VISUAL IMPACT ASSESSMENT REPORT
FOR THE KLIPKRAAL WEF 2

VISUAL IMPACT ASSESSMENT REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS, AS AMMENDED

Prepared for

KLIPKRAAL WIND ENERGY FACILITY 2 (PTY) LTD

Prepared by

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NOVEMBER 2022

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REPORT TITLE:	Visual Impact Assessment (VIA) Report for the Klipkraal WEF 2
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APPROVED

M KLAPWIJK

PROPONENT

Klipkraal Wind Energy Facility 1 (Pty) Ltd is the project proponent who has commissioned this VIA. Contact details are as follows:

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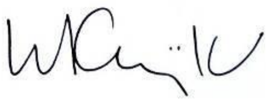
Menno Klapwijk has specialised for 38 years in environmental planning, construction rehabilitation and control, visual impact assessment, and landscape site design. Significant visual impact projects include: N3 De Beers Pass, Mzimvubu Government Water Scheme, Aggeneys Solar Park, Moatize Power Plant (Mozambique), Transnet Multi-purpose Pipeline, Saldanha Steel, Mozal (Alusaf – Mozambique), Letsibogo Dam (Botswana), Blue Circle Cement Factory (East London), Phlogopite Factory (Phalaborwa), Iscor Heavy Minerals Smelter (Empangeni), many VIA's for Eskom 765 kV and 400kV transmission lines and substations, Mmamabula 400kV Transmission Line, Mine and Power Plant (Botswana), West Coast Combined Cycle Gas Turbine Power Plant (CCGT), De Hoop Dam and Pipeline (Sekhukuneland), Tugela Water Project (KwaZulu-Natal), Delportshoop Tower Mast (Delportshoop, Northern Cape), N3 Toll Road, Cedara (KwaZulu-Natal) to Heidelberg (Gauteng), Maputo Steel Project (Maputo, Mazambique), Ga-Pila Village (Potgietersrus, Limpopo Province) and Pom Pom Camp (Okavango, Botswana).

He has more than 100 publications and reports dealing mostly with environmental planning, environmental rehabilitations and control specification, environmental impact assessment and visual impact assessment.

1983:	B. Sc (Land Arch), Texas A & M
1986:	Environmental Impact Assessment, Graduate School of Business, UCT
Registered:	South African Council for Landscape Architecture Practitioners (SACLAP)
Member:	Institute of Landscape Architects of South Africa (ILASA)
Member:	American Society of Landscape Architects (ASLA)
Member:	International Association of Impact Assessors (SA)
Past Council Member:	Council for the Built Environment (CBE)

DECLARATION OF INDEPENDENCE
I, Menno Klapwijk, as authorised representative of Cave Klapwijk and Associates, hereby confirm my independence as a specialist and declare that neither I nor Cave Klapwijk and Associates have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which Cave Klapwijk and Associates was appointed as Visual Impact Assessor in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the Visual Impact Assessment for the Hatherley Township Establishment Environmental Impact Assessment. I further declare that I am confident in the results of the studies undertaken and conclusions drawn as a result of it – as is described in my attached report.



Signed………………….. Date: 11 November 2022

EXECUTIVE SUMMARY

VISUAL IMPACT ASSESSMENT
KLIPKRAAL 2 WEF

VISUAL IMPACT ASSESSMENT REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS, AS AMENDED

INTRODUCTION

Klipkraal Wind Energy Facility 2 (Pty) Ltd (hereafter referred to as 'Klipkraal 2'), has appointed SiVEST Environmental (hereafter referred to as 'SiVEST') to undertake the required EIA processes for the proposed construction of five (5) wind farms and associated infrastructure [including substations and Battery Energy Storage Systems (BESS)] on a number of properties, majority being adjacent, near the town of Fraserburg in the Northern Cape Province of South Africa. The proposed wind farms make up a larger wind energy facility (WEF) (with associated BESS) which will be referred to as the Klipkraal WEF. It should be noted that the proposed wind farm projects form part of separate EIA applications.

The proposed WEF and associated grid connection infrastructure is located approximately 30 km southeast of Fraserburg in the Karoo Hoogland Local Municipality, in the Namakwa District Municipality (**Figure 1: Regional Locality Plan)**

The site is situated on the top of a plateau landform. The edge of the landform forms an escarpment that descends generally to the south. Intermittent views are contained mainly to the upper plateau levels. The landscape is flat and stony dotted with hills and mountains. The groundcover is mainly grassy dwarf shrubland containing very few trees if at all any. The low ground cover does not assist in any visual screening or blending with the landscape, especially bearing in mind the scale and magnitude of the wind turbines

METHOD

The study area was determined as the site and a 20 and 40 km buffer zone around it. The visibility of the turbines would be insignificant beyond this point. Refer to **Figure 1 Regional Locality Map,** which identifies the study area. However, a 40 km buffer zone has also been included in the study, as it may be possible, that when viewed from an elevated position, the structures could be visible depending on light and atmospheric conditions as well as the red flashing lights on top of the turbines at night.

The method used was both a desk top study using Google Earth and a site inspection. The Screening report generated by the National Web-Based Environmental Screening Tool, as provided by SIVEST, was used as a point of departure.

To address the objectives of the impact assessment study the following method will be used:

- In terms of the EIA process a site sensitivity verification process was initiated. This report provided recommendations based the site's sensitivity to the proposed development.

- Define the extent of the affected visual environmental, the viewing distance and the critical views.

- Determine the setting, visual character and land use of the area surrounding the area, and the Genius Loci (sense of place). This will be done in terms of:

    - Topography
    - Vegetation cover
    - Land use
    - Visibility
    - Landscape diversity
    - Landscape character
    - Landscape quality

- Discus and/or meet with the specialist consultant team to identify specific aspects of the construction and development which would affect the visual quality of a setting.

- Define the extent of the affected visual environmental, the viewing distance and the critical views.

- Evaluate the landscape characteristics against which impact criteria ratings will be applied.

- The viewshed, the area within which the proposed project can be visible, will be determined using digital 1:50 000 topographic maps with 20 m contour intervals analysed by the Geographic Information System (GIS), algorithms available in the ArcView Software Suite.

A site visit was undertaken over the period of 11 to 13 May 2022.

The purpose of the site visit was to determine the extent of the potential visibility of the turbine structures and powerline grid alternatives and to understand and document the receiving environment.

The field study entailed travelling public roads that surrounded and crossed the study area to determine the potential visibility from these areas. The route (**Figure 2: Locality Map with Photo/Viewpoints**) followed the N1 from Beaufort West south-west turning north-west along a dirt road towards Fraserburg soon after the Grid Corridor Alternative 1 crosses the N1. The route follows the Grid Corridor then follows a route forking west towards the Alternative 2 route. The route then heads north immediately after crossing the Alternative 2 route heading towards the point where Alternative 1 and 2 converge. The route then crosses Alternative route 2 heading west, follows a valley north-wards to the west of the WEF sites to where the roads forks towards Fraserburg and Loxton. The remainder of the route follows the road towards Loxton.

Google Earth was used to identify homesteads and structures that may be visually impacted. This information was used during the site inspection.

LIMITATIONS, CONSTRAINTS AND ASSUMPTIONS

The following assumptions and limitations are applicable to this study:

- The assessment is based on assumed demographic data. No detailed study will be done to determine accurate data on potential viewers of the project components. If necessary, these studies could be undertaken during the design phase of the project; Google Earth was used to identify homesteads and structures that may be visually impacted. This information was used during the site inspection. It was not possible to determine whether these structures were occupied as most of them were closed when the site visit was conducted. It could also be that these structures are occupied on a temporary basis.

- Determining a visual resource in absolute terms is not achievable. Evaluating a landscape's visual quality is both complex and problematic. Various approaches have been developed but they all have one problem in common: unlike noise or air pollution, which can be measured in a relatively simple way, for the visual landscape mainly qualitative standards apply. Therefore, subjectivity cannot be excluded in the assessment procedure (Lange 1994). Individually there is a great variation in the evaluation of the visual landscape based on different experiences, social level and cultural background. Exacerbating the situation is the inherent variability in natural features. Climate, season, atmospheric conditions, region, sub-region all affect the attributes that comprise the landscape. What is considered scenic to one person may not be to another (NLA, 1997).

- Localized visual perceptions of the economically depressed communities have not been tested as these may be influenced rather by the economic and job opportunities that would exist rather than the direct visual perception of the project.

- The viewshed map is computer generated and does not take into account local and minor visual interruptions in the landscape such as trees on the edge of roads, minor landforms, buildings, etc. As a result, the visibility on these maps could be overstated.

- The assessment does not consider the ancillary project infrastructure and components such as borrow pits, spoil dumps, construction camp sites, etc. These components will be assessed in detail during the design phase should the project be implemented.

- The 'Do Nothing' alternative was not specifically addressed as it is likely that the existing landscape will remain in its existing condition.

FINDINGS

The impact assessment was undertaken for only the main components of the project i.e., wind turbines and associated infrastructure. The study excluded ancillary components such as borrow pits, quarries, lay-down areas and construction camps. This study evaluated the visual impact of the project with a view to assessing its severity based on the author's experience, expert opinion and accepted techniques.

The description of the visual impacts of the phases of construction and decommissioning are not considered as significant visual impacts since the period of activity is of relatively short duration and of a primary impact (localized, of short duration and easily mitigated at the end of the phase). The fact that disturbed areas, e.g. camps / lay-down areas will be rehabilitated also reduces the impacts of these phases.

It is the operational phase that presents the most significant long term visual impact. This is due primarily to the scale and form of the proposed development. Visibility reduces exponentially the further the viewer is from the proposed development.

Table 3, **Klipkraal 2 WEF High Level Impact Table - Visual**, summarises the impacts for the construction, operation and decommissioning phases.

EVALUATION OF THE PROJECT

The project will exert a **negative** influence on the visual environment. This is largely due to the:

- high visibility of the wind turbines which can be 180-200m high (300 to tip of the blade), within the study area.
- the high visibility of construction and operation activity within the low growing, uniform open Karoo veld of uniform visual pattern;
- the low VAC of the area due to the low and uniform visual pattern of vegetation which does not allow for the project to be visually accommodated within the landscape as a result of the high visual contrast and absent screening;
- the scale of the project in a rural setting;
- the introduction of an extensive project within a rural setting that will be brightly lit by security lighting including red flashing aviation warning/hazard lights on the top of the turbines throughout the night.

However, due to the low relative visual quality of the area the overall significance of the visual impact is regarded as **Moderate** (a rating of **3** on a scale of 1-5)

CONCLUSIONS

Based on the field observations and the studies herein and with the implementation of the mitigation measures, it is the Visual Specialist’s opinion the visual impact of the wind farm layout does not present a potential fatal flaw provided that the recommended mitigation measures are implemented.

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1 INTRODUCTION

Klipkraal Wind Energy facility 2 (Pty) Ltd (hereafter referred to as 'Klipkraal 2'), has appointed SiVEST Environmental (hereafter referred to as 'SiVEST') to undertake the required EIA processes for the proposed construction of five (5) wind farms and associated infrastructure [including substations and Battery Energy Storage Systems (BESS)] on a number of properties, majority being adjacent, near the town of Fraserburg in the Northern Cape Province of South Africa. The proposed wind farms make up a larger wind energy facility (WEF) (with associated BESS) which will be referred to as the Klipkraal WEF. It should be noted that the proposed wind farm projects form part of separate EIA applications.

The overall objective of the proposed wind farm projects is to generate electricity by means of renewable energy technologies, capturing wind energy to feed into the national grid, which will be procured under either the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), other government run procurement programmes, any other program it intends to supply power to or for sale to private entities, if required. To further ensure efficient power delivery, the facility will also incorporate the use of storage technologies like batteries (i.e. BESS).

As required in Part A of the Government Gazette 43110, GN 320, a site sensitivity verification was undertaken to confirm the current land use and environmental sensitivity of the proposed project area. The details of the site sensitivity verification are noted below:

Date of Site Visit	11-13 May 2022
Specialist Name	Menno Klapwijk
Professional Registration Number	87006
Specialist Affiliation / Company	South African council for the Landscape Architectural Professions (SACLAP) Bapela Cave Klapwijk
Specialist Topic	Visual Impact Assessment
Proposed WEF Project Name	Klipkraal WEF 2

The proposed WEF and associated grid connection infrastructure is located approximately 30 km southeast of Fraserburg in the Karoo Hoogland Local

Municipality, in the Namakwa District Municipality (**Figure 1: Regional Locality Plan)**

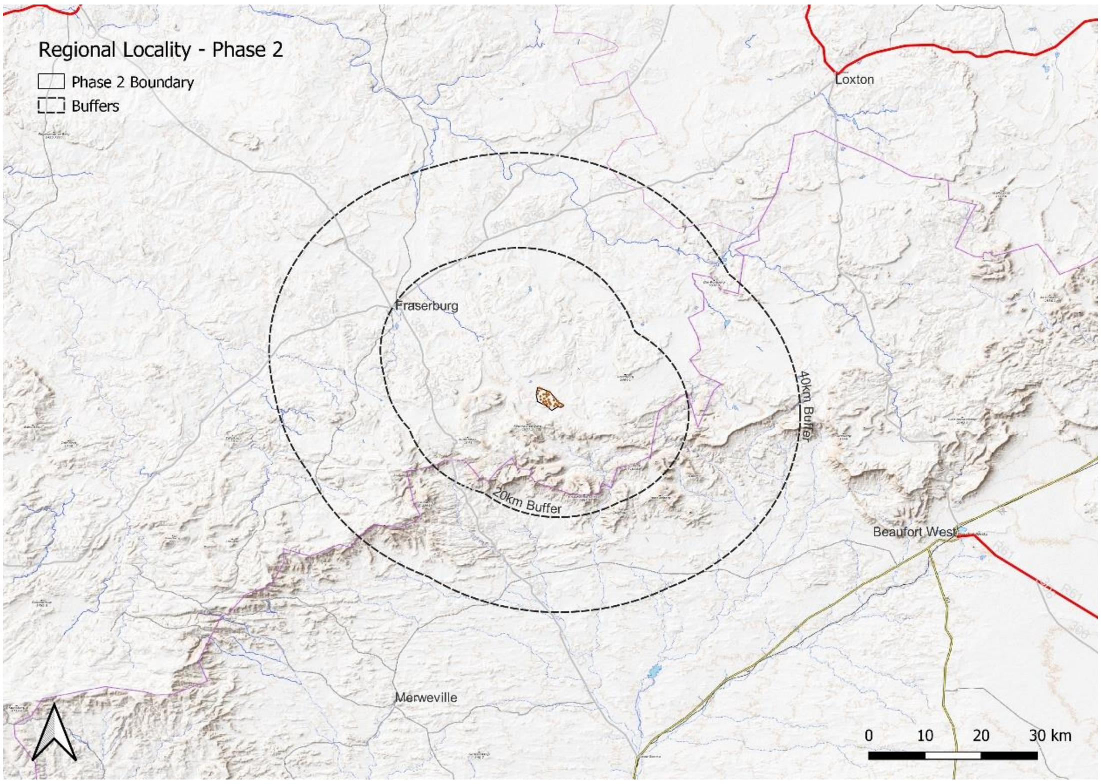

Figure 1: Regional Locality Map

2 OBJECTIVES

This visual assessment is a specialist study to determine the visual effects of the proposed development on the surrounding environment.

The primary objective of this specialist study is therefore to describe the potential impact of these structures on the visual character and sense of place of the area. This Specialist Study will have the following objectives

- Determine the visual character of the area by evaluating environmental components such as topography, current land use activities, surrounding land use activities, etc.
- Identify elements of particular visual quality that could be affected by the proposed project.
- Assessment of the preferred project layout following the site sensitivity verification and layout identification.
- Viewshed for various elements of the proposed development must be calculated, defined, and presented, and the varying sensitivities of these viewsheds must be highlighted.

- Specification of development setbacks or buffers required and provide clear motivations for these recommendations.
- Identification and assessment of the potential direct, indirect, and cumulative impacts of the proposed development on the receiving environment from a visual perspective.
- Cumulative impacts to be assessed by considering renewable energy projects and other applicable (and relevant) projects within 20 km of the proposed projects.
- Impact significance must be rated both without and with mitigation, and must cover the construction, operational and decommissioning phases of the project.
- Identification of the visual impact of the proposed project infrastructure on the different viewsheds. All impacts should be considered under varying conditions as appropriate to the assessment i.e. day, night, clear weather, cloudy weather, etc.
- Maps depicting viewsheds across the sites should be generated and included in the VIA Report. These maps must indicate current viewsheds/visual landscape/obstructions, as well as expected visual impacts during the construction, operational and decommissioning phases of the proposed project.
- An impact statement indicating the acceptability of the proposed development and EA condition recommendations.
- A description of assumptions and limitations in the report.
- A section indicating how the National Web-Based Screening Tool was interrogated and whether classification of the site is accurate or not. If not, it must be motivated why the classification is not accurate.
- Identification of any additional protocols, licensing and/or permitting requirements that are relevant to the project and the implications thereof.
- Provide recommendations with regards to potential monitoring programmes; and
- Determine mitigation and/or management measures, which could be implemented to as far as possible, reduce the effect of negative impacts and enhance the effect of positive impacts. Also, identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts.

3 THE VISIBILITY IN CONTEXT

The site is situated on the top of a plateau landform. The edge of the landform forms an escarpment that descends generally to the south. Intermittent views are contained mainly to the upper plateau levels. The landscape is flat and stony dotted with hills and mountains. The groundcover is mainly grassy dwarf shrubland containing very few trees if at all any. The low ground cover does not assist in any visual screening or blending with the landscape, especially bearing in mind the scale and magnitude of the wind turbines

4 STUDY APPROACH AND METHOD

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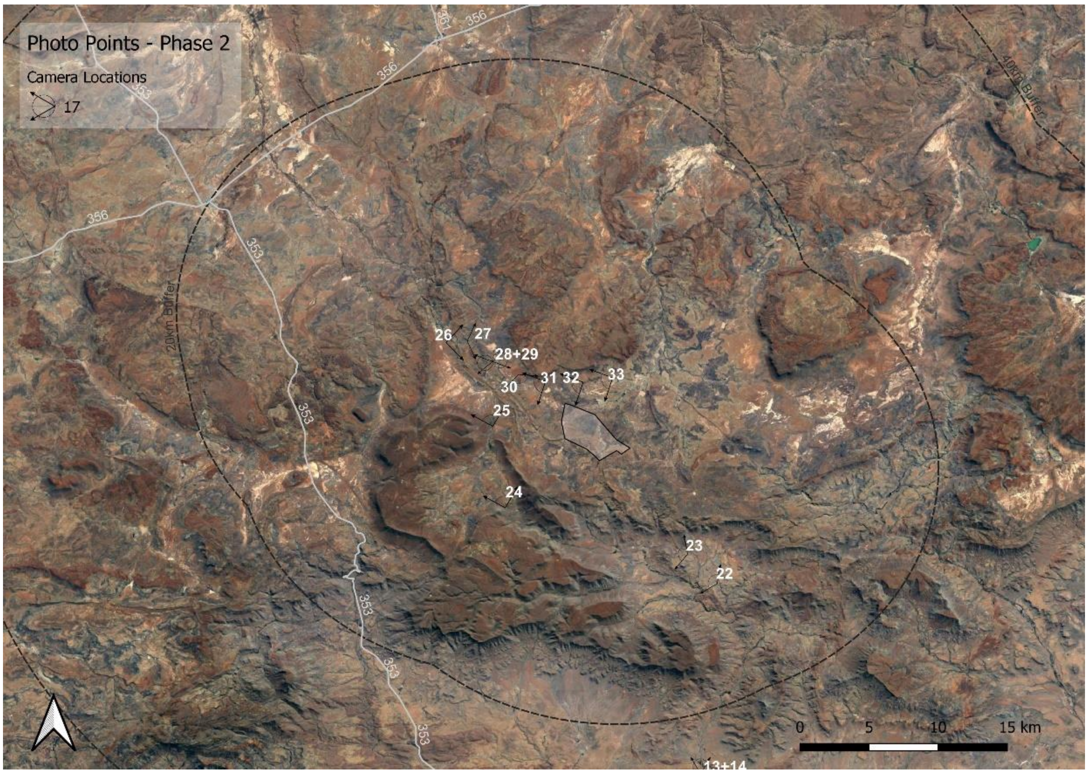

Figure 2: Locality Map with Photo/Viewpoints

The **Visual Assessment** covers the following key aspects:

Description of the visual landscape of the area with specific focus on topographical features that offer impact mitigation opportunities and constraints.

Description of key areas from which the proposed project will be seen (the view shed) as well as the viewing distance.

An assessment of the visual absorption capacity of the landscape (i.e., the capacity of the landscape to visually absorb structures and forms placed upon it). Particular attention must be paid to conservation, tourism, eco-tourism and associated activities, and potential impacts on sense of place.

The identification of potential impacts (positive and negative, including cumulative impacts if relevant) of the proposal on the visual landscape during construction and operation.

Recommendations on position alternatives, and additional alternatives should they be identified, to avoid negative impacts.

The identification of mitigation measures for enhancing benefits and avoiding, reducing, or mitigating negative impacts and risks (to be implemented during design, construction and operation of the proposed project).

The formulation of a clear and simple system to monitor impacts, and their management, based on key indicators.

To aid in the integration of findings, this study must involve close collaboration with the Heritage, Social and Socio-Economic Impact Assessments.

5 LIMITATIONS, CONTRAINTS AND ASSUMPTIONS

The following assumptions and limitations are applicable to this study:

- The assessment is based on assumed demographic data. No detailed study will be done to determine accurate data on potential viewers of the project components. If necessary, these studies could be undertaken during the design phase of the project; Google Earth was used to identify homesteads and structures that may be visually impacted. This information was used during the site inspection. It was not possible to determine whether these structures were occupied as most of them were closed when the site visit was conducted. It could also be that these structures are occupied on a temporary basis.

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- Localized visual perceptions of the economically depressed communities have not been tested as these may be influenced rather by the economic and job opportunities that would exist rather than the direct visual perception of the project.

- The viewshed map is computer generated and does not take into account local and minor visual interruptions in the landscape such as trees on the edge of roads, minor landforms, buildings, etc. As a result, the visibility on these maps could be overstated.

- The assessment does not consider the ancillary project infrastructure and components such as borrow pits, spoil dumps, construction camp sites, etc. These components will be assessed in detail during the design phase should the project be implemented.

- The 'Do Nothing' alternative was not specifically addressed as it is likely that the existing landscape will remain in its existing condition.

6 DESCRIPTION OF THE AFFECTED ENVIRONMENT

6.1 Description of the Works

The proposed WEF and associated grid connection infrastructure is located approximately 30 km southeast of Fraserburg in the Karoo Hoogland Local Municipality, in the Namakwa District Municipality.

This report is focussed only on Phase 2 (Facility 2)

At this stage it is anticipated that the proposed Klipkraal 2 WEF will comprise up to sixty (60) wind turbines with a maximum total energy generation capacity of up to approximately 300 MW. In summary, the proposed Klipkraal 2 WEF development will include the following components:

Wind Turbines:

- Approximately 60 turbines, between 5MW and 8MW, with a maximum export capacity of up to approximately 300MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or any other program.
- The final number of turbines and layout of the wind farm will, however, be dependent on the outcome of the Specialist Studies in the EIA phase of the project;
- Each wind turbine (See **Figure 3 Diagram of Proposed Wind Turbines)** will have a maximum hub height of up to approximately 200m;
- Each wind turbine will have a maximum rotor diameter of up to approximately 200m;
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 100m x 100m (total footprint of approx. 10 000m^2) per wind turbine during construction and for on-going maintenance purposes for the lifetime of the proposed wind farm projects. This will however depend on the physical size of the wind turbine;

Figure 3 Diagram of Proposed Wind Turbines

- Each wind turbine will consist of a foundation (i.e. foundation rings) which may vary in depth, from approximately 3m and up to 10m or greater, depending on the physical size of each wind turbine. It should be noted that the foundation can be up to as much as approximately 700m³;

Electrical Transformers:

- Electrical transformers will be constructed near the foot of each respective wind turbine in order to step up the voltage to 66kV.
- The typical footprint of the electrical transformers is up to approximately 10m x 10m, but can be up to 20m x 20m at certain locations;

Step-up / Collector Substations:

- One 11-66/132-400kV step-up / collector substation, each occupying an area of up to approximately 2ha,
- The proposed substation will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substation has been included in this EIA and in the grid connection infrastructure BA (separate application - substations, switching stations and power lines) to allow for handover to Eskom.
- Following construction, the substation will be owned and managed by Eskom. The current applicant will retain control of the medium voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 400kV components) of the substation will likely be ceded to Eskom shortly after the completion of construction;

Main Transmission Substations (MTS):

- One (1) new 132/400kV Main Transmission Substation (MTS) is being proposed, occupying an area of up to approximately 120ha.
- The proposed MTS will include an Eskom portion and an IPP portion.
- Following construction, the substation will be owned and managed by Eskom. The current applicant will retain control of the 132-400kV and lower voltage components of each MTS, while the 132/400kV voltage components of the MTS will likely be ceded to Eskom shortly after the completion of construction;

Electrical Infrastructure:

- The wind turbines will be connected to the proposed substation via medium voltage (i.e. 33kV) cables.
- These cables will be buried along access roads wherever technically feasible, however, the cables can also be overhead (if required);
- Each WEF will then connect to the MTS via an up to 400kV powerline.

Battery Energy Storage Systems (BESS):

- One (1) Battery Energy Storage System (BESS) will be constructed for the wind farm and will be located next to the 33-66/132-400kV step-up / collector substations which form part of the respective wind farms, or in between the wind turbines.

- It is anticipated that the type of technology will be either Lithium Ion or Sodium-Sulphur (or as determined prior to construction).
- These batteries are not considered hazardous goods as they will be storing ‘energy’.
- The size, storage capacity and type of technology will be determined / confirmed prior to construction. This information will be provided to I&AP’s prior to the commencement of construction.

Roads:

- Internal roads with a temporary width of up to approximately 15m will provide access to the location each wind turbine. These roads will be rehabilitated back to 8m once construction has been completed.
- Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.
- Existing site roads may also be upgraded using temporary concrete stones in order to accommodate for the heavy loads.
- Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions.

Site Access:

- The proposed wind farm application site will be accessed via existing gravel roads from the R353 Regional Route;

Temporary Staging Areas:

- A temporary staging area will be required for the wind farm and will be located both at the foot of each wind turbine and at the storage facility (i.e. turbine development area) to allow for working requirements.
- One (1) temporary staging area per wind turbine / range of wind turbines will be required.
- Temporary staging areas will cover an area of up to approximately 100m x 100m (10 000m2 / 1ha) each;

Temporary Construction Camps:

- One (1) temporary construction camp will be required during the construction phase for the wind farm.
- This area will be used as a permanent maintenance area during the operational phase.
- The combined Temporary Construction Camp / Permanent Maintenance Area will cover an area of up to approximately 2.25ha.
- A cement batching plant as well as a chemical storage area will fall within the Temporary Construction Camp and Permanent Maintenance Area.
- The Temporary Construction Camp and Permanent Maintenance Area will be strategically placed within the proposed wind farm site and will avoid all high sensitivity and/or ‘no-go’ areas;

Offices, Accommodation, a Visitors’ Centre and Operation & Maintenance (O&M) Buildings:

- An office (including ablution facilities), accommodation (including ablution facilities), a Visitors’ Centre and an Operation & Maintenance

(O&M) building will be required and will occupy areas of up to approximately 100m x 100m (i.e. 1ha).

- Each wind farm (i.e. each phase) will have its own O&M building and Office, however, the Accommodation and Visitors' Centre will be centralised locations which will be shared between certain wind farm projects (i.e. shared between certain phases which will be confirmed at a later stage);

Septic Tank and Soak-Away Systems:

- The proposed wind farm will consist of a septic tank and soak-away system.
- This will be required for construction as well as long term use.
- The septic tank and soak-away system will be placed 100m or more from water resource (which includes boreholes);

Fencing:

- Fencing will be required and will surround the wind farm.
- The maximum height of the fencing as well as the area which the fencing will cover will be confirmed during the detailed design phase, prior to construction commencing.
- Fences will however be constructed according to specifications recommended by the Ecologist and Avifauna specialist (as per the EMPr);

Temporary Infrastructure to Obtain Water from Available Local Sources:

- Temporary infrastructure to obtain water from available local sources will be required. Water may also be obtained from onsite boreholes and from the town of Fraserburg.
- New or existing boreholes, including a potential temporary above ground pipeline (approximately 50cm in diameter) for each wind farm, to feed water to the sites are being proposed.
- Water will potentially be stored in temporary water storage tanks.
- The necessary approvals from the Department of Water and Sanitation (DWS) will be applied for separately (should this be required); and

Temporary Containers:

- Temporary containers of up to approximately 80m^3 will be required for the storage of fuel on-site during the construction phase of the wind farm.
- The chemical storage area will fall within the Temporary Construction Camp and permanent Maintenance Area.

Phases 1 to 3 of the WEF application site incorporates the following farm portions:

- Remainder of the Farm Matjesfontein No. 409 (RE/409) - C02600000000040900000.
- Remainder of the Farm Klipfontein No. 447 (RE/44) - C02600000000044700000; and

- Portion 1 of the Farm Klipfontein No. 447 (1/447) - C02600000000044700001.

Phases 4 to 5 of the WEF application site incorporates the following farm portions:

- Portion 3 of the Farm Ratelfontein No. 394 (3/394) - C02600000000039400003; and
- Remainder of the Farm Matjiesfontein No. 411 (RE/411) - C02600000000041100000.

Phase	Applicant	Capacity	No. of turbines
Phase 1	Klipkraal Wind Facility 1 (Pty) Ltd	300MW	60
Phase 2	Klipkraal Wind Facility 2 (Pty) Ltd	300MW	60
Phase 3	Klipkraal Wind Facility 3 (Pty) Ltd	300MW	60
Phase 4	Klipkraal Wind Facility 4 (Pty) Ltd	300MW	60
Phase 5	Klipkraal Wind Facility 5 (Pty) Ltd	300MW	

6.2 Description of the Affected Receiving Environment

The extent of the visual impact of the project will depend on the following characteristics of the receiving environment:

Topography

Topography describes the landform that gives rise the physical setting.

Vegetation Cover

Vegetation refers to the vegetation cover in terms of visual diversity and not in terms of botanical characteristics.

Land Use*

Land use is described in terms of the visual mix of land uses that is a function of land diversity and character.

Visibility

Visibility is described in terms of the areas that theoretically have direct line of sight in relation to distance the viewer is away from the object. Critical affected views are also described.

Landscape Diversity

Landscape diversity is a function of topography, vegetation and land use. The greater the diversity, the greater is the potential for the proposed development to blend with the surrounding landscape.

Landscape Character

The spirit, or sense of place, is that quality imparted by the aspects of scale, colour, texture, landform, enclosure, and in particular, the land use. According to K. Lynch (1992) 'it is the extent to which a person can recognise or recall a place as being distinct from other places as having a vivid, or unique, or at least a particular character of its own'.

The quality of *Genius Loci* is a function of attributes such as the scenic beauty or uniqueness and distinctive character of the built and cultural landscape.

Visual Quality

The visual quality is the visual significance given to a landscape determined by cultural values and the landscape's intrinsic physical properties (Smardon, *et al*, 1986). While many factors contribute to a landscape's visual quality, they can ultimately be grouped under three headings: vividness, intactness and unity.

The visual quality can be categorised under relative headings such as high, medium and low visual quality for the study area. High refers to those areas that have a high aesthetic appeal such as mountains, river valleys, unspoilt coastal zones, and wilderness areas. The medium areas are those that have high visual diversity, but which have already been modified by human activity comprising the aesthetic appeal such as roads, minor infrastructure and settlements. The low visual quality areas are those that are relatively highly populated, and which have been heavily impacted on by human activity such as industrial and mining areas or which have a low aesthetic appeal due to a lack of landscape diversity or interest.

The study area focuses on a 50 km radius around each of the project components.

6.2.1 Topography

The area is located on top of a rather featureless plateau. The landscape is a relatively flat to rolling and stony, but the area is dotted with hills and mountains to the west and east. The geology forms part of the Karoo Sequence sandstones and shales. The landscape drops down over the edge of an escarpment to the south-east towards Beaufort West and the N1. There are several ephemeral pans scattered within the flat landscape. The landscape is covered with low growing and sparse vegetation (see **Photos 1 and 2**)

Implications for the Project

The flat landscape does not assist in limiting the visual exposure of the affected area. There are no rising landforms, other than on the visual periphery, that will screen views from any of the sensitive visual receptors such as farm homesteads. Any tall structure within the study area will be visible for extended distances Mountain ridges to the southwest and northeast terminate views on the visual periphery to between 10-15km. Fraserburg and most of the R353 are not affected visually due to topography.

6.2.2 Vegetation Cover

The very nature of the vegetation in this area, Upper Nama Karoo and the Eastern Mixed Nama Karoo ((Low and Rebelo,1996). Western Upper Karoo, Eastern Upper Karoo and Roggeveld Shale Renosterveld) (Musina and Rutherford 2006) and which forms part of the Nama Karoo Biome **(Figure 4: Vegetation)** is low growing and visually uniform which does not provide much visual screening (see Photos 1 and 2). The vegetation is dominated by a variety of dwarf shrubs. Trees never dominate the landscape Although the vegetation is not overly sensitive to the development, it does not assist in reducing the visual expose of the turbines. The vegetation is typical of the Karoo ambience, and it is this together with the topography which provides the Karoo sense of place.

Photo 1: Typical sparse and open Karoo landscape

Photo 2 Typical sparse and open Karoo landscape

Implications for the Project

The relatively flat and uniformly textured vegetation of the landscape types will visually contrast significantly with the proposed turbines and associated infrastructure making it more visible in the landscape.

The low vegetation height does not assist in screening the proposed development, nor does it assist in blending it with the landscape.

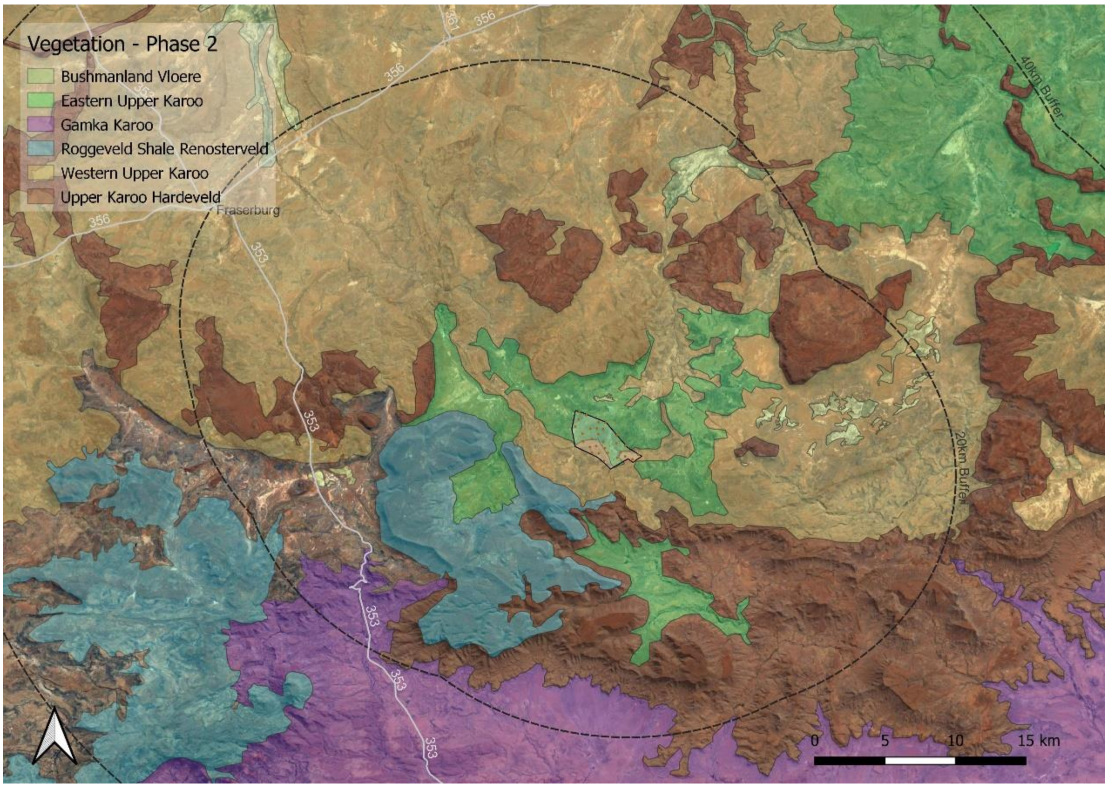


Figure 4: Vegetation

6.2.3 Land-use

The current visible land-use is predominantly low-density small stock farming which include Dorper and Merino Sheep and Boer Goats.

The area appears to be sparsely populated, which was borne out during the site visit. Many of the homesteads appear to be uninhabited.

The largest town in the area is Fraserburg, which lies approximately 20 km to the northwest, Loxton which lies approximately 80km to the northeast and Beaufort West 90km to the southeast.

There are few establishments that rely on the sense of place of the Karoo such as guest houses and game farms that will potentially be affected by the proposed development.

Implications for the Project

The area, with its current pastural land-use and sparse population would be minimally affected in terms of land-use. The towns and villages are all beyond 20-90 km away and the visual impact on them would be insignificant.

6.2.4 Visibility and Shadow Flicker

Visibility

The visibility is dependent on the topography. The existing topography is very flat and open which does not assist in limiting the views. Visibility of the structures, due to the tall and imposing scale of the turbines, can be continuous and uninterrupted to beyond 25 km. It is considered that beyond 50 km views of the development, though still visible are considered insignificant in the landscape due to the exponential diminishing effect of distance. However, due to topography visibility to the north does not extend more than 15km while the hills and mountains to the southwest and northeast terminate the visibility approximately 10km. Views to the east extend to approximately 25km. Visibility to the south terminates on the edge of the escarpment at about 17km while to the southeast it is no more than 5km.

In a study sponsored by the United States Department of the Interior Bureau of Land Management, 377 observations of five wind facilities in Wyoming and Colorado were made under various lighting and weather conditions. The facilities were found to be visible to the unaided eye at >58 km under optimal viewing conditions, with turbine blade movement often visible at 39 km. Under favourable viewing conditions, the wind facilities were judged to be major foci of visual attention at up to 19 km (12 mi) and likely to be noticed by casual observers at >37 km. A conservative interpretation suggests that for such facilities, an appropriate radius for visual impact analyses would be 48 km that the facilities would be unlikely to be missed by casual observers at up to 32 km, and that the facilities could be major sources of visual contrast at up to 16 km (Sullivan, *et. al*, 2011).

The critical views are from those visual receptors that are most impacted by the visual intrusion of the proposed development. These would include users of public roads, towns, villages, game farms and lodges, settlements as well as farmsteads in the nearby vicinity.

Although not all homesteads are occupied fulltime, (see dots on **Figure 5: Visual Receptors**) many of these will be in direct line of sight and within the 0-5 km zone where the magnitude of impact could be high. Other sensitive receptors include Fraserburg, the Karoo National Park, travellers on the main roads such as the R353, R356 and the R61, activities and institutions that rely on the aesthetic environment such as game farms, national parks, lodges, guesthouses as well as hunting and or photographic safari operations.

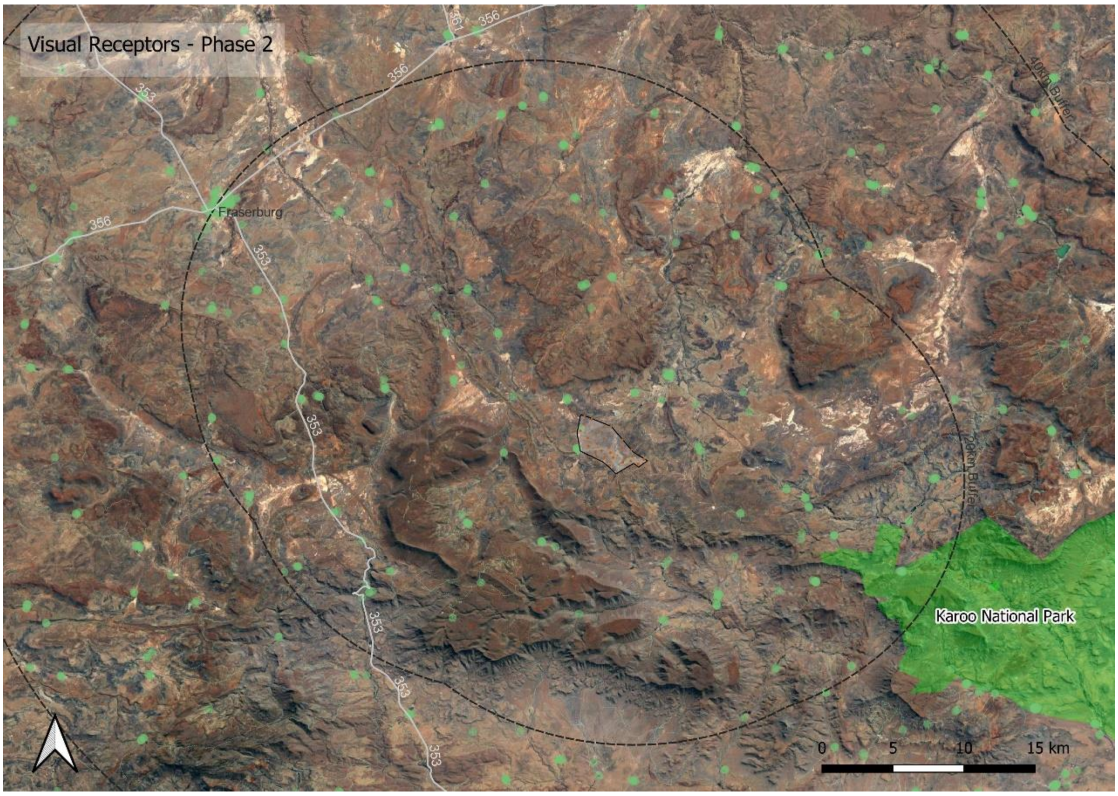


Figure 5: Visual Receptors

Landscape receptors are physical areas that are regarded as visually interesting and which provide sense of place, such as the typical Karoo ambience, to that area. These receptors include rivers and drainage ways, mountains, ridges, vegetation, and any other interesting features (**See Figure 6: Landscape Receptors**).

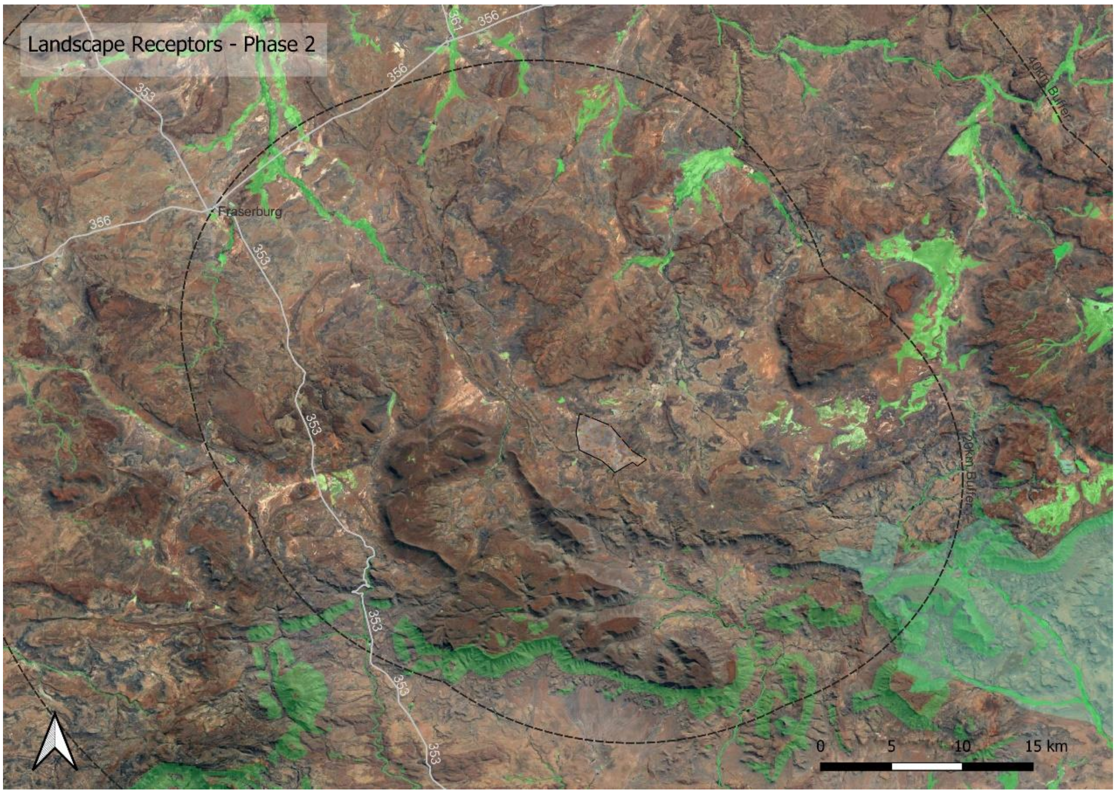


Figure 6: Landscape Receptors

The turbine towers, due to the open and flat topography and lack of screening vegetation, could easily to be visible beyond the 40 km zone. However, due to hills and mountains on the peripheral edges and the drop off at the edge of the escarpment visibility to the north does not extend more than 15km while the hills and mountains to the southwest and northeast terminate the visibility approximately 10km. Visibility to the south terminates on the edge of the escarpment at about 17km while to the southeast it is no more than 5km. **(See Figure 7: Viewshed of Wind Turbine).**

The Karoo is renowned and highly valued for its dark night skies. It is a requirement by Civil Aviation that a red hazard flashing navigation light be installed on top of each turbine. These lights can be seen over extended distances of at least 40 km and when viewed against a dark sky they become very visible.

Substations and Other Infrastructure

Part of the brief was to assess the visual impact of the proposed substations and other infrastructure. As the substations and associated infrastructure are located among the towers and are much shorter than them (i.e., maximum height at 10 m) it was regarded that their visual impact would be minimal in relation to the towers

Shadow Flicker

Farmsteads and other housing in close proximity to the wind turbines could experience the effect of flicker. A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker and can be a temporary phenomenon experienced by people at nearby residences or public gathering places. The impact area depends on the time of year and day (which determines the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker generally occurs during low angle sunlight conditions, typically during sunrise and sunset times of the day. However, when the sun angle gets very low (less than 3 degrees), the light has to pass through more atmosphere and becomes too diffused to form a coherent shadow. Shadow flicker will not occur when the sun is obscured by clouds or fog, at night, or when the source turbine(s) are not operating. (Green Rhino Energy). Not only can shadow flicker be a nuisance to nearby residents but, it has been suggested, could aggravate medical problems such as migraine and epilepsy.

Shadow flicker intensity is defined as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker intensity diminishes with greater receptor-to-turbine separation distance. Shadow flicker intensity for receptor-to-turbine distances beyond 1,500 meters is very low and generally considered imperceptible. Shadow flicker intensity for receptor-to-turbine distances between 1,000 and 1,500 meters is also low and considered barely noticeable. At this distance shadow flicker intensity would only tend to be noticed under conditions that would enhance the intensity difference, such as observing from a dark room with a single window directly facing the turbine casting the shadow during sunny conditions. At distances less than 1,000 meters, shadow flicker may be more noticeable. In general, the largest number of shadow flicker hours, along with greatest shadow flicker intensity, occurs nearest the wind turbines (Green Rhino Energy).

A shadow flicker analysis calculates for each point of interest, in this case for each turbine:

- Number of hours per year that the flickering occurs,
- Maximum length (in minutes) that flickering occurs on the worst day in the year, and
- Number of days in the year that shadow flickering appears at all.

All the above are calculated for both the worst case.
Following German regulation, shadow flickering cannot be perceived by the human eye if the angle of the sun over the horizon is less than 3°. Plus, the blades of the turbines must cover at least 20% of the sun.

While guidelines differ, the ones in Germany are most widely adopted. Accordingly, the maximum impact allowed by shadow flickering is:

- 30 hours per annum of flickering in the worst case
- 30 minutes maximum on the worst day in the year

The shadow flicker exercise was done for each of the turbine towers. The area of flicker influence was determined by the areas receiving 30 or more hours of flickering. **(See Figure 8: Shadow Flicker Analysis)** the area bounded by the yellow (30-99 hours per annum) is the extent of shadow flicker impact. The areas in red reflect those areas that will receive at least 100 hours per annum while the green areas will receive 10-29 hours per annum. The areas unshaded will receive less than 10 hours per annum. Furthermore, zone of influence does not extend more than 2 km beyond any of the towers.

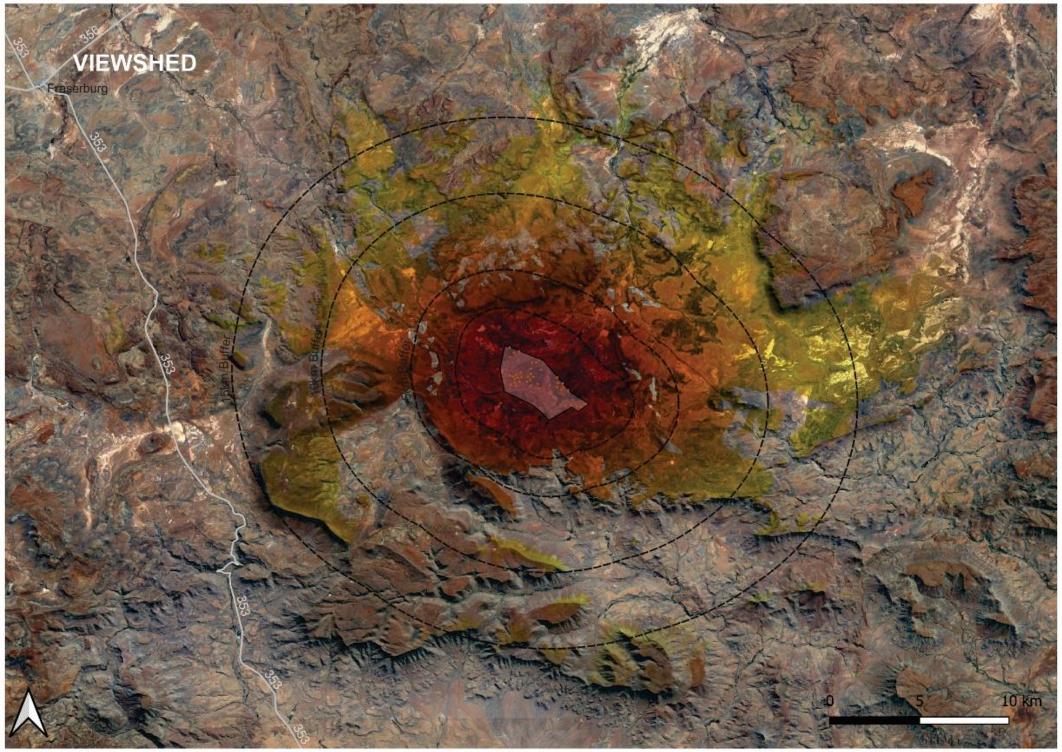
Implications for the Project

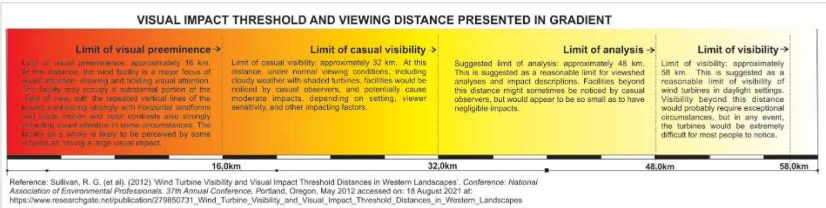
The greatest impact is within the 16 km zone. There is little that topography and vegetation can help to mitigate this impact. This will have a high impact on the critical visual receptors such as the farmsteads and occupied buildings. There are farmsteads that will be directly impacted as well as some of the district roads that service the area such as the one that transects the study area which connects Fraserburg with Loxton via the R381 midway between Loxton and Beaufort West. The N1 to the south, the R353 to the west and the R356 to the north are all beyond the visibility zone of influence. There are relatively few visual receptors, such as those that rely on the visual quality of the visual environment, such as game farms, national parks, lodges, and guesthouses, that will be affected.

To minimise the visual intrusion of the red hazard flashing navigation lights, the use of AVWS (Audio Visual Warning System) technology should be investigated. AVWS is a radar-based obstacle avoidance system that activates obstruction lighting and audio signals only when an aircraft is in close proximity to an obstruction on which an AVWS unit is mounted, such as a wind turbine. The obstruction lights and audio warnings are inactive when aircraft are not in proximity to the obstruction. BML 2013[3]

The substations and the access road will have relatively no impact on the overall visibility as these are visually insignificant compared to the turbine towers. The turbines would be the overwhelming visual intrusion within the landscape and would dominate any lesser structures

The analysis of potential shadow flicker impacts from the development on the visual receptors indicates that the impacts are expected to be minor. It is not expected that the zone of influence will extend further that 2 km from any of the turbines. In reality the impacts beyond 1 km will be very low intensity. Also, shadow flicker is not expected to be a significant environmental impact.





Note:
The viewshed analysis is presented to illustrate the visibility of the ***Klipkraal 2*** wind farm assuming the following: 40 wind turbines at a maximum height of 300m, made up of 200m hub height and 100m rotor blades. The off-set to establish the viewshed is 200m (i.e. hub height)

KLIPKRAAL 2: SPECIFICATIONS

Number of Turbines: 40

Hub Height: 200m

Rotor Radius: 100m

Maximum Height: 300m

Figure 7: Viewshed of Wind Turbines

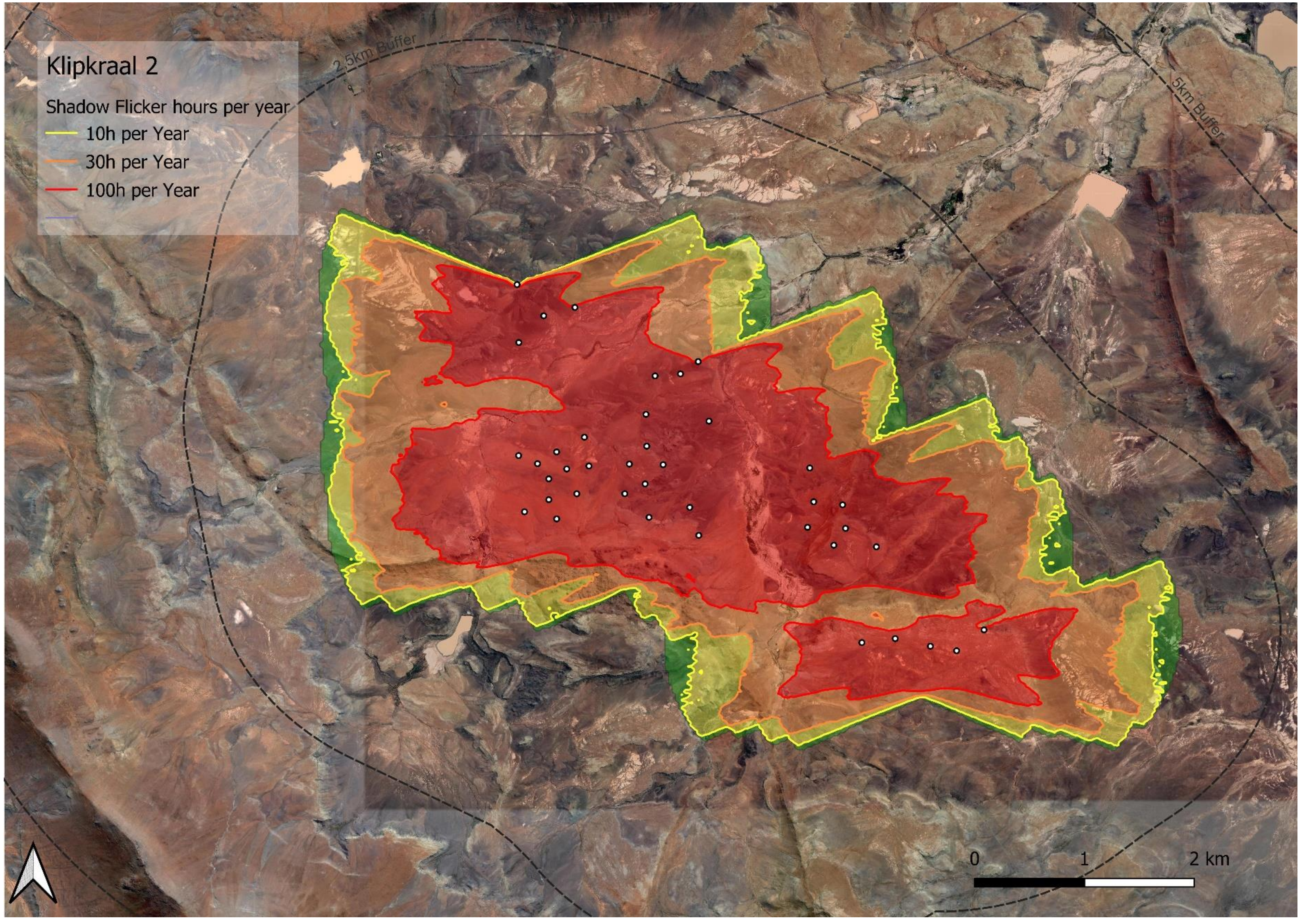


Figure 8: Shadow Flicker Analysis

6.2.5 Landscape Diversity

Landscape diversity within the study area is primarily based on the topographical features as well the vegetation, namely the Karoo veld and the existing land uses. The greater the diversity, the greater is the potential for the proposed development to blend with the surrounding landscape.

The peripheral visual boundaries to the north, east and west are truncated by low ridges. The peripheral visual boundary to the south and west is relatively undistinguished. The area appears to be sparsely populated, which was borne out during the site visit. The study area is not regarded as having a high visual quality when compared to other areas in the region such as the Swartberg Mountains, Meiringspoort and the mountains around Beaufort West and the Karoo National Park but it does display the typical and iconic Karoo landscape. The existing land-use does not add to the diversity of the area being mainly low-density small stock farming. Low hills and shallow drainage ways occur. The tallest structures in the area are power lines and wind pumps. The area exhibits a low visual diversity.

Implications for the Project

The higher the visual diversity, the greater is the opportunity to visually blend the project with the environment as these will more readily accept visual change or any structure placed within them. The higher the diversity, the higher the Visual Absorption Capacity (VAC) or the ability of the environment to accept visual change.

The low visual diversity of area will result in a low VAC and will in turn result in any large scale or tall structure to be highly visible due to the lack of screening and the high visual contrast. The surrounding hills and mountains on the visual periphery contain the views and terminate the views

6.2.6 Landscape Quality and Character

The spirit, or sense of place, is that quality imparted by the aspects of scale, colour, texture, landform, enclosure, and in particular, the land use. According to K. Lynch (1992) ‘it is the extent to which a person can recognise or recall a place as being distinct from other places as having a vivid, or unique, or at least a particular character of its own’.

The quality of *Genius Loci* is a function of attributes such as the scenic beauty or uniqueness and distinctive character of the built and cultural landscape.

The *Genius Loci* or sense of place of the study area is typical Nama Karoo with its low arid bushes, wide open landscape and the sheep and goat farming. The only tall structures in the area are the odd wind pump and transmission lines. The sense of place of the rural and natural ambience and character of the setting will be changed by the high visual prominence of the turbines.

The visual quality can be categorised as low visual quality for the study area. The low visual quality is based on the lack of visual diversity as a result of the uniformity of the vegetation which lack specific interest, and the surrounding flat and open landscape.

Implications for the Project

The proposed WEF will significantly alter the existing ambience and character of the area from a rural open landscape to one that is industrial in nature.

7 IDENTIFICATION OF POTENTIAL RISK SOURCES

Various risk sources for the visual impact have been identified for the construction and operation phases and can be classified as both negative and positive. The following general risks are associates with the visual intrusion in the landscape.

7.1 Risk Sources

7.1.1 Construction Phase

It is anticipated that the major risk source during construction would be:

Negative Risk Sources

- Excessive clearing and stripping of topsoil for preparing the area for the development,
- Edge shaping and embankment landscape stabilisation of the platforms not done or unsuccessful.
- The relatively random and disorganised lay down of building materials, vehicles and offices.
- The extent and intensity of the security and construction lighting at night.
- Dust from construction activities.
- Open and un-rehabilitated landscape scarring; and
- High seed bank of alien species in the topsoil can lead to the uncontrolled spread of exotic invader plant species. This could create a vegetated area that is visually contrary to the surrounding landscape.

Positive Risk Sources

- Image of construction activity could lead to a perceived view of progress and benefit to the community.

7.1.2 Operational Phase

It is anticipated that the major risk source during operation would be:

Negative Risk Sources

- Areas and /or specific sites of aesthetic value may be disfigured by the introduction of a wind farm within the viewshed resulting in a permanent change to the existing visual quality of visually sensitive areas.
- Constant disruption of rural night ambience by red warning flashing lights.
- The compromising of views from or the alteration of the ambience of natural areas.
- Edges may not blend in with the landscape or cut slopes may be too steep to be adequately re-vegetated.
- Need to keep certain areas such as road reserves, platform edges etc. clear of vegetation which will result in visual scarring.

Positive Risk Sources

- The development could be the visual affirmation of progress and prosperity for the region. Localised visual perceptions of the economically depressed communities of the population have not been tested as these may be influenced rather by the economic and job opportunities that could exist rather than the direct visual perception of the project.

8 THE VISUAL ASSESSMENT

8.1 The Visual Analysis

This section describes the aspects which have been considered in order to determine the intensity of the visual impact on the area. The criteria include the area from which the project can be seen (the viewshed), the viewing distance, the capacity of the landscape to visually absorb structures and forms placed upon it (the visual absorption capacity), and the appearance of the project from important or critical viewpoints.

8.2 The Viewshed

The viewshed is a topographically defined area which includes all possible observation sites from which the project will be visible. The boundary of the viewshed, which connects high points in the landscape, is the boundary of possible visual impact (Alonso, et al, 1986). Local variations in topography and man-made structures would cause local obstruction of views. The viewshed, based on the GIS assessment and fieldwork, extends for the main part varying from <1 km to greater than 25 km (**Figure 7**).

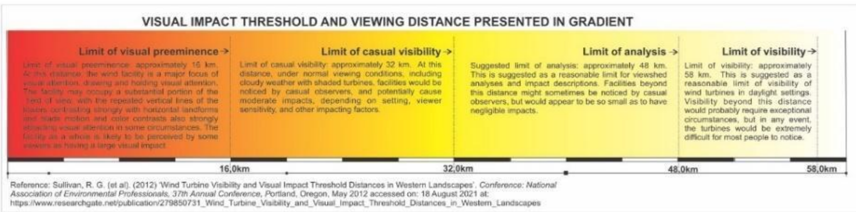
8.3 The Viewing Distance

The visual impact of an object in the landscape diminishes at an exponential rate as the distance between the observer and the object increases (Hull and Bishop, 1988).

Thus, the visual impact at 1000 metres would be approximately a quarter of the impact as viewed from 500 metres. Consequently, at 2000 metres, it would be one sixteenth of the impact at 500 metres. The view of the project components would appear so small from a distance of 5000 metres or more that the visual impact at this distance is insignificant. On the other hand, the visual impact of the project components from a distance of 500 metres or less would be at its maximum (**Figure 9: An Example of Exponential Reduction of Visibility over Distance**). Views are potentially possible up to 50 km with views of the WEF within 16 km (being the limit of visual pre-eminence) seen as a major focus of visual attention, drawing and holding one's visual attention (see **Section 6.2.4: Visibility and Shadow Flicker**)

8.4 Critical Views

Views identified as being critical have been discussed under Section 4.2. These have been overlaid on the viewshed to determine the extent of these within the viewing zones radiating out from the project components. In summary the critical views are those sensitive receptors which include Fraserburg, the Karoo National Park, travellers on the main roads such as the R353, R356 and the R61, activities and institutions that rely on the aesthetic environment such as game farms, national parks, lodges, guesthouses as well as hunting and or photographic safari operations. Although not all homesteads are occupied fulltime, (see dots on **Figure 5: Visual Receptors**) many of these will be in direct line of sight and within the 0-5 km zone where the magnitude of impact could be high



EXPONENTIAL REDUCTION OF VISUAL IMPACT OVER DISTANCE

Figure 9: An Example of Exponential Reduction of Visibility over Distance

8.5 The Visual Absorption Capacity

The Visual Absorption Capacity (VAC) is a measure of the landscape's ability to visually accept / accommodate or embrace a development. Areas which have a high visual absorption capacity are able to easily accept objects so that their visual impact is less noticeable. Conversely areas with low visual absorption capacity will suffer a higher visual impact from structures imposed on them. In this case the VAC has been defined as a function of three factors.

The VAC was determined, based on the author's field experience, taking the following into account:

- Slope
- Visual pattern (landscape texture) with regard to vegetation and structures
- Vegetation height

Table 1: Visual Absorption Factors and their Numerical Values

VAC Factor		Categories		
Slope	Range Numerical Value VAC	0-3 % 3 Low	3-6 % 2 Moderate	> 6 % 1 High
Vegetation Height	Range Numerical Value VAC	< 1 m 3 Low	1-6 m 2 Moderate	6 m 1 High
Visual Pattern	Description Numerical Value VAC	Uniform 3 Low	Moderate 2 Moderate	Diverse 1 High

It is therefore concluded that the VAC can be regarded as:

Slope	0-3%	value of 3
Vegetation height	<1m	value of 3
Visual pattern	Uniform	value of 3

It has a combined rating of 9 which equates with a **Low VAC** due to flat open landscape and arid grassland.

This implies that the areas with a **Low** VAC are inherently unable to visually accommodate or accept the visual change made by the proposed wind facility.

8.6 Cumulative Impacts

Visual impacts have been assessed in terms of the impact the development will have on the visual environment. Visual assessment is a component of the human aesthetics and is considered part of a suite of social impacts such as noise and sense of place which together may result in a higher cumulative impact than if it were read in isolation. This study assesses only the visual impacts.

Cumulative visual impacts may arise where more than one wind turbine development is visible from the same point. There are several renewable energy generation facilities approved and in the planning stages in the area as indicated in **Figure 10** below. However, these are at least 70km or more and beyond a distance where they are visible.

This increase cannot be measured empirically. However, it can be assumed that, as visual impacts reduce exponentially with distance, conversely doubling the size and volume of a development may increase the impact exponentially.

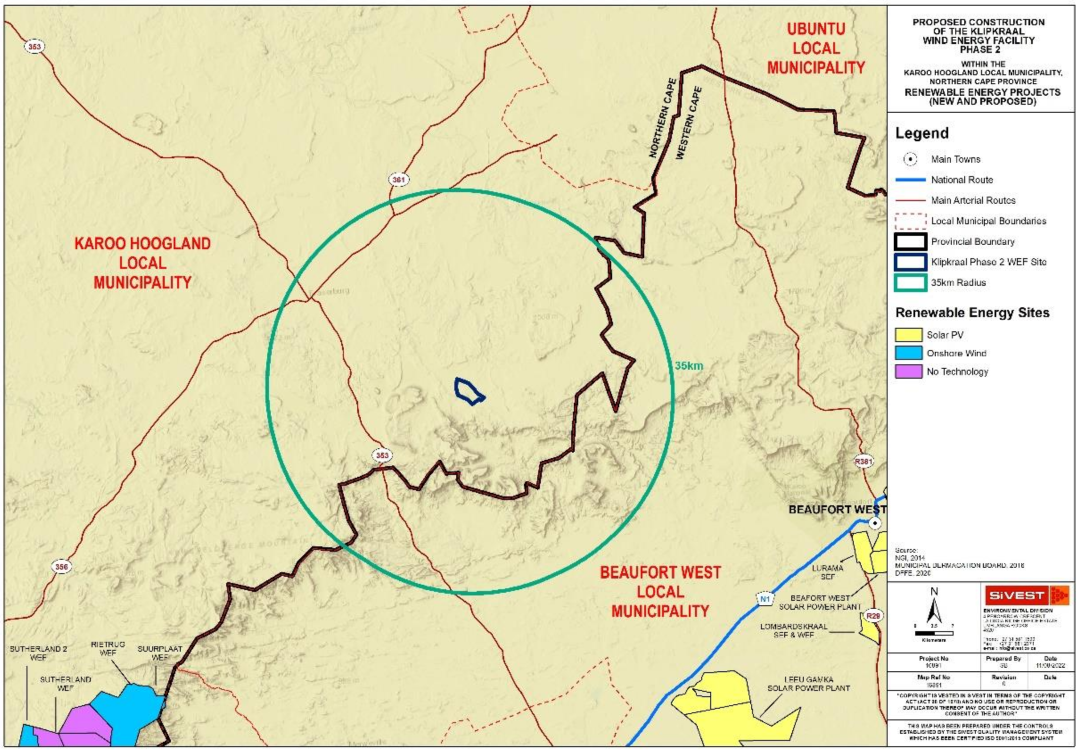


Figure 10: Regional EA Applications for Renewable Energy Projects Located Within a 35 km Radius from the Proposed WEFs Study Area

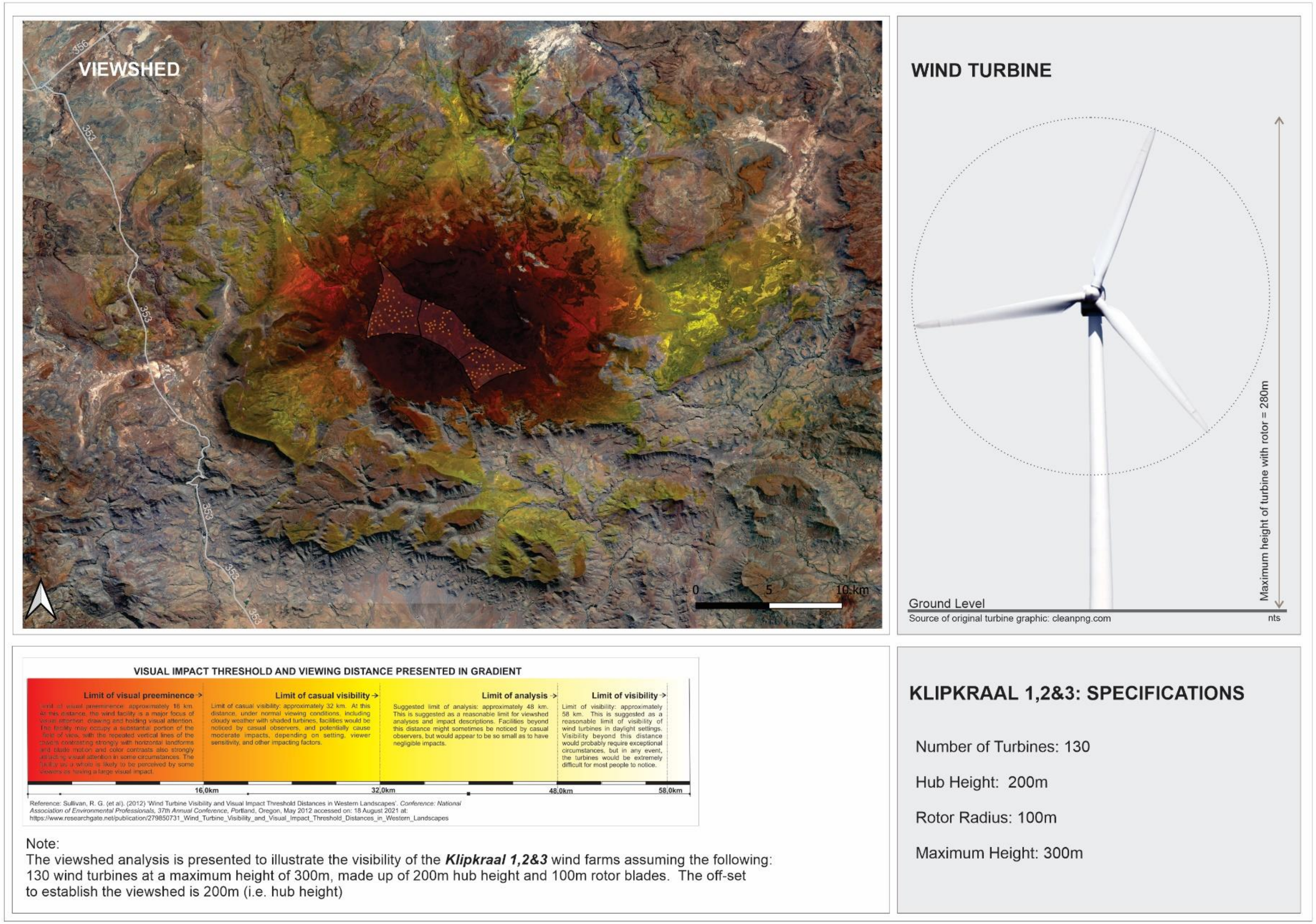


Figure 11: Combined viewshed of the Klipkraal 1, 2 and 3 WEF's

9 EVALUATION CRITERIA

Table 2: Impact Criteria Assessment and Rating Scales

Criteria	Rating Scales	Notes
Status	Positive	Environment overall will benefit from the impact
	Negative	Environment overall will be adversely affected by the impact
	Neutral	Environment overall will not be affected
Spatial Extent	Site specific	Site-specific, affects only the development footprint.
	Local	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius).
	Regional	Regional (beyond a 10 km radius and <100 km) to national.
	National	>100 km
	International	e.g. Greenhouse gasses or migrant birds
Duration	Very short term	Instantaneous
	Short term	0-1 years (i.e. duration of construction phase).
	Medium term	1-10 years.
	Long term	More than 10 years. Impact will cease after the operational life of the activity.
	Permanent	The impact will occur beyond the project decommissioning
Intensity	Low	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.
	Medium	Where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.
	High	Where natural, cultural or social functions and processes are altered to the extent that the impact will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
Reversibility	Low	Low reversibility of impacts
	Moderate	Moderate reversibility of impacts
	High	Impact is highly reversible at end of project life
	Permanent	The impact is permanent i.e. non-reversable
Potential for impact on irreplaceable resources	Reversable	Resource is easy to replace/rehabilitate
	Low	No irreplaceable resources will be impacted.
	Moderate	Resources that will be impacted can be replaced, with effort.
	High	There is no potential for replacing a particular vulnerable resource that will be impacted.
Consequence (a combination of extent, duration, intensity and the potential for impact on irreplaceable resources).	Slight	Where no natural systems/environmental functions, patterns or processes are affected..
	Moderate	Where the environment continues to function but in a modified manner.
	Substantial	Environmental functions and processes are altered such that they temporarily or permanently cease.
	Severe	Environmental functions and processes are altered to where they temporarily or permanently cease

Criteria	Rating Scales	Notes
	Extreme	Environmental functions and processes are altered to where they permanently cease
Probability (the likelihood of the impact occurring)	Extremely unlikely	Little or no chance of occurring
	Very unlikely	<30% chance of occurring
	Unlikely	30-50% chance of occurring.
	Likely	51-90% chance of occurring
	Very likely	> 90% chance of occurring regardless of mitigation measures
Significance (All impacts including potential cumulative impacts)	Very low	The risk/impact may result in very minor alteration of the environment and can be easily avoided by implementing appropriate mitigation measures and will not have an influence on the decision-making
	Low	The risk/impact may result in minor alteration of the environment and can be easily avoided by implementing appropriate mitigation measures and will not have an influence on the decision-making if not mitigated.
	Moderate	The risk/impact will result in moderate alteration of the environment and can be avoided by implementing appropriate mitigation measures and will only have an influence on the decision-making if not mitigated.
	High	The risk/impact will result in major alteration of the environment even with the implementation of appropriate mitigation measures and will have an influence on the decision-making.
	Very high	The risk/impact will result in a very major alteration of the environment even with the implementation of appropriate mitigation measures and will have an influence on the decision-making (i.e. the project cannot be authorised unless major changes to the design are carried out to reduce the significance rating

9.1 The Visual Impact

The visual impact of the project in the landscape is a function of many factors or criteria. Some of the factors are measurable such as viewing distance, the visual absorption capacity of the surrounding landscape, and the scale of the surrounding environment and landform. Other factors are subjective viewpoints, which are extremely difficult to consistently categorise the opinion of the community. Studies in the USA have shown that professionals and environmental groups view modification of the natural landscape more negatively than other groups (McCool, *et al* 1986).

The critical appraisal of the visual impact of the project and associated works on the landscape is presented from the viewpoint of the informed citizen and professional. To the more economically depressed communities surrounding the proposed project, it may well be that they do not, or will not, object to the visual intrusion in their immediate environment. It may be that they welcome it since they could perceive it as a symbol of prosperity and personal advancement opportunity.

The visual impact will, however, vary when evaluated against the criteria of intensity of visual impact and the significance of the impact.

An example is the situation where a project component such as a toll plaza or bridge is located within a fairly narrow undisturbed valley between two rising landforms. The visual impact's intensity is low since it cannot be seen from surrounding areas. The component has the hillsides as a backdrop and therefore blends into the valley texture. The significance, however, is high within the context of the scenic value of the pristine valley because the sense of place and the character of the valley are severely compromised.

The converse is also true in that a high visual intensity impact can have a low significance. The visual impact assessment will therefore be based on the criteria of intensity and significance relative to land use and the nearness to important viewpoints.

9.2 Spatial Extent

The visual impact for construction of the wind turbines will occur on a **local** scale due to the localized extent of the development. However, the visual impact for the operational phase will extend as far as it can be seen, which can be up to 50 km and beyond either side and therefore is at a **regional** scale. The impact of the shadow flicker will occur at a **local** level as it will not be of significance beyond 2km. The impact for the construction and operation of the substations and the access road will occur on a **local** scale.

The viewshed analysis suggests that theoretically some of the project components can at times be seen for over 50 km. Due to the exponential decrease in visibility, the visibility of these components should be insignificant beyond 32 km.

The fact that the majority of the viewers, many of whom could be tourists, are in transit and are not viewing from a static or stationary viewpoint, implies that the viewer carries the visual impact effect with him or her beyond the physical visible confines. Views from the N12 are extensive.

9.3 Duration

The duration of the impact during construction will be **short term** due to the relatively short construction period and the rehabilitation of the disturbed areas.

The duration of the impact during the operational phase will be **long term**, in other words greater than 10 years and as long as the anticipated lifetime of the project, with the impact terminating only after a possible decommissioning of the project.

9.4 Intensity or Severity

The intensity of the visual impact during construction and operation will be **high** within the 8 000 m zone wherever the project components intrude in the critical viewpoints. The large extent of the project will be highly visible at night due to the security lighting and the red hazard lighting on top of the masts.

9.5 Frequency of Occurrence

The frequency of occurrence of the impact is **continuous** while it remains visible, i.e., 24 hours. The project will also be visible at night due to the security lights which creates a beacon effect in an area that is not excessively lit at night.

9.6 The Probability of Occurrence

To determine the significance of an identified impact/risk, the consequence must be multiplied by probability (quantitatively as shown in **Figure 12** below)

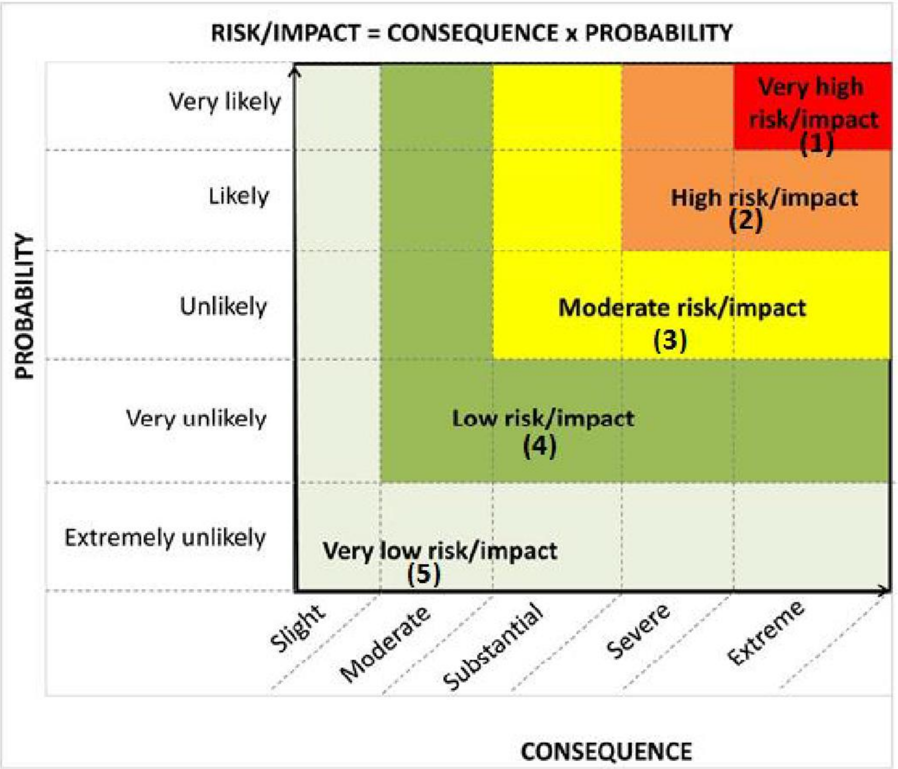


Figure 9: Guide to Assessing Risk/Impact Significance as a result of Consequence and Probability

The construction and operational impact described is probable and can be regarded as **likely**. It must be recognized, however, that much of this assessment is subjective and that it is not possible to empirically state that the impact will occur. It is regarded that the probability of occurrence of the impact of shadow flicker during construction is **extremely unlikely** while during operation it is regarded as **likely.**

9.7 Reversibility

The impact on reversibility is regarded as having a **high** rating due to the fact that the vegetation and landforms can to some extent be recreated, restored or rehabilitated to the original form. This is dependent on how much disturbance to the natural vegetation takes place during construction. If the entire area is first stripped of vegetation and or topsoil and drainage channels altered prior to construction and operation the ability to reverse the impact becomes far more difficult or even impossible.

9.8 Irreplaceable Loss of Resources

The impact is regarded as **Replaceable.**

9.9 Consequence

The consequence during construction is regarded as **Moderate**. During the operational phase, however, the consequence of the wind turbines is regarded as **substantial** while that of the access road, substations and shadow flicker is regards as **moderate**.

9.10 Significance

The significance of the impact during construction, pre- and post-mitigation, is **very low** for the impact of shadow flicker while that for the wind turbines, access road and substations is considered to be **Low**. The significance of the impact during the operational phase, pre- and post-mitigation, is **low** for the shadow flicker and **moderate** for the wind turbines, access road and substations. The significance during decommissioning is **low** pre-mitigation and **very low** post-mitigation

9.11 Status of the Impact

The impact status is considered **negative** for the construction and operational phases.

9.12 Degree of Confidence in Predictions

The confidence is considered to be **high** as the level of judgement is based generally on common sense, general knowledge, the author’s field experience and the inherently subjective nature of this type of assessment.

9.13 Appliable Legislation

There are no specific legal requirements nor is there any direct reference to the visual environment in the legislation. General legislation pertaining to the environment is contained in the National Environmental Management Act (NEMA) (Act No. 107 of 1998) as well as the National Heritage Resources Act No. 25, 1999 and the associated provincial regulations provide legislative protection for listed or proclaimed site, such as urban conservation areas, nature reserves and proclaimed scenic routes.

The National Environmental Management Principles as contained in NEMA require that sustainable developments require the following considerations (amongst others):

2(4)(ii) that pollution and degradation of the environment are avoided, or, that where they cannot be altogether avoided, are minimised and remedied; and
2(4)(iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied.

The National Heritage Resources Act refers, under Part 1 General Principles, to the National Estate:
3.(2)(d) Landscapes and natural features of cultural significance

Visual pollution is controlled to a limited extent, by the Advertising on Roads and Ribbons Act (Act No. 21 of 1940) which deals mainly with signage on public roads.

The Protected Areas Act (NEMA) (Act 57 of 2003, Section 17) is also intended to protect natural landscapes

The Western Cape DEA&DP have produced 'A Guideline for Involving Visual and Aesthetic Specialists in EIA Processes'

9.14 Ability to Adapt

The affected receptors include travellers on the main roads such as the N12, R306 and the R61, activities and institutions that rely on the aesthetic environment such as game farms, national parks, lodges, B&B's as well as hunting and or photographic safari operations. Their ability to adapt is a response to their livelihood, economic activity and sense of well-being. The impact on the affected receptor's ability to adapt is considered low (-) wherever the surrounding land use has no inherent high scenic qualities that can be utilised for future tourism.

Table 3: Klipkraal 2 WEF High Level Impact Table - Visual

Impact	*Impact Criteria*		*Significance and Ranking (Pre-mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-mitigation)*	*Confidence Level*
VISUAL						
DIRECT – CONSTRUCTION PHASE						
Visual intrusion and potential flicker effect by wind turbines and associated structures and infrastructure on visual receptors	*Status*	*Negative*	Very low (5)	• Site turbines at least 2 km from any occupied homestead or hospitality/tourism facility, where possible to limit effect of shadow flicker	*Very low (5)*	*High*
	Spatial Extent	*Local*				
	Duration	*Short Term*				
	Consequence	*Moderate*				
	Probability	*Extremely Unlikely*				
	Reversibility	*High*				
	Irreplaceability	*Replaceable*				
Visual intrusion by wind turbines and associated structures and infrastructure on visual and landscape receptors	*Status*	*Negative*	Low (4)	• Limit area of disturbance for turbine footprint, access roads and construction camp or sites • Suppress dust during construction • Site turbines at least 2 km from any occupied homestead hospitality/tourism facility, where possible • Mitigation will already have been implemented by the placement of turbines	*Low (4)*	*High*
	Spatial Extent	*Regional*				
	Duration	*Short Term*				
	Consequence	*Moderate*				
	Probability	*Likely*				
	Reversibility	*High*				
	Irreplaceability	*Replaceable*				

				according to distance from visual receptors • Limit area of disturbance for access roads, substations and construction camp sites • Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors. • Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld • Suppress dust during construction. • Blend edges of road and platforms with surrounding landscape • Rehabilitate exposed disturbed areas • Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape • Limit need for security lighting • Use non-reflective materials • Paint all other project infrastructure elements		

				such as operational buildings, support poles etc. a dark colour • Avoid bright colour/patterns and logos		
Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors	*Status*	*Negative*	Low (4)	• Limit area of disturbance for access roads, substations and construction camp sites • Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors. • Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld • Suppress dust during construction. • Blend edges of road and platforms with surrounding landscape • Rehabilitate exposed disturbed areas • Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape • Limit need for security lighting	*Low (4)*	*High*
	Spatial Extent	*Local*				
	Duration	*Short Term*				
	Consequence	*Moderate*				
	Probability	*Likely*				
	Reversibility	*High*				
	Irreplaceability	*Replaceable*				

				• Use non-reflective materials • Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour • Avoid bright colour/patterns and logos		
DIRECT – OPERATIONAL PHASE						
c	*Status* *Spatial Extent* *Duration* *Consequence* *Probability* *Reversibility* *Irreplaceability*	*Negative* *Local* *Long term* *Substantial* *Likely* *High* *Replaceable*	Moderate (3)	• Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors • Manage need for top of turbine red hazard lighting to only when a plane enters the affected airspace rather than be permanently lit • Limit need for security lighting	*Low (4)*	*High*
Visual intrusion by wind turbines and associated structures and infrastructure on landscape receptors	*Status* *Spatial Extent* *Duration* *Consequence* *Probability* *Reversibility* *Irreplaceability*	*Negative* *Regional* *Long term* *Substantial* *Likely* *High* *Replaceable*	Moderate (3)	• Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors • Limit need for security lighting • Use non-reflective materials • Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour • Avoid bright colour/patterns and logos	*Moderate (3)*	*High*

Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors	***Status***	***Negative***	Moderate (3	• Maintain rehabilitated disturbed areas	*Moderate (3)*	*High*
	Spatial Extent	***Local***				
	Duration	***Long term***				
	Consequence	***Moderate***				
	Probability	***Likely***				
	Reversibility	***High***				
	Irreplaceability	***Replaceable***				
DIRECT – DECOMMISSIONING PHASE						
Visual intrusion and potential flicker effect by wind turbines and associated structures and infrastructure on visual receptors Visual intrusion by wind turbines and associated structures and infrastructure on visual and landscape receptors	***Status***	***Neutral***	Low (4)	• Remove all project components from site • Rip all compacted hard surfaces such as platforms, words areas, access and service roads etc. and reshape to blend with the surrounding landscape • Rehabilitate/revegetate all disturbed areas to visually the original state by shaping and planting	*Very low (5)*	*High*
	Spatial Extent	***Local***				
	Duration	***Medium term***				
	Consequence	***Moderate***				
	Probability	***Likely***				
	Reversibility	***High***				
	Irreplaceability	***Replaceable***				

Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors							

10 RECOMMENDED GENERAL MITIGATION / MANAGEMENT MEASURES

10.1 Earthworks and Landscaping

- The mitigation measures during operation will need to focus on effective rehabilitation of the construction area. These specifications must be explicit and detailed and included in the contract documentation (Environmental Management Plan) so that the tasks can be costed and monitored for compliance and result.

- Site turbines at least 2 km from any occupied homestead, hospitality/tourism facility, where possible to reduce the impact of shadow flicker. Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors.

- It is recommended that that a suitably qualified person, such as a landscape architect, is appointed to give attention to the concept and design of the aesthetic aspects of the project during the detailed design phase of the project prior to construction to integrate the design especially the shape of the cut and fill slopes with the surrounding landscape to ensure that the project blends in physically and aesthetically with the environment. The cut and fill slopes should not be steeper than 1:2.5 vertical to horizontal as this allows vegetation to establish more easily. This will also reduce erosion of the soil surface.

- A detailed landscape and rehabilitation plan should be developed timeously by the landscape architect. The general landscaping shall reflect the existing surrounding landscape. Shape and blend edges of roads and platforms with surrounding landscape.

- Sculpturing or shaping the slopes and access roads to angles and forms that are reflected in the adjacent landscape can reduce the visual impact. By blending the edges with the existing land-forms the visual impression made, is that the project component has followed the natural shape of the landscape, rather than been “engineered” through the landscape.

- Limit the area of disturbance for turbine footprint, access roads, construction camp or sites, lay-down areas, batching plants, substations etc.

- Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors.

- Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld.

- It is essential that all slopes, as well as all areas disturbed by construction activity, are suitably topsoiled and vegetated as soon as is possible after final shaping. The progressive rehabilitation measures will allow the maximum growth period before the completion of the project.

- All areas affected by the construction works will need to be rehabilitated and re-vegetated.

- For access / service roads and servitudes, avoid straight edges and corridors. These lines should complement the landscape through which they pass (Litton, 1980).

- The special conditions of contract must include for the stripping and stockpiling of topsoil (whatever is there available) from the construction areas for later re-use. Topsoil is considered to be at least the top 300 mm of the natural soil surface and includes grass, roots and organic matter. The areas to be cleared of topsoil should be all areas that will be covered by structures, roads and construction camps These areas should be topsoiled and re-vegetated. If the topsoil thickness is less than 300mm then a minimum of 100mm should be stripped and stored.

- All areas that will be affected by construction activities and where dust will be generated will require dust suppression by regular wetting, possibly by means of a water bowser or by means of an environmental friendly soil binding compound. The importance of suppressing the visual aspects of dust cannot be overstressed since the visibility will generate the impression of a polluting industry.

- All existing large trees (if any) that fall outside the earthworks area must be retained. These will assist in softening the forms of the structures and obscure views to them.

- Rehabilitate exposed disturbed areas. The rehabilitation and stabilisation of vegetation of all rehabilitated areas, buffer strips and new landforms must be done as soon as the forms are complete. The monitoring and management of the vegetation programme is important to ensure that problems (erosion, die back, lack of grass cover) are identified early so that corrective measures can be taken.

10.2 Lighting

- Manage the need for top of turbine red aviation hazard lighting to only when a plane enters the affected airspace rather than be permanently lit i.e. implementation of Audio Visual Warning System (AVWS) technology, if possible.

- As night lighting during both construction and operation is one of the more objectionable forms of visual impact, it is important that selective and sensitive location and design of the lighting requirements for the construction camp and the power station are developed. For instance, reduce the height from which floodlights are fixed and identify zones of high and low lighting requirements with the focus of the lights being inward, rather than outward.

- Avoid up-lighting of structures but rather direct the light downwards and focused on the object to be illuminated. Avoid directing the light towards the direction from where it would be most experienced/visible. Light spill, particularly upwards, must be minimised. This can be achieved by implementing the following recommendations:

It is recommended that lighting is designed by a lighting engineer in collaboration with the landscape architect for the project. The aspects of the lighting solution should include the following:

- Light fittings should have shields to eliminate sight of the light source;
- Down lighting of areas is preferred to up lighting;
- Any perimeter lights are to be directed downwards and inwards;
- Emitted light colour should be a softer light than sodium (yellow) or mercury halide (blue-white). The light colour should also be chosen with knowledge of what colour will attract insects. It is important that a colour type and spread of light will not cause insects to be attracted to it and in so doing deplete the insect diversity of the region. For this purpose an entomologist familiar with the effect of light frequencies on insects should be consulted.
- Florescent lights attract insects although they provide a softer illumination effect;
- The use of flood lights to illuminate structures, large areas or features should not be considered. Rather incorporate concealed lights to shine downwards. Darker areas on the building elevations will provide a less visually noticeable structure;
- No light fittings should spill light upwards or be directed upwards from a distance towards the area or building to be illuminated;
- The lighting plan should strive to maximise the light energy use. This should include a hierarchy of lights that differentiates their function so that the best type is used. Some may be switched on only when needed;
- Security lights should not flood the area with light continuously but should be activated by a motion sensor;

- It is now accepted that lighting of new projects should be subdued and energy efficient.

10.3 Colours for Roofs, Buildings and Structures

The colour of the components of the project components will make a difference to the visual fit of the project into the landscape and setting.

Tones and tints of selected complementary colours that fit the setting should be considered.

Permanent roads and pathways paved with a durable brick of brown/sand or ochre colour will further help to blend these elements in to the setting. The light brown colour is a similar colour to existing gravel roads in the area. The light colour will also not generate high surface temperatures as an asphalt surface would

Subdued and complimentary natural shades and tints blend easily into a landscape setting.

Vivid primary or bright or reflective colours or surfaces will accentuate the visual presence of the development and should be avoided.

11 PHOTOS AND SIMULATIONS

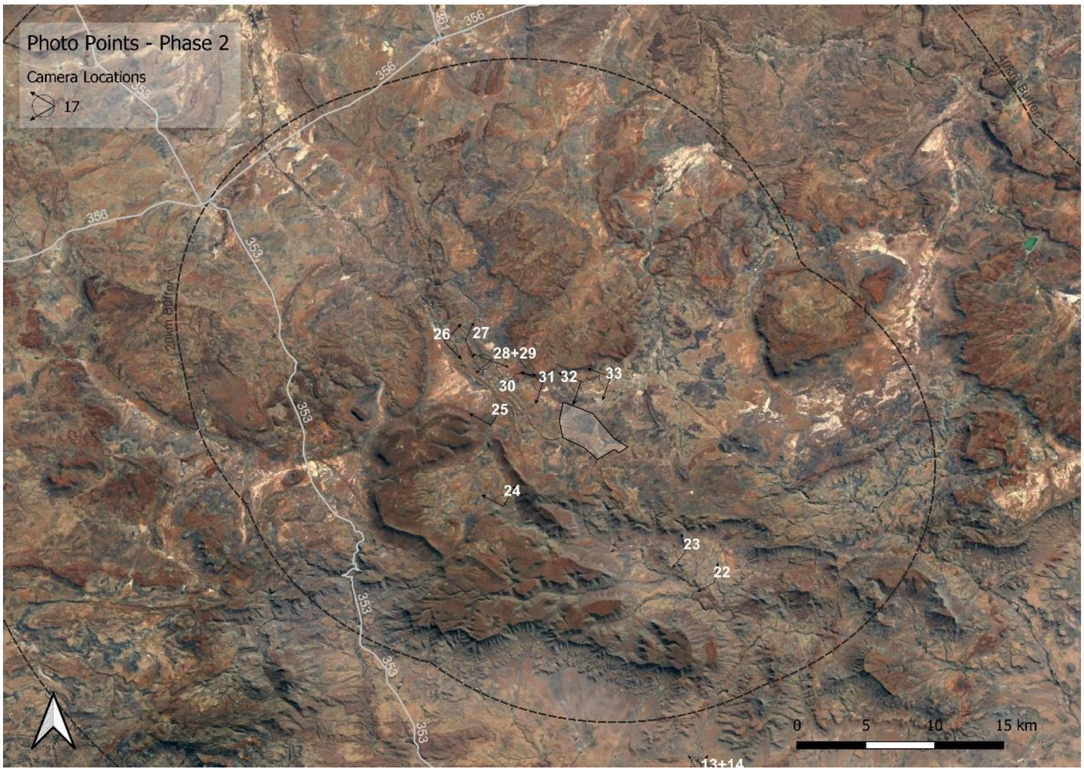


Figure 12: Camera Locations

Photo Point 30 (see Figure 12)

Photo Point 31

Photo Point 32

Photo Point 33

12 DISCUSSION AND CONCLUSIONS

The impact assessment was undertaken for only the main components of the project i.e., wind turbines and associated infrastructure. The study excluded ancillary components such as borrow pits, quarries, lay-down areas and construction camps. This study evaluated the visual impact of the project with a view to assessing its severity based on the author's experience, expert opinion and accepted techniques.

The description of the visual impacts of the phases of construction and decommissioning are not considered as significant visual impacts since the period of activity is of relatively short duration and of a primary impact (localized, of short duration and easily mitigated at the end of the phase). The fact that disturbed areas, e.g. camps / lay-down areas will be rehabilitated also reduces the impacts of these phases.

It is the operational phase that presents the most significant long term visual impact. This is due primarily to the scale and form of the proposed development. Visibility reduces exponentially the further the viewer is from the proposed development.

Table 3, **Klipkraal 2 WEF High Level Impact Table - Visual**, summarises the impacts for the construction, operation and decommissioning phases.

13 FINAL SPECIALIST STATEMENT AND AUTHORISATION RECOMMENDATION

13.1 Statement and Reasoned Opinion

The project will exert a **negative** influence on the visual environment. This is largely due to the:

- high visibility of the wind turbines which can be 180-200m high (300 to tip of the blade), within the study area.
- the high visibility of construction and operation activity within the low growing, uniform open Karoo veld of uniform visual pattern;
- the low VAC of the area due to the low and uniform visual pattern of vegetation which does not allow for the project to be visually accommodated within the landscape as a result of the high visual contrast and absent screening;
- the scale of the project in a rural setting;

- the introduction of an extensive project within a rural setting that will be brightly lit by security lighting including red flashing aviation warning/hazard lights on the top of the turbines throughout the night.

However, due to the low relative visual quality of the area the overall significance of the visual impact is regarded as **Moderate** (a rating of **3** on a scale of 1-5)

13.2 EA Condition Recommendations

Based on the field observations and the studies herein and with the implementation of the mitigation measures, it is the Visual Specialist's opinion the visual impact of the wind farm layout does not present a potential fatal flaw provided that the recommended mitigation measures are implemented.

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15 APPENDICES

15.1 Appendix A- Sensitivity Report

SITE SENSITIVITY VERIFICATION
VISUAL IMPACT ASSESSMENT
FOR THE KLIPKRAAL WEF 2

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

Prepared for

KLIPKRAAL WIND ENERGY FACILITY 2 (PTY) LTD

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JULY 2022

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REPORT TITLE:	Site Sensitivity Verification Visual Impact Assessment for the Klipkraal WEF 2
CLIENT:	Klipkraal Wind Energy Facility 2 (Pty) Ltd
PROJECT NAME:	Klipkraal WEF 2 Site Sensitivity Verification Report
REPORT STATUS:	Draft
BCK PROJECT NUMBER:	22001
PLACE AND DATE:	Pretoria, July 2022
KEYWORDS AND PHRASES:	Site Verification Report, WEF 2, Western Cape Province, Northern Cape Province, Visual Impact Assessment, Arura

APPROVED

M KLAPWIJK

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SITE SENSITIVITY REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

INTRODUCTION

Klipkraal Wind Energy facility 2 (Pty) Ltd (hereafter referred to as 'Klipkraal 2'), has appointed SiVEST Environmental (hereafter referred to as 'SiVEST') to undertake the required EIA processes for the proposed construction of seven (7) wind farms and associated infrastructure [including substations and Battery Energy Storage Systems (BESS)] on several properties, majority being adjacent, near the towns of Beaufort West and Fraserburg in the Northern Cape Province of South Africa. The proposed wind farms make up a larger wind energy facility (WEF) (with associated BESS) which will be referred to as the Klipkraal WEF

As required in Part A of the Government Gazette 43110, GN 320, a site sensitivity verification was undertaken to confirm the current land use and environmental sensitivity of the proposed project area. The details of the site sensitivity verification are noted below:

Date of Site Visit	11-13 May 2022
Specialist Name	Menno Klapwijk
Professional Registration Number	87006
Specialist Affiliation / Company	South African council for the Landscape Architectural Professions (SACLAP) Bapela Cave Klapwijk
Specialist Topic	Visual Impact Assessment
Proposed WEF Project Name	Klipkraal WEF 2

METHOD OF THE SITE SENSITIVITY VERIFICATION

The study area was determined as the site and a 20 and 40 km buffer zone around it. The visibility of the turbines would be insignificant beyond this point. Refer to **Figure 1 Regional Locality Map,** which identifies the study area. However, a 40 km buffer zone has also been included in the study, as it may be possible, that when viewed from an elevated position, the structures could be visible depending on light and atmospheric conditions as well as the red flashing lights on top of the turbines at night.

The method used was both a desk top study using Google Earth and a site inspection. The Screening report generated by the National Web-Based Environmental Screening Tool, as provided by SIVEST, was used as a point of departure.

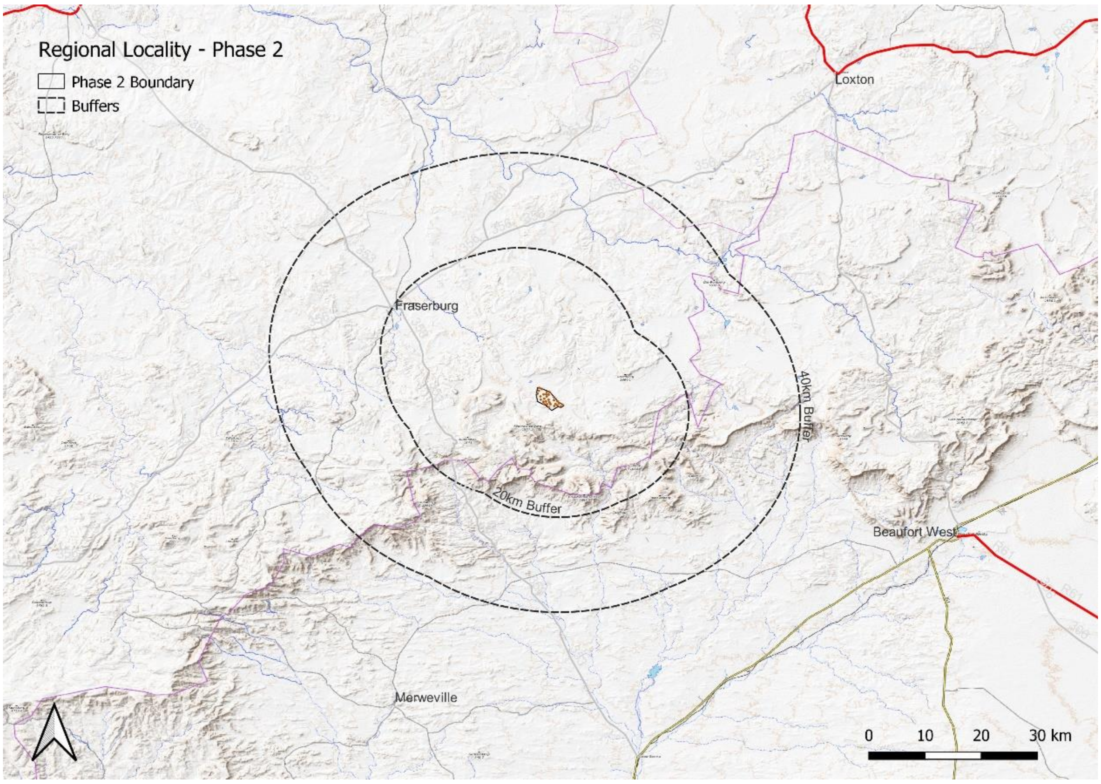

Figure 1: Regional Locality Map

Google Earth was used to identify homesteads and structures that may be visually impacted. This information was used during the site inspection.

A site visit was undertaken over the period of 11 to 13 May 2022.

The purpose of the site visit was to determine the extent of the potential visibility of the turbine structures and powerline grid alternatives and to understand and document the receiving environment.

The field study entailed travelling public roads that surrounded and crossed the study area to determine the potential visibility from these areas. The route (**Figure 2: Locality Map with Photo/Viewpoints**) followed the N1 from Beaufort West south-west turning north-west along a dirt road towards Fraserburg soon after the Grid Corridor Alternative 1 crosses the N1. The route follows the Grid Corridor then follows a route forking west towards the Alternative 2 route. The route then heads north immediately after crossing the Alternative 2 route heading towards the point where Alternative 1 and 2 converge. The route then crosses Alternative route 2 heading west, follows a valley north-wards to the west of the WEF sites to where the roads forks towards Fraserburg and Loxton. The remainder of the route follows the road towards Loxton.

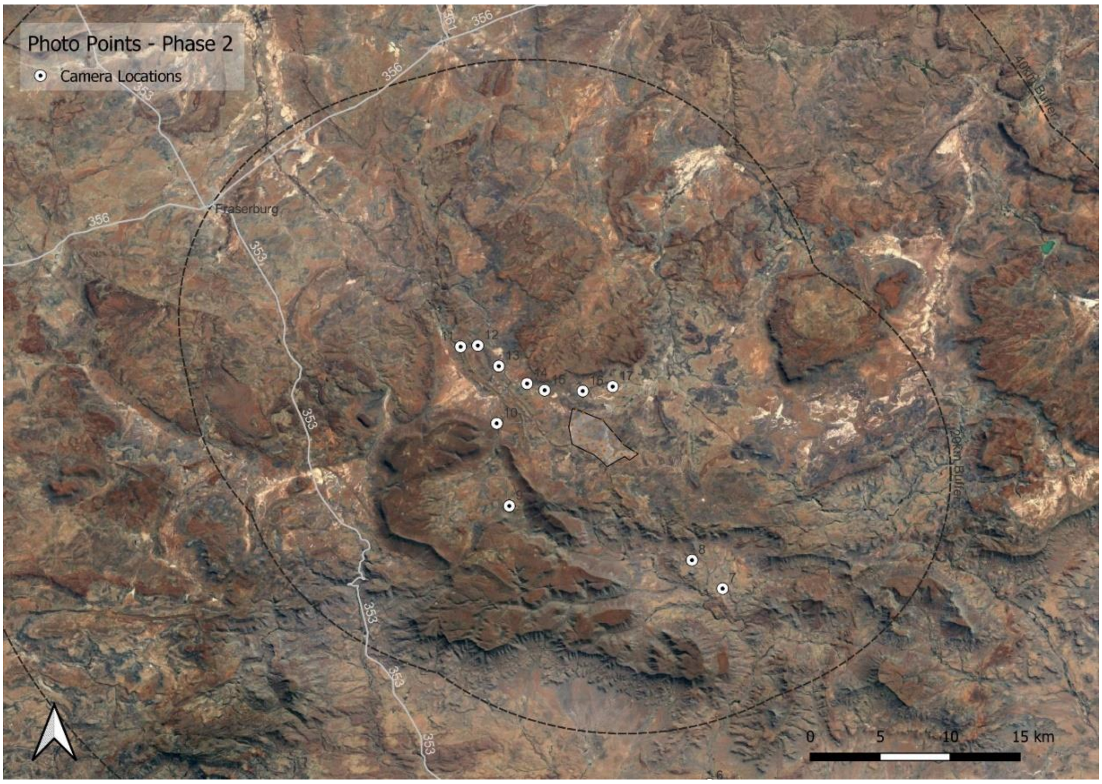

Figure 2: Locality Map with Photo/Viewpoints

OUTCOMES

3.1 Confirmation or dispute the current use of the land and the environmental sensitivity

The Screening Tool report provided a Flicker Theme Sensitivity map (See **Figure 3: Relative Flicker Theme Sensitivity**) that showed areas of low sensitivity and very high sensitivity, which specifically relate to areas with “potential temporarily or permanently inhabited residence”. This coincided with the information obtained from Google Earth in terms of homesteads and structures. However, several of the homesteads appeared to be unoccupied or even abandoned. If this is the case the issue regarding flicker would not be applicable to all these dwellings.

Figure 3: Relative Flicker Theme Sensitivity

The Screening tool indicates the Flicker effect to be of very high sensitivity for potential temporary or permanently inhabited residences

The Screening Tool also contains a map of relative landscape theme sensitivity, (**Figure 4: Relative Landscape Theme Sensitivity**) as it relates to wind developments. The map shows that the proposed site intersects with the following areas and is regarded as having very high sensitivity:

Sensitivity	Feature(s)
Low	Slope less than 1:10
Very High	Mountain tops and high ridges
Very High	Slope more than 1:4

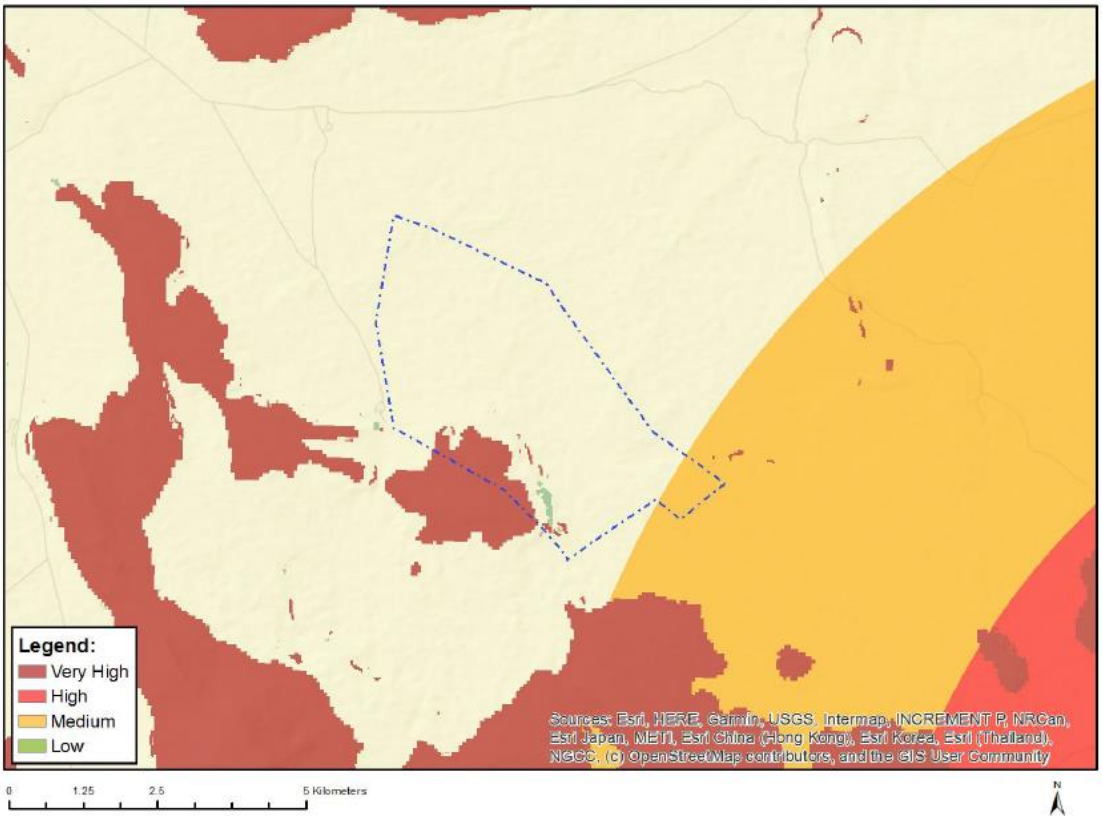

Figure 4: Relative Landscape Theme Sensitivity

These relative landscape themes do not relate specifically to the visual impact except for the more aesthetically pleasing mountain tops and high ridges as well as rivers and wetlands. The flatter slopes and the low vegetation increase the visual sensitivity of the area. The mountains are experienced below the plateau on the visual periphery and are generally not visible form the study area

The Screening Tool indicated that the Plant Theme Sensitivity (**Figure 5: Plant Theme Sensitivity)** was low sensitivity. However, the very nature of the vegetation in this area (Western Upper Karoo, Eastern Upper Karoo and Roggeveld Shale Renosterveld **(Figure 6: Vegetation**) is low growing and visually uniform which does not provide much visual screening. Although the vegetation is not overly sensitive to the development it does not assist in reducing the visual expose of the turbines. The vegetation is typical of the Karoo ambience and it is this together with the topography which provides the Karoo sense of place.

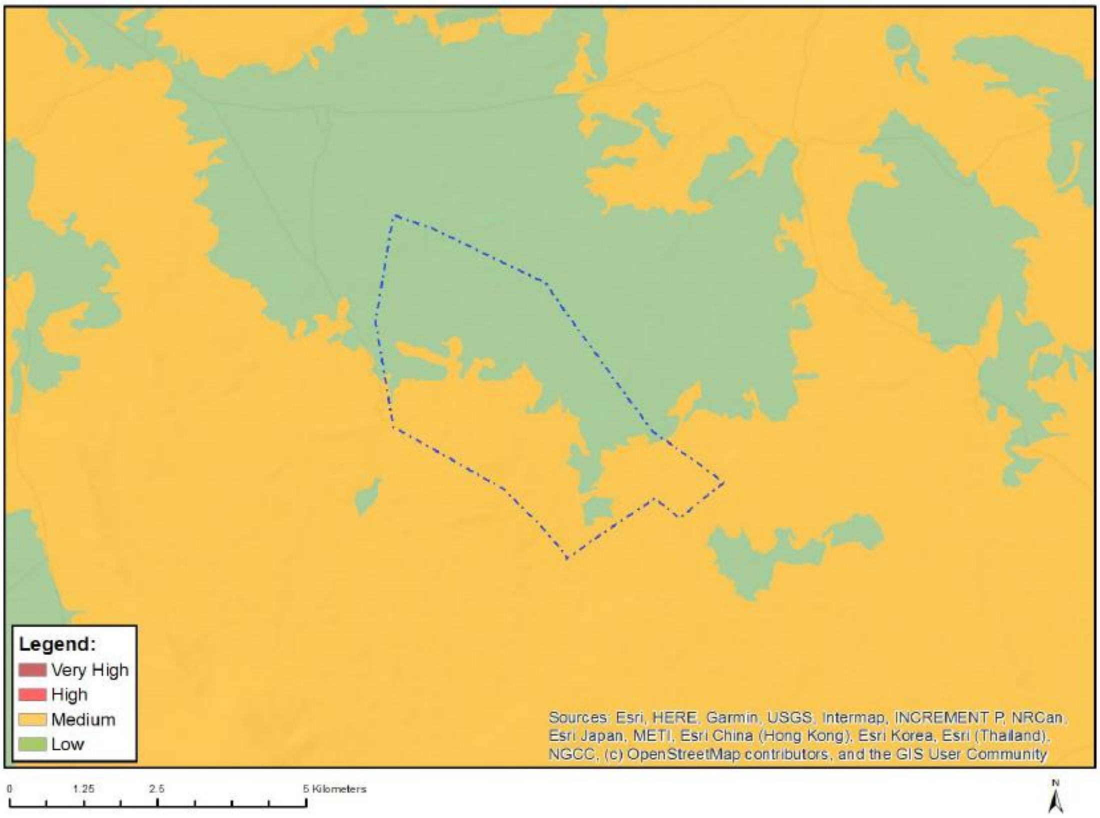

Figure 5: Plant Theme Sensitivity

3.2 Motivation and evidence of either the verified or different use of the land and environmental sensitivity

The study area's landscape varies from relatively flat to rolling with low ridges. The area is located on top of a plateau which drops down over the edge to the south. The landscape is covered with low growing and sparse vegetation (see Photos 1 and 2). The current land-use is primarily small stock grazing. The peripheral visual boundaries to the north and east are truncated by low ridges. The peripheral visual boundary to the south and west is relatively undistinguished. The area appears to be sparsely populated, which was borne out during the site visit. The study area is not regarded as having a high visual quality when compared to other areas in the region such as the Swartberg Mountains, Meiringspoort and the mountains around Beaufort West and the Karoo National Park but it does display the typical and iconic Karoo landscape.

Photo 1: Typical sparse and open Karoo landscape

Photo 2 Typical sparse and open Karoo landscape

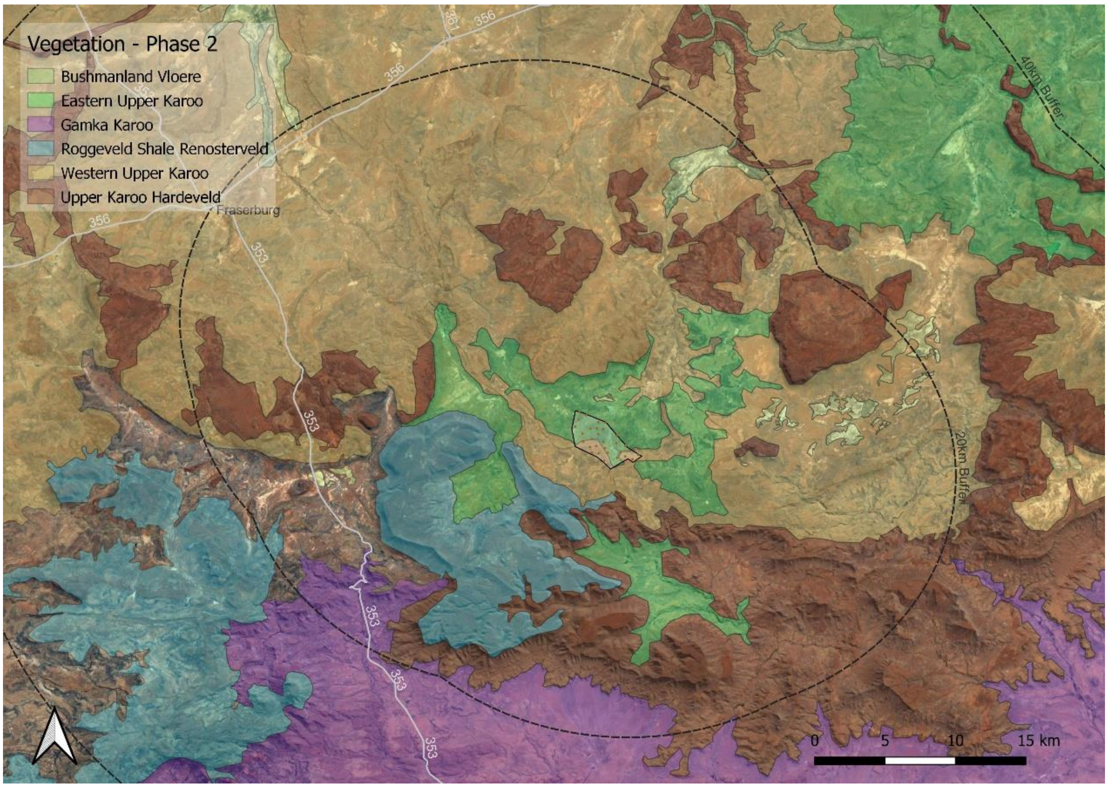

Figure 6: Vegetation

3.3 Description of the high-level impacts that may occur due to the proposed development of the WEF project

The sensitive receptors within the study area are those receptors that will be directly impacted by the visual intrusion by the turbines. (**See Figure 7: Visual Receptors**).

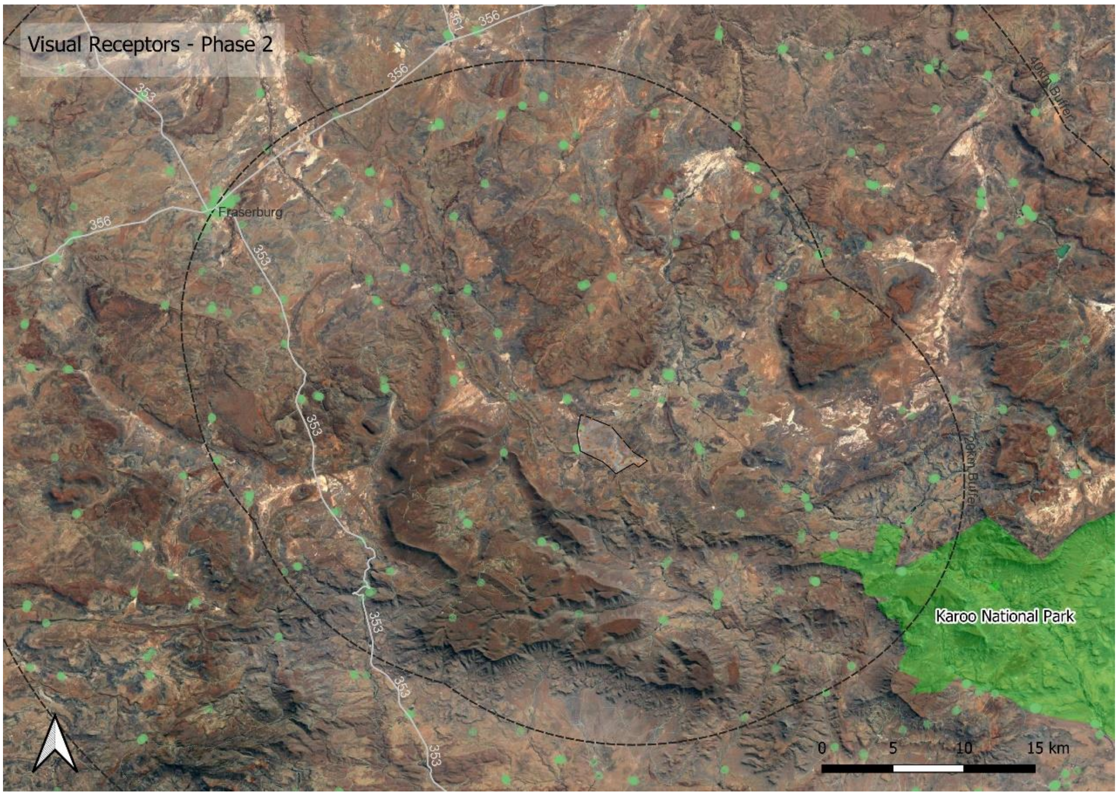

Figure 7: Visual Receptors

Although not all homesteads are occupied fulltime, (see green dots on Figure 6) many of these will be in direct line of sight and within the 0-5km zone where the magnitude of impact could be high. Other sensitive receptors include local towns and villages such as Fraserburg and Loxton, travellers on the main roads such as the N1, R353 and secondary public roads, activities and institutions that rely on the aesthetic environment such as game farms, the Karoo National Park, lodges, and B&B’s. The flicker effect of the turbine blades at certain times of the day could impact on these sensitive receptors, especially within the 2km range.

Landscape receptors are physical areas that are regarded as visually interesting and which provide sense of place, such as the typical Karoo ambience, to that area. These receptors include rivers and drainage ways, mountains, ridges, vegetation, and any other interesting physical features (**See Figure 8: Landscape Receptors**).

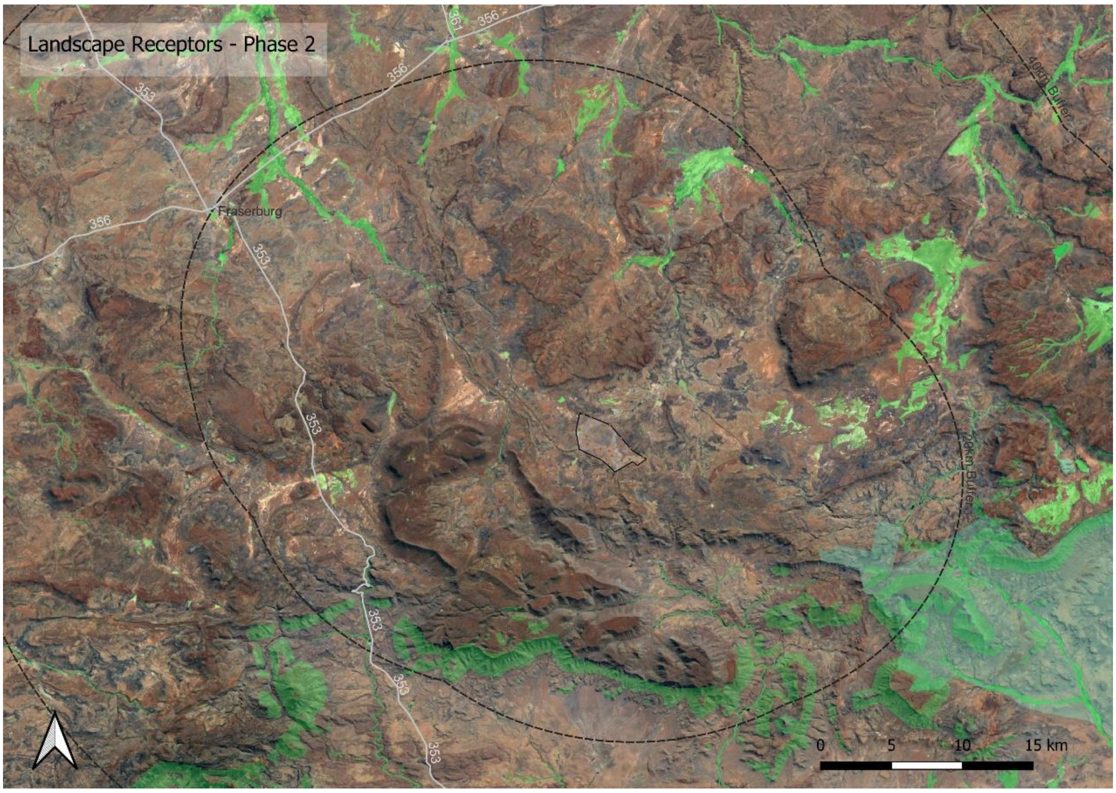

Figure 8: Landscape Receptors

3.4 Review input on the preferred infrastructure locations

As with most WEF's the opportunity to alter turbine positions is limited as positions these are based on topography, wind conditions and other technical considerations. Those turbines that are closest to homesteads and other sensitive visual receptors and which are within the accepted restriction zone[2] of 0-5 km would potentially have to be omitted or the layout design revised to accommodate these homesteads due to the potential high significant impact. Homesteads within a 2 km zone could be subjected to the effects of visual flicker

3.5 Description of the potential direct, indirect and cumulative impacts that will require further assessment in the EIA Phase.

Direct impacts that need to be considered are the impacts on sensitive receptors such as towns, homesteads, tourists and those establishments that rely on the natural aesthetics of the environment such as conservation area, national parks, guest houses and B&B's as well as hunting and or photographic safari operations.

[2] Cave S, 2013. Wind Turbines Planning and Separation Planning Distances, Northern Ireland Assembly: Research and Information Service Research paper

Shadow flicker could have an impact on nearby homesteads. Turbines should be sited in such a way as to eliminate the effect by using flicker determination software for calculations. If the turbines cannot re-position, then they should not operate during the short timeframe when the effect is a concern.

The Karoo is renowned and highly valued for its dark night skies. It is a requirement by Civil Aviation that a red hazard flashing navigation light be installed on top of each turbine. These lights can be seen over extended distances of at least 40km and when viewed against a dark sky they become very visible. To minimise this visual intrusion, the use of AVWS (Audio Visual Warning System) technology should be investigated. AVWS is a radar-based obstacle avoidance system that activates obstruction lighting and audio signals only when an aircraft is in close proximity to an obstruction on which an AVWS unit is mounted, such as a wind turbine. The obstruction lights and audio warnings are inactive when aircraft are not in proximity to the obstruction. BML 2013[3]

Cumulative visual impacts may arise where more than one wind turbine development is visible from the same point. There are several renewable energy generation facilities approved and in the planning stages in the area as indicated in Figure 8 below. However, these are at least 70km or more and beyond a distance where they are visible.

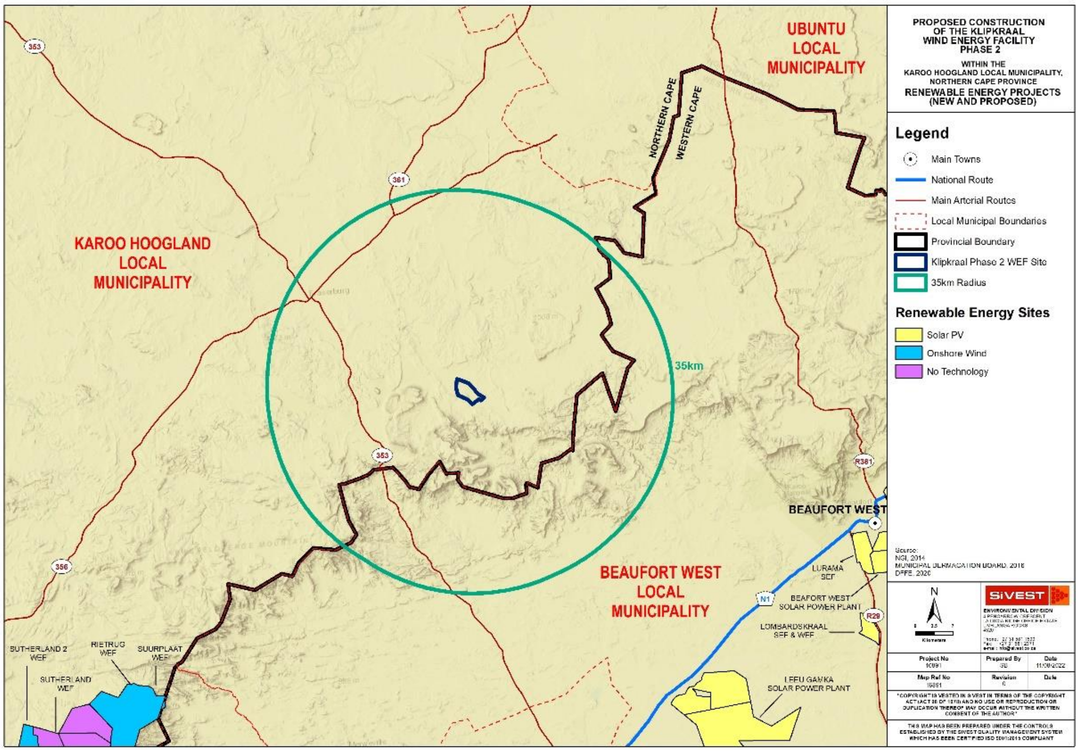

Figure 9: Regional EA Applications for Renewable Energy Projects Located Within a 25 km Radius from the Proposed WEFs Study Area

[3] United States Department of the Interior. 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. Bureau of Land Management. Cheyenne, Wyoming. 342 pp, First Edition 2013

3.6 Applicable Legislation

There are no specific legal requirements nor is there any direct reference to the visual environment in the legislation. General legislation pertaining to the environment is contained in the National Environmental Management Act (NEMA) (Act No. 107 of 1998) as well as the National Heritage Resources Act No. 25, 1999 and the associated provincial regulations provide legislative protection for listed or proclaimed site, such as urban conservation areas, nature reserves and proclaimed scenic routes.

The National Environmental Management Principles as contained in NEMA require that sustainable developments require the following considerations (amongst others):

2(4)(ii) that pollution and degradation of the environment are avoided, or, that where they cannot be altogether avoided, are minimised and remedied; and

2(4)(iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied.

The National Heritage Resources Act refers, under Part 1 General Principles, to the National Estate:

3.(2)(d) Landscapes and natural features of cultural significance

Visual pollution is controlled to a limited extent, by the Advertising on Roads and Ribbons Act (Act No. 21 of 1940) which deals mainly with signage on public roads.

The Protected Areas Act (NEMA) (Act 57 of 2003, Section 17) is also intended to protect natural landscapes

The Western Cape DEA&DP have produced 'A Guideline for Involving Visual and Aesthetic Specialists in EIA Processes'

APPENDICES

Appendix A- Specialist Expertise

MENNO KLAPWIJK

LANDSCAPE ARCHITECT AND ENVIRONMENTAL PLANNER

PRESENT POSITION IN FIRM:	Principal – Bapela Cave Klapwijk
TELEPHONE NO	0832558127
WEBSITE	www.bck.co.za
ADDRESS	891 Jan Shoba Street Brooklyn Pretoria 0181
DATE OF BIRTH:	9 June 1954
NATIONALITY:	South African born in Johannesburg
LANGUAGE:	Mother Tongue: English Others: Afrikaans
ACADEMIC QUALIFICATIONS:	1983 : B.Sc. (Landscape Architecture) Texas A&M University, USA. 1986 : Environmental Impact Assessment, Graduate School of Business, University of Cape Town.
PROFESSIONAL QUALIFICATION:	Registered Landscape Architect
KEY FIELDS OF EXPERIENCE:	Particular aspects of experience include: • Visual impact assessment. • Planning and design for conservation areas, natural resource areas, nature reserves and game farms • Landscape design for parks, corporate headquarters, office and industrial parks,

housing developments, hotels, plazas and pedestrian malls.
- Recreation planning.
- Environmental Monitoring and Auditing.
- Site / master planning and development.
- Integrated environmental assessment and planning for existing and future land uses.
- Mining and quarry reclamation and development planning and design.

PROFESSIONAL REGISTRATION AND MEMBERSHIP:

Registered: South African Council for Landscape Architecture (SACLAP) Reg No. 87006
Member: Institute of Landscape Architects of South Africa (ILASA).
Member: American Society of Landscape Architects (ASLA).
Member: International Association of Impact Assessors (SA) (IAIA-SA).

YEARS OF EXPERIENCE AND CAREER SUMMARY:

Thirty seven years as landscape architect and environmental planner in the United States of America ,Namibia, Botswana, Lesotho, Swaziland, Mozambique, Angola and South Africa

1989 - present: Bapela Cave Klapwijk, Pretoria - Principal

1988 - 1989: Plan Associates, Pretoria – Associate, Senior Landscape Architect.

1983 - 1988: Chris Mulder Associates Inc., Pretoria - Senior Landscape Architect..1982 - 1983: Austin and Landphair (SHWC), Landscape Architects, College Station, Texas.

ADVISORY P**OSITIONS:**

Executive Central Council Member (Institute of Landscape Architects of South Africa) (1986-1991).

Elected member of the Board of Control for Landscape Architects of South Africa (BOCLASA now SACLAP)

City Council of Pretoria, ILASA representative on CCP Town Planning and Aesthetics Committee (1987 - 2001).

External Examiner, Department of Landscape Architecture, University of Pretoria (1985 - 2016).

CSIR panel of experts to assist in the development of visual impact guidelines for the Western Cape

Council for the Built Environment Council member (June 2010 – June 2014)

Member of Alien and Invasive Species Review Panel 2020-2021

PEER REVIEWER

- VIA Shell Ultra City, Johannesburg for CSIR
- VIA Alpha Cement Factory, Saldanha for Mark Wood Consultants
- VIA Coega IDZ and Harbour, Port Elizabeth for African Environmental Solutions

EDITORIAL BOARDS

- Environmental Planning and Management (EMP) Journal
- Landscape SA Journal

PROFESSIONAL AWARDS AND COMPETITIONS:

2015 • Institute of Landscape Architects of South Africa (ILASA) National Award of Excellence: Category Design: Taung Skull World Heritage Site – Picnic Site

2007 • Institute of Landscape Architects of South Africa (ILASA) National Award of Excellence: Category Environmental Planning: Taung Skull World Heritage Site

2001 • Institute of Landscape Architects of South Africa (ILASA) National Award of Excellence: Category Environmental Planning: Driekoppies Dam

1997 • SAACE Construction World: Olifants-Sand Water Transfer Scheme.

1996 • Premier and National Awards from the Concrete Manufacturer's Association for paving design: Hatfield Plaza.

1995 • EPPIC National Premium Award: Venetia Balance.

- South African Landscape Contractors Institute (SALI). Silver Award: Bentel Abramson Head Office (with Eksklusiewe Tuine).
- South African Landscape Contractors Institute (SALI). Silver Award: AFCOL Head Office (with Eksklusiewe Tuine).

1994 • South African Landscape Contractors Institute (SALI). Gold Award: Hampton Park (with Eksklusiewe Tuine).

- South African Landscape Contractors Institute (SALI). Silver Award: Gilooly's View (with Eksklusiewe Tuine).

1992 • Institute of Landscape Architects of South Africa (ILASA). Commendation: Tourism RSA.

1991 • Institute of Landscape Architects of South Africa. National Award of Merit: Category Environmental Planning: Limpopo (Greefswald) Government Water Scheme for DWAF.

- First place in design competition for the Chris Barnard Health Centre (with H Taljaard Carter and Partners).

1987 • American Society of Landscape Architects. Honour Award: Category Planning and Research: Songimvelo Natural Resource Areas (with CMAI).

1986 • Commendation: Design competition for Bloemfontein Urban River Front.

1983 • Sigma Lambda Alpha Landscape Architecture Academic Honour Society (USA).

- Merit Award for academic excellence, Texas Chapter ASLA.

1982 • Faculty Award, Texas A&M University.

1981 • Faculty Award, University of Pretoria.

1980 • ILASA Student Award, University of Pretoria.

1979 • ILASA Student Award, University of Pretoria.

Appendix B- Specialist Declaration