will have the least impact on visual			

[6] Depending on the building design, the developer may find it preferable to paint the building white in order to reflect heat and keep the interior of the building cool.

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												receptor locations.			

Table 8: Impact assessment summary table for the Decommissioning Phase

Impact pathway	Nature of potential impact/risk	Status[7]	Extent[8]	Duration[9]	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated ?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
VISUAL															
DECOMMISSIONING PHASE															
Direct Impacts															
Decommissioning Activities	Visual intrusion and dust emissions	Negative	Local	Short-Term	Substantial	Very likely	High	Low	Moderate	No	Yes	- Carefully plan to minimize the decommissioning period and avoid delays. - Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. - Make use of existing gravel access roads where possible. - Unless there are water shortages, ensure that dust suppression techniques are implemented on all access roads. - Maintain a neat construction site.	Low	4	Medium

[7] Status: Positive (+) ; Negative (-)
[8] Site; Local (<10 km); Regional (<100); National; International
[9] Very short-term (instantaneous); Short-term (<1yr); Medium-term (1-10 years); Long-term (project duration); Permanent (beyond project decommissioning)

Table 9: Cumulative impact assessment summary table

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
VISUAL															
CUMULATIVE IMPACTS															
Construction Activities	Visual intrusion and dust emissions	Negative	Regional	Short Term	Substantial	Very likely	Moderate	Moderate	Moderate	No	Yes	- 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 development site,	Moderate	3	Medium

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												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			

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												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, such as monochromatic dull colours. - 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).			
Operational Activities	Visual intrusion, dust emission and light pollution and glare	Negative	Regional	Long Term	Substantial	Very likely	Moderate	Moderate	Moderate	No	Yes	- Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines	Moderate	3	Medium

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												with a lower capacity. Areas of high visual sensitivity 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. - Turbine colours should adhere to CAA requirements. - Turbines should be repaired promptly, as they are considered more visually appealing when			

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												the blades are rotating (or at work) (Vissering, 2011). - If possible, the operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment[10]. In addition, 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			

[10] Depending on the building design, the developer may find it preferable to paint the building white in order to reflect heat and keep the interior of the building cool.

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												chaotic landscape made up of diverse colours, textures and patterns (Vissering, 2011). - As far as possible limit the number o maintenance vehicles, which ar allowed to acces the sites. - Bury cables under the ground where possible. - Unless there ar water shortages ensure that dus suppression techniques ar implemented on a access roads. - Select th alternatives tha will have the leas impact on visua receptor locations as identified i Section 1.8			

Table 10: Impact assessment summary table for the No Go Alternative

Impact pathway	Nature of potential impact/risk	Status[11]	Extent[12]	Duration[13]	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated ?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
VISUAL															
DECOMMISSIONING PHASE															
Direct Impacts															
No Go Alternative	If the WEF is not developed in this area, there will be no change in the visual character or the sense of place. Visual impacts would therefore be nil.	Neutral	N/A	N/A	Nil	Nil	N/A	N/A	Nil	N/A	N/A	N/A	N/A	Nil	High

[11] Status: Positive (+) ; Negative (-)
[12] Site; Local (<10 km); Regional (<100); National; International
[13] Very short-term (instantaneous); Short-term (<1yr); Medium-term (1-10 years); Long-term (project duration); Permanent (beyond project decommissioning)

1.8 COMPARATIVE ASSESSMENT OF ALTERNATIVES

The different alternatives are shown on Map 10 in Appendix B.

Road Layout Alternatives:
Two (2) access road alternatives are being considered to connect the public MN004469 road to the new WEF road network between the turbines on the ridges. These are as follows:

- Access road alternative 1 - Western route is approximately 4.6 km in length, almost all of which comprises an existing jeep track; and
- Access road alternative 2 - Eastern route is approximately 5.7 km in length, almost all of which would be a new road.

Construction Camp Alternatives:
Three (3) alternative construction camp layouts (including the area required for a batching plant) are being considered. These include the following:

- Construction camp 1 - Located on a flat high-lying area between turbines 43 and 47;
- Construction camp 2 - Located adjacent to and east of the MN4469 public road on the Remainder of the Farm 193 Urias Gat, south of construction camp 3; and
- Construction camp 3 - Located adjacent to and east of the MN4469 public road on Portion 6 of the Farm 193 Urias Gat, north of construction camp 2.

Substation Alternatives:
Three (3) onsite 33/132kV substation location alternatives were identified based on technical studies which considered aspects such as topography, earth works and levelling, environmentally sensitive features, electrical losses, turbine locations and existing agricultural use. All three (3) positions are located relatively in the centre of the WEF. These include the following:

- Substation alternative 1 - Located south of turbine 38 and north of turbine 9;
- Substation alternative 2 - Located south of turbine 42 and north of turbine 13; and
- Substation alternative 3 - Located southeast of turbine 44.

A comparative assessment of alternatives has been undertaken in order to determine which of the above-mentioned alternatives would be preferred from a visual perspective. The preference rating for each alternative is provided in **Table 11** below The alternatives are rated as preferred, favourable, least preferred, or no-preference.

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

- The location of the power line or on-site substation site in relation to areas of high elevation, especially ridges, koppies or hills;
- The location of the associated infrastructure in relation to sensitive receptor locations; and
- The location of the power line or on-site substation site in relation to areas of natural bushveld vegetation (clearing site for the development worsens the visibility).

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
LEASTPREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Table 11: Comparative Assessment of Alternatives

Alternative	Preference	Reasons (incl. potential issues)
ROAD LAYOUT ALTERNATIVES		
Access Road Alternative 1	Favourable	This access road alternative will be situated within largely natural / scenic parts of the study area and as such, is expected to alter the character of the surrounding area to some degree and to have a moderate to low visual impact. From a visual perspective however, no fatal flaws have been identified and Alternative 1 is considered favourable.
Access Road Alternative 2	Favourable	As with Alternative 1, Alternative 2 will be situated within largely natural / scenic parts of the study area and as such, is expected to alter the character of the surrounding area to some degree and to have a moderate to low visual impact. From a visual perspective however, no fatal flaws have been identified and Alternative 2 is also considered favourable.
SUBSTATION ALTERNATIVES		
Substation Alternative 1	Favourable	Substation Alternative 1 is situated within a highly natural / scenic part of the study area and as such the substation development is expected to alter the character to some degree. Alternative 1 is however located in an area of the site which is relatively less visible from the surrounding receptors and would thus be associated with a low level of visual impact. Accordingly, Substation Alternative 1 is considered to be favourable from a visual perspective. In addition, the proposed substation would form part of the proposed Kudusberg WEF and would be dwarfed by the large number of wind turbines that would be visible.
Substation Alterative 2	Favourable	Substation Alternative 2 is also situated within a highly natural / scenic part of the study area and as such the substation development is expected to alter the character to some degree. Alternative 2 is however located in an area of the site which is relatively less visible from the surrounding receptors and would thus be associated with a low level of visual impact. Accordingly, Substation Alternative 2 is considered to be favourable from a visual perspective. In addition, the proposed substation would form part of the proposed Kudusberg WEF and would be dwarfed by the

Alternative	Preference	Reasons (incl. potential issues)
		large number of wind turbines that would be visible.
Substation Alternative 3	Favourable	As with Alternatives 1 and 2, Alternative 3 is situated within a highly natural / scenic part of the study area and as such the substation development is expected to alter the character to some degree. Alternative 3 would however be relatively more visible from the surrounding receptors than the other alternatives, although the proximity of the turbines to this site would reduce the level of visual impact to low. Accordingly, Substation Alternative 3 is considered to be favourable from a visual perspective. .
CONSTRUCTION CAMP ALTERNATIVES		
Construction Camp Alternative 1	Least preferred	Construction Camp Alternative 1 is situated in a part of the study area which is largely natural / undisturbed and is therefore expected to alter the visual character to some degree. In addition, this alternative is situated in an area which is highly visible to the surrounding receptors. This alternative is thus associated with a relatively high level of visual impact. Given the temporary nature of the construction camp however, the high visual impacts are not considered to be a fatal flaw, although Construction Camp Alternative 1 is the least preferred alternative.
Construction Camp Alternative 2	Favourable	Construction Camp Alternative 2 is also situated in a part of the study area which is largely natural / undisturbed and is therefore expected to alter the visual character to some degree. This alternative is however likely to be far less visible from the surrounding area than Alternative 1 and as such the associated visual impacts will be moderate to low. Construction Camp Alternative 2 is thus favourable form a visual perspective.
Construction Camp Alternative 3	Favourable	Construction Camp Alternative 3 is situated relatively close to Alternative 2 and as such the associated visual impacts are also considered to be moderate to low. Construction Camp Alternative 3 is therefore also favourable form a visual perspective.

1.9 REVISED LAYOUT

Subsequent to the completion of all specialist studies, the developer has refined the proposed WEF layout in line with the recommendations of the various specialists. The refined layout (received on 15th October 2018) incorporated some very minor amendments to the turbine locations, road network and construction camp alternatives. The new layout has been assessed from a visual perspective and it has been concluded that these amendments do not change the findings of this VIA.

The revised layout is provided in Appendix D.

1.10 INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

Design Phase Monitoring:

Although no monitoring can be undertaken during the design phase, it must be ensured that no turbines are placed within 500m of the existing dwellings and potentially sensitive receptor locations which are situated within the proposed application site (i.e. within the 500m exclusion buffers applicable only to turbines – see **Section 1.6.2**

Construction Phase Monitoring:

Ensure that visual management measures are included as part of the EMPr and monitored by an Environmental Control Officer (ECO). This will include monitoring activities associated with visual impacts such as the siting of construction camp, management of soil stockpiles, screening and dust suppression. Regular reporting to an environmental management team must also take place during the construction phase.

Operation Phase Monitoring:

Ensure that visual mitigation measures are monitored by the management team on an on-going basis. This will include monitoring activities associated with visual impacts such as the control of signage, lighting and dust on the site.

Decommissioning Phase Monitoring:

Ensure that procedures for the removal of structures and stockpiles during decommissioning are implemented, including recycling of materials. In addition, it must be ensured that rehabilitation of the site to a visually acceptable standard is undertaken.

1.11 CONCLUSION AND RECOMMENDATIONS

A VIA has been conducted in order to identify the potential visual impact and issues related to the development of the proposed 325 MW Kudusberg WEF located west of the R354 between Matjiesfontein and Sutherland in the Western and Northern Cape Provinces. Although most of the study area has a largely natural, 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. The study area / visual assessment zone has seen very limited transformation / disturbance and is considered to be largely natural / scenic. The study area will therefore be impacted significantly 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 a 50km radius 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 low levels of leisure-based or nature-based tourism activities in the assessment area, no sensitive visual receptor locations were identified within the study area. It was further ascertained that, although fifty two (52) potentially sensitive receptors were identified within the visual assessment zone, the proposed WEF development is likely to visually impact only twenty-three (23) of these receptors. In many cases, roads along which people travel, are regarded as sensitive receptors. The primary thoroughfare in the study area is the R356 Regional Route which is a gravel road. It is however considered unlikely that this road would be widely used by tourists and as such it is not regarded as being visually sensitive. No potentially sensitive receptor roads were therefore identified within the study area.

To assess the impact of the proposed development on the sensitive and potentially sensitive receptor locations identified within the study area, a receptor impact rating was undertaken. It was established that the proposed Kudusberg WEF would not result in a high visual impact on any of the identified sensitive visual receptors. It would however result in a medium visual impact on both of the sensitive receptor locations. In terms of the potentially sensitive visual receptor locations, the proposed WEF would result in a negligible visual impact on majority of the receptor locations (28 in total). The proposed development would however result in a medium visual impact on twenty-three (23) of the identified potentially sensitive receptor locations. In addition, the proposed development would result in a high visual impact on one (1) of the potentially sensitive receptor locations, namely VR 54 (which is a Farmstead / Homestead). As this receptor is located on the application site, it is assumed that the landowner has a vested interest in the development and as such would not perceive the WEF in a negative light.

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 WEF (including associated infrastructure) is expected to have a moderate negative visual impact rating during both construction and operation, with relatively few mitigation measures available. The significance of the cumulative impacts associated with the proposed 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 proposed WEF in addition to the other renewable energy developments (including associated infrastructure) proposed nearby would have a moderate negative visual impact rating during both construction and operation, with relatively few mitigation measures available. These impacts would however remain moderate after the implementation of the relevant mitigation measures, due to the nature of the impacts.

Overall it can be concluded that the visual impact of the proposed WEF would be reduced due to the lack of sensitive visual receptors present. However, it is expected that the proposed development would significantly alter the largely natural / scenic character of the study area and contrast highly with the typical land use and/or pattern and form of human elements present.

As previously mentioned, several renewable energy developments are being proposed within a 50 km radius of the proposed WEF application site. One of these WEFs is already under construction while construction on three other WEFs is scheduled to commence in April 2019. 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. As mentioned, the cumulative impact assessment has been based solely on the information made available at the time by the EAP, namely the CSIR. The cumulative impact assessment has thus been based on broad assumptions as to the likely impacts of these developments. The relatively large number of renewable energy facilities within the surrounding area and their potential for large scale visual impacts could however significantly alter the sense of place and visual character in the study area, as well as exacerbate the visual impacts on surrounding visual receptors.

It should be noted however that the study area is located within the RREDZ 2 known as Komsberg, and thus the concentration of renewable energy developments is supported in this area.

1.11.1 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. All 56 wind turbines each with a generation capacity ranging between 3 MW and 6.5 MW, with a hub height of each turbine up to 140m and its rotor diameter up to 180 m along with associated infrastructure can be authorized on the proposed site. Should the hub height and or rotor diameter decrease in the future, the visual impact is expected to remain the same or potentially reduce from moderate to low. However, 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.

1.12 REFERENCES

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1.13 APPENDICES

Appendix A

IMPACT RATING METHODOLOGY PROVIDED BY CSIR

Specialist Impact Assessment Criteria

The identification of potential impacts and risks should include impacts that may occur during the construction, operational and decommissioning phases of the activity. The assessment of impacts is to include direct, indirect, as well as cumulative impacts.

In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed activity is well understood so that the impacts associated with the activity can be understood. The process of identification and assessment of impacts will include:

- Determine the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determine future changes to the environment that will occur if the activity does not proceed;
- An understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

As per DEA *Guideline 5: Assessment of Alternatives and Impacts* the following methodology is to be applied to the prediction and assessment of impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

- **Nature of impact** - this reviews the type of effect that a proposed activity will have on the environment and should include "what will be affected and how?"

- **Status** - Whether the impact on the overall environment (social, biophysical and economic) will be:
    - Positive - environment overall will benefit from the impact;
    - Negative - environment overall will be adversely affected by the impact; or
    - Neutral - environment overall will not be affected.

- **Spatial extent** – The size of the area that will be affected by the risk/impact:
    - Site;
    - Local (<10 km from site);
    - Regional (<100 km of site);
    - National; or
    - International (e.g. Greenhouse Gas emissions or migrant birds).

- **Duration** – The timeframe during which the risk/impact will be experienced:

- Very short term (instantaneous);
- Short term (less than 1 year);
- Medium term (1 to 10 years);
- Long term (the impact will occur for the project duration); or
- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).

- **Reversibility of impacts -**
  - High reversibility of impacts (impact is highly reversible at end of project life, i.e. this is the most favourable assessment for the environment. For example, the nuisance factor caused by noise impacts associated with the operational phase of an exporting terminal can be considered to be highly reversible at the end of the project life);
  - Moderate reversibility of impacts;
  - Low reversibility of impacts; or
  - Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment. The impact is permanent. For example, the loss of a palaeontological resource on the site caused by building foundations could be non-reversible).

- **Irreplaceability of resource loss caused by impacts –**
  - High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment. For example, if the project will destroy unique wetland systems, these may be irreplaceable);
  - Moderate irreplaceability of resources;
  - Low irreplaceability of resources; or
  - Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).

Using the criteria above, the impacts will further be assessed in terms of the following:

- **Probability** – The probability of the impact occurring:
  - Extremely unlikely (little to no chance of occurring);
  - Very unlikely (<30% chance of occurring);
  - Unlikely (30-50% chance of occurring)
  - Likely (51 – 90% chance of occurring); or
  - Very Likely (>90% chance of occurring regardless of prevention measures).

- **Consequence**–The anticipated severity of the impact:
  - Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
  - Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
  - Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).

- **Significance** – To determine the significance of an identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure 1 below). The approach incorporates internationally recognised methods from the Intergovernmental Panel on Climate Change (IPCC) (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the municipal capacity, a sensitive wetland), qualitatively (very low, low, moderate, high, very high) against a predefined set of criteria (as shown in Figure 1 below).

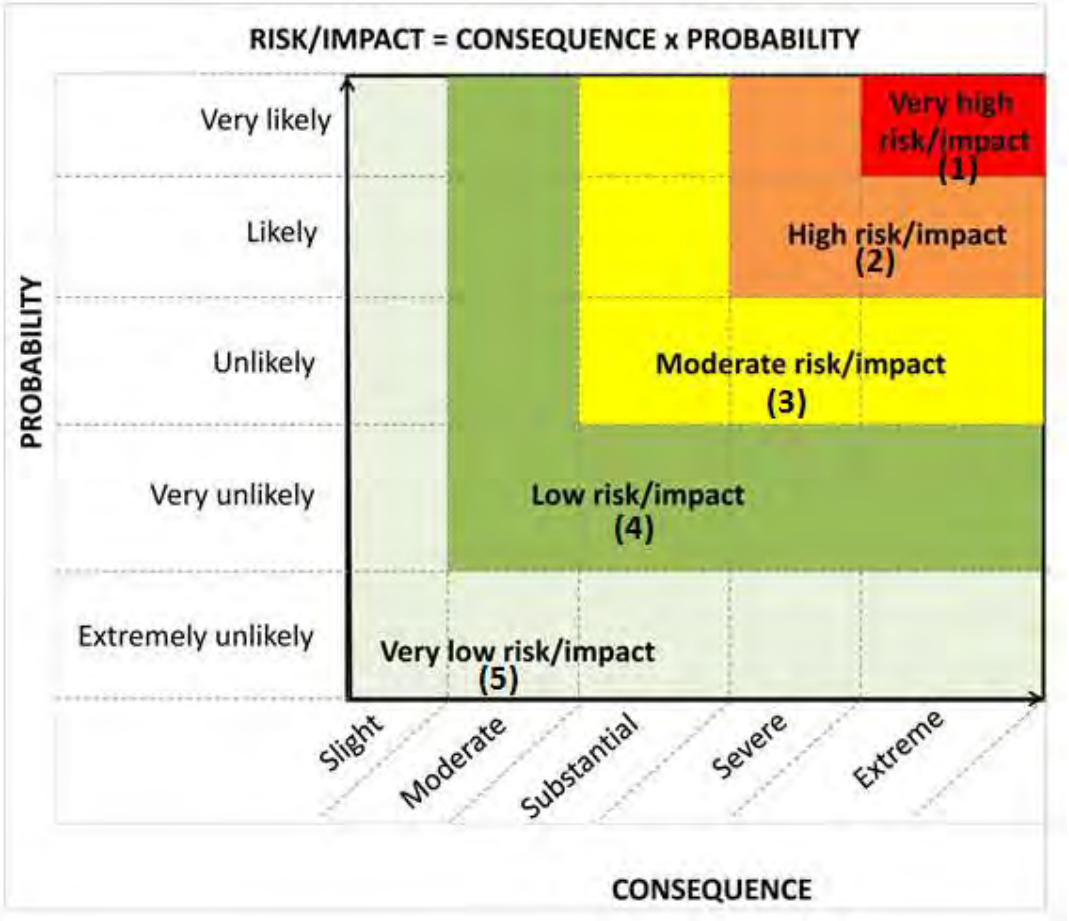

Figure 1: Guide to assessing risk/impact significance as a result of consequence and probability.

- **Significance** – Will the impact cause a notable alteration of the environment?
  - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);

- Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated); or
- High (the risk/impacts will result in a considerable alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making).
- Very high (the risk/impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

The above assessment must be described in the text (with clear explanation provided on the rationale for the allocation of significance ratings) and summarised in an impact assessment Table in a similar manner as shown in the example below (Table 1).

- **Ranking -** With the implementation of mitigation measures, the residual impacts/risks must be ranked as follow in terms of significance:

    - Very low = 5;
    - Low = 4;
    - Moderate = 3;
    - High = 2; and
    - Very high = 1.

- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
    - Low;
    - Medium; or
    - High.

Impacts will then be collated into an EMPr and these will include the following:

- Management actions and monitoring of the impacts;
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts; and
- Positive impacts will be identified and enhanced where possible.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts will be evaluated for the construction, operational and decommissioning phases of the development. The assessment of impacts for the decommissioning phase will be brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- The impact evaluation will, where possible, take into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

- Impacts should be assessed for all layouts and project components.
- **<u>IMPORTANT NOTE FROM THE CSIR</u>: IMPACTS SHOULD BE DESCRIBED BOTH BEFORE AND AFTER THE PROPOSED MITIGATION AND MANAGEMENT MEASURES HAVE BEEN IMPLEMENTED. THE ASSESSMENT OF THE POTENTIAL IMPACT "BEFORE MITIGATION" SHOULD TAKE INTO CONSIDERATION ALL MANAGEMENT ACTIONS THAT ARE ALREADY PART OF THE PROJECT DESIGN (WHICH ARE A GIVEN). THE ASSESSMENT OF THE POTENTIAL IMPACT "AFTER MITIGATION" SHOULD TAKE INTO CONSIDERATION ANY ADDITIONAL MANAGEMENT ACTIONS PROPOSED BY THE SPECIALIST, TO MINIMISE NEGATIVE OR ENHANCE POSITIVE IMPACTS.**

Appendix B

PROJECT MAPS

Map 1 – Regional Context Map

PROPOSED CONSTRUCTION OF THE KUDUSBERG WIND FARM

NEAR MATJIESFONTEIN, WESTERN AND NORTHERN CAPE PROVINCES

VISUAL ASSESSMENT: REGIONAL CONTEXT

NAMAKWA DISTRICT MUNICIPALITY
SUTHERLAND
R354
R356
NAMAKWA DISTRICT MUNICIPALITY
NORTHERN CAPE PROVINCE
TANKWA
ONGELUKS
DORING
R355
WESTERN CAPE PROVINCE
R356
R354
CAPE WINELANDS DISTRICT MUNICIPALITY
CENTRAL KAROO DISTRICT MUNICIPALITY
LAINGSBURG
MATJIESFONTEIN
N 1
BUFFELS
R323
R 46
R 46
TOUWS RIVER
TOUWS

Legend

- Main Towns
- Provincial Boundaries
- District Municipal Boundaries
- Main Roads
- Main Rivers
- Kudusberg Application Site
- 8km Visual Assessment Zone

SOURCE:
NFEPA, 2011
NGI, 2014

N

0 6 12

Kilometers

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Project No	Prepared By	Date
15200	KLS	30/07/2018
Map Ref No	**Revision**	**Date**
15200/01	0	

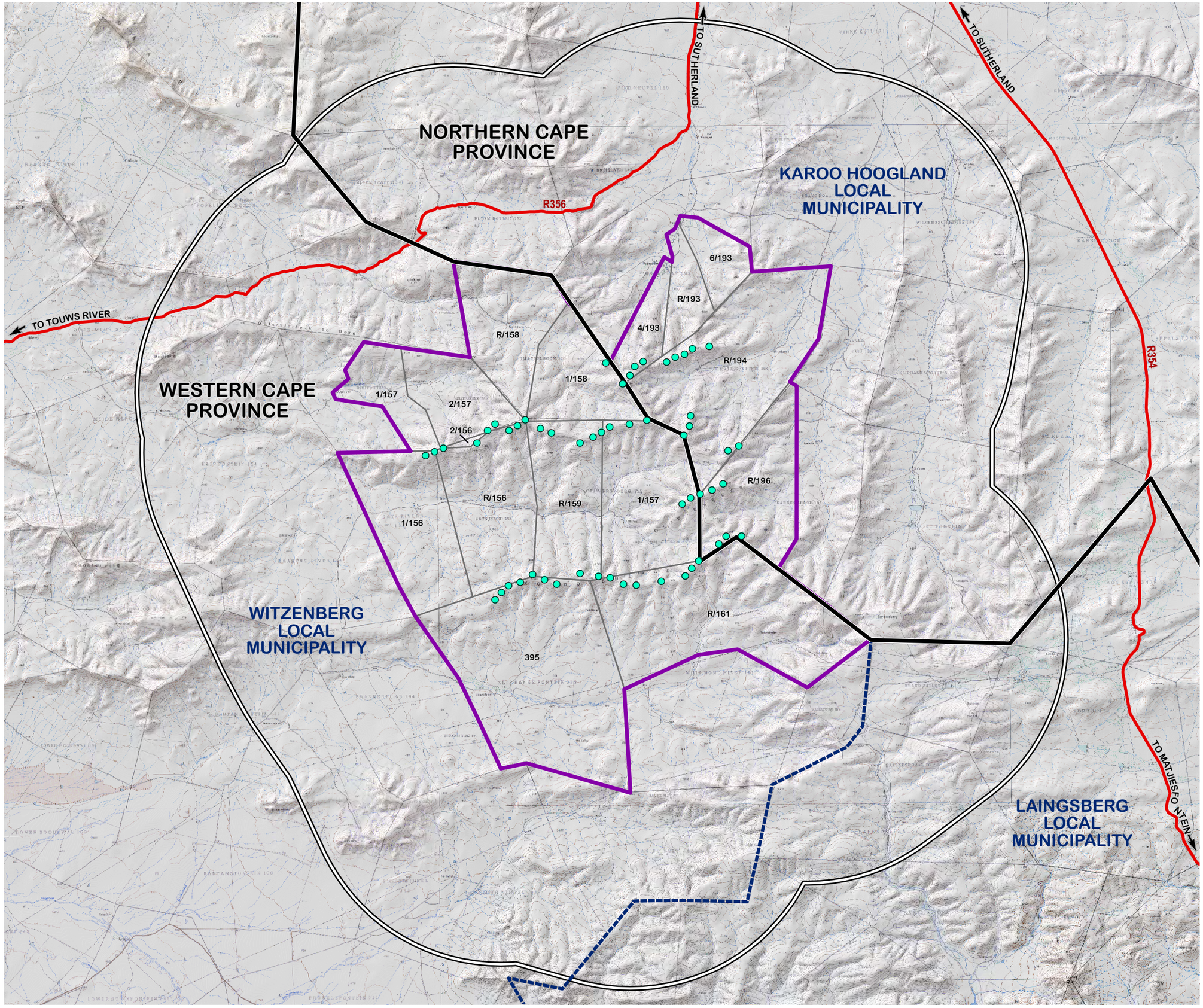
THIS MAP HAS BEEN PREPARED UNDER THE CONTROLS ESTABLISHED BY THE SiVEST QUALITY MANAGEMENT SYSTEM WHICH HAS BEEN CERTIFIED ISO 9001:2008 COMPLIANT

Map 2 – Site Locality Map

PROPOSED CONSTRUCTION OF THE KUDUSBERG WIND FARM

NEAR MATJIESFONTEIN, WESTERN AND NORTHERN CAPE PROVINCES

VISUAL ASSESSMENT: SITE LOCALITY



Legend

- Provincial Boundaries
- Local Municipal Boundaries
- Main Roads
- Rivers
- Kudusberg Application Site
- Component Farm Portions
- 8km Visual Assessment Zone
- Proposed Turbine Positions

SOURCE:
DEMARCATION BOARD, 2011
NGI, 2014

N

0 1.5 3

Kilometers

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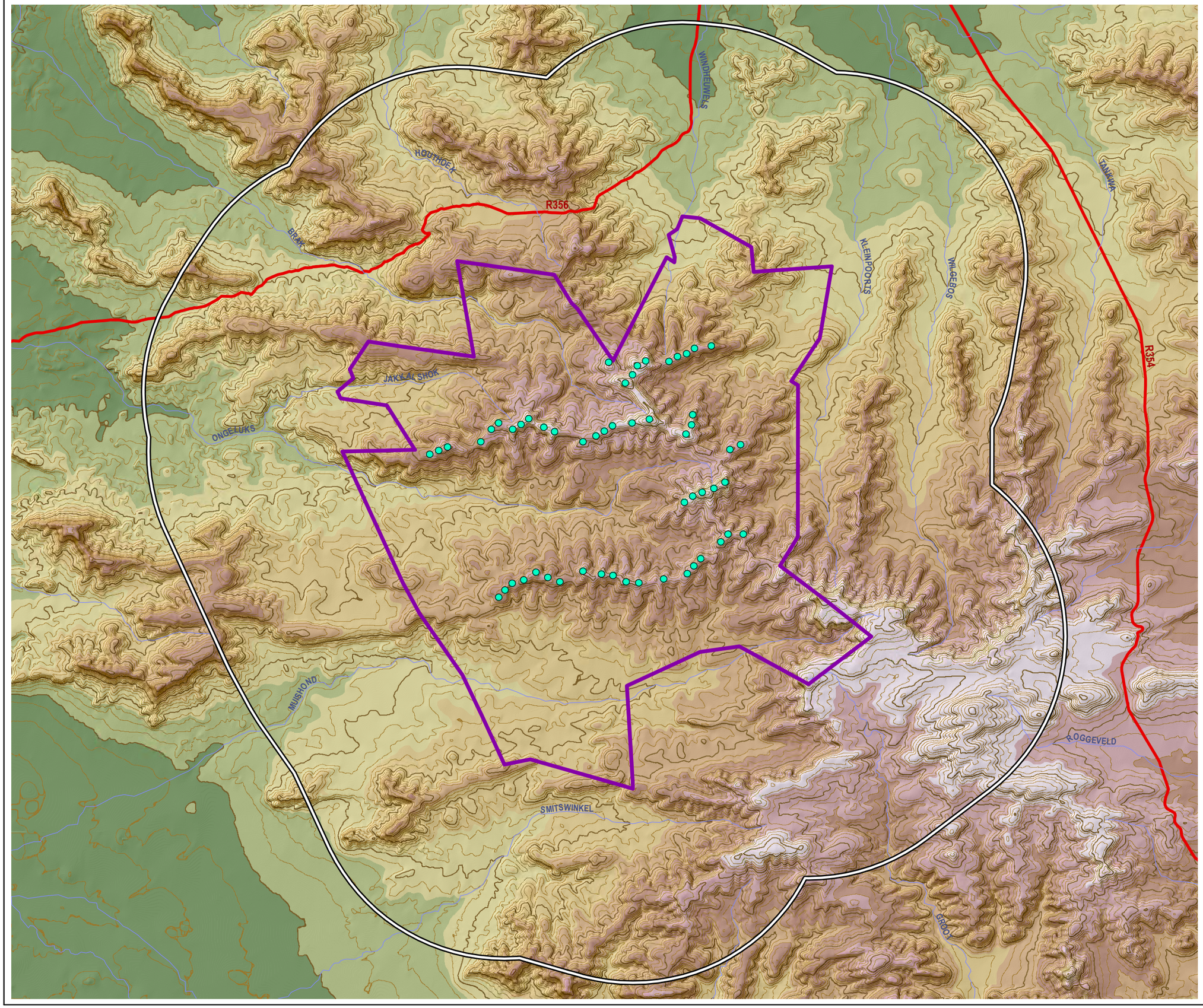
Map 3 – Topography Map



PROPOSED CONSTRUCTION OF THE KUDUSBERG WIND FARM

NEAR MATJIESFONTEIN, WESTERN AND NORTHERN CAPE PROVINCES

VISUAL ASSESSMENT: TOPOGRAPHY

Legend

- Main Roads
- Rivers
- Contours (100m Interval)
- Contours (20m Interval)
- Kudusberg Application Site
- 8km Visual Assessment Zone

Elevation (msl)

- High: >1,250m
- Low: <=700m

SOURCE:
NFEPA, 2011
NGI, 2014

N

0 1.5 3

Kilometers

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