APPENDIX E7: Visual Impact Assessment

ENVIRONMENTAL & ENGINEERING

REPORT

GENESIS ECO-ENERGY DEVELOPMENTS (PTY) LTD

VISUAL IMPACT ASSESSMENT (VIA)

REPORT REF: 22-1746

PARYS, UP TO 200 MW, SOLAR PV AND BESS HYBRID PROJECT - FREE STATE PROVINCE

21 September 2022

VERSION AA - Draft

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DISCLAIMER:

EXECUTIVE SUMMARY

Genesis Eco-Energy Developments (Pty) Ltd proposes the development of the Parys, up to 200 Megawatt (MW) Solar Photovoltaic and Battery Energy Storage System Hybrid Project located south of Parys, within the Ngwathe Local Municipality which forms part of the Fezile Dabi District Municipality, in the Free State Province of South Africa. The electricity generated by the project will be injected into the existing Eskom 132 Kilovolt distribution system. The applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme bid windows and /or other renewable energy markets within South Africa, such as the Corporate and Industrial sector. As a result of the proposed development, the applicant has appointed Nemai Consulting (Pty) Ltd to undertake the relevant environmental authorisations associated with the proposed project.

The proposed project will consist of Solar Panels, a Battery Energy Storage System made up of a maximum of 45 shipping containers, substations, overhead powerlines and ancillary infrastructure. The proposed infrastructure may have adverse effects on the visual characteristics of the surrounding environment therefore, Nemai Consulting have appointed Eco Elementum (Pty) Ltd to undertake a Visual Impact Assessment for the proposed project.

The scope of work for this Visual Impact Assessment included the following:

1. Describing the existing visual characteristics of the proposed site and its environment;
2. A viewshed and viewing distance determination using Geographic Information System analysis up to 15 Kilometres from the proposed structures;
3. A visual exposure analysis;
4. Identifying and rating of potential visual impacts; and
5. Recommending mitigation measures for the identified visual impacts.

SUMMARY OF FINDINGS

The above assessment analysed the potential visual impacts that the proposed project may have on the surrounding area. From a visual perspective, the results indicate that the proposed infrastructure will create a moderate negative visual impact on the surrounding areas during each phase of the activity. These impacts can be reduced after the recommended mitigation measures are implemented. However, the overall visual impact will remain as a moderate negative impact during the operational phase of the project. This is mainly due to permanent nature of the structures.

Given the presence of existing powerlines, an Eskom substation and agricultural/farming activities within the study area, the proposed project is expected to increase the cumulative visual impact experienced by the identified sensitive receptors. The proposed solar plant is also expected to alter the sense of place of the study area and may set a precedent for future renewable energy plants. Although the development of new infrastructure to ensure sustainable electricity to the region forms part of the municipality's 5-year goal and the expected visual exposure of the proposed project is low, the proposed solar plant, in conjunction with any further renewable energy plants, will have a negative visual impact on the surrounding study area mainly due to the areas high scenic quality attributed to the presence of the Vredefort Dome and tourism along the Vaal River. Therefore, it is recommended that the environmental authorities consider the overall cumulative impact on the character and the areas sense of place before a final decision is taken with regard to the optimal number of renewable energy activities in the area.

Mitigation measures for each phase of the activity have also been recommended and should be adhered to in order to lessen the visual impact as far as possible.

Considering the viewshed, visual exposure results and the visual impact assessment, the recommended Solar PV and BESS Hybrid project can proceed from a visual perspective provided that the recommended mitigation measures are adhered to. Furthermore, given that the proposed development is expected to alter the areas current sense of place, it must be carefully managed in order to not significantly conflict with the areas current sense of place.

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DEFINITION OF TERMS

Assessment A systematic, independent and documented review of operations and practises to ensure that relevant requirements are met.

Construction The time period that corresponds to any event, process, or activity that occurs during the Construction phase (e.g., building of site, buildings, and processing units) of the proposed project. This phase terminates when the project goes into full operation or use.

Critical viewpoints Important points from where viewers will be able to view the proposed or actual development and from where the development may be significant.

Cumulative Impacts The summation of the effects that result from changes caused by a development in conjunction with the other past, present or reasonably foreseen actions (The landscape Institute, Institute of Environmental Management & Assessment. 2002).

Decommissioning To remove or retire (a mine, etc.) from active service.

Environmental Component An attribute or constituent of the environment (i.e., air quality; marine water; waste management; geology, seismicity, soil, and groundwater; marine ecology; terrestrial ecology, noise, traffic, socio-economic) that may be impacted by the proposed project.

Environmental Impact A positive or negative condition that occurs to an environmental component as a result of the activity of a project or facility. This impact can be directly or indirectly caused by the project's different phases (i.e., Construction, Operation, and Decommissioning).

Field of view The field of view is the angular extent of the observable world that is seen at any given moment. Humans have an almost 180º forward-facing field of view. Note that human stereoscopic (binocular) vision only covers 140º of the field of view in humans; the remaining peripheral 40º have no binocular vision due to the lack of overlap of the images of the eyes. The lower the focal length of a lens, the wider the field of view.

Landscape Integrity Landscape integrity are visual qualities, which enhance the visual and aesthetic experience of the area.

Mitigation In the context of Visual Impact Assessments - Any action taken or not taken in order to avoid, minimise, rectify, reduce, eliminate, or compensate for actual or potential adverse visual impacts.

Operation The time period that corresponds to any event, process, or activity that occurs during the Operation (i.e., fully functioning) phase of the proposed project or development. (The Operation phase follows the Construction phase, and then terminates when the project or development goes into the Decommissioning phase).

Scenic value Degree of visual quality resulting from the level of variety, harmony and contrast among the basic visual elements.

Sense of place The character of a place, whether natural, rural or urban, it is allocated to a place or area through cognitive experience by the user.

Viewshed	The theoretical area within which an observer is likely to see a specific structure or area in the landscape. It is generated from a digital terrain model (DTM) made up of 3D contour lines of the landform. Intervening objects, structures or vegetation will modify the view shed at ground level.
Visual Absorption Capacity	The ability of elements of the landscape to "absorb" or mitigate the visibility of an element in the landscape. Visual absorption capacity is based on factors such as vegetation height (the greater the height of vegetation, the higher the absorption capacity), structures (the larger and higher the intervening structures, the higher the absorption capacity) and topographical variation (rolling topography presents opportunities to hide an element in the landscape and therefore increases the absorption capacity).
Visual character	The overall impression of a landscape created by the order of the patterns composing it; the visual elements of these patterns are the form, line, colour and texture of the landscape's components. Their interrelationships are described in terms of dominance, scale, diversity and continuity. This characteristic is also associated with land use.
Visual Exposure	Visual exposure is based on distance from the project to selected viewpoints. Visual exposure or visual impact tends to diminish exponentially with distance. The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if the proposed mine activities and associated infrastructure were not visible, no visual impact would occur. Visual exposure is determined by the Viewshed or the view catchment being the area within which the proposed development will be visible.
Visual sensitivity	Visual sensitivity can be determined by several factors in combination, such as prominent topographic or other scenic features, including high points, steep slopes and axial vistas.

ACRONYMS AND ABBREVIATIONS

BESS	Battery Energy Storage System
C&I	Corporate and Industrial
DTM	Digital Terrain Model
DSM	Digital Surface Model
EcoE	Eco Elementum (Pty) Ltd
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
GIIP	Good International Industry Practice
GIS	Geographic Information System
IDP	Integrated Development Plan
I&AP's	Interested and Affected Parties
Km	Kilometre
kV	Kilovolt
Km	Kilometre
m	Meters
Mamsl	Meters Above Mean Sea Level
MRA	Mining Right Area
Nemai Consulting	Nemai Consulting (Pty) Ltd
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SA	South Africa
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
ZVI	Zone of Visual Influence

PROJECT INFORMATION

Table 1-1: Applicant Details

Name of Applicant:	Genesis Eco-Energy Developments (Pty) Ltd
Contact Person:	-
Contact Number:	-
Email:	-
Postal Address:	-
Physical Address:	-
File Reference Number DMR:	-

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Website:	www.ecoe.co.za

SPECIALIST DECLARATION OF INDEPENDENCE

In support of an application in terms of the National Environmental Management Act 107 of 1998 (GNR983, GNR984 and GNR985, GG38282 of 4 December 2014 ("Listed Activities") that will require an environmental authorisation if triggered. As amended by GNR 327, GNR 325 and GNR 324.

I, **Nakéla Naidoo** as specialist, has been appointed in terms of regulation 12(1) or 12(2), and can confirm that I shall —

a. Be independent;
b. have expertise in undertaking specialist work as required, including knowledge of the Act, these Regulations and any guidelines that have relevance to the proposed activity;
c. ensure compliance with these Regulations;
d. perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application'
e. take into account, to the extent possible, the matters referred to in regulation 18 when preparing the application and any report, plan or document relating to the application;
f. disclose to the proponent or applicant, registered interested and affected parties to the proponent or applicant, registered interested and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing –
g. any decision to be taken with respect to the application by the competent authority in terms of these Regulations; or
h. the objectivity of any report, plan or document to be prepared by the EAP or specialist, in terms of these Regulations for submission to the competent authority; and
i. Unless access to that information is protected by law, in which case it must be indicated that such protected information exists and is only provided to the competent authority.

Nakéla Naidoo	[signature]
Name and Surname	Signature
21/09/2022	**Sunninghill**
Date	Signed at

1. INTRODUCTION

Genesis Eco-Energy Developments (Pty) Ltd (the applicant) proposes the development of the Parys, up to 200 Megawatt (MW) Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Hybrid Project located south of Parys, within the Ngwathe Local Municipality which forms part of the Fezile Dabi District Municipality, in the Free State Province of South Africa (SA) (refer to Figure 1.1 below). The electricity generated by the project will be injected into the existing Eskom 132 Kilovolt (kV) distribution system. The applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and /or other renewable energy markets within SA, such as the Corporate and Industrial (C&I) sector. As a result of the proposed development, the applicant has appointed Nemai Consulting (Pty) Ltd (Nemai Consulting) to undertake the relevant environmental authorisations associated with the proposed solar PV and BESS hybrid project.

The proposed project will consist of PV Solar Panels, a BESS made up of a maximum of 45 shipping containers, substations, overhead powerlines and ancillary infrastructure. The proposed infrastructure may have adverse effects on the visual characteristics of the surrounding environment therefore, Nemai Consulting have appointed Eco Elementum (Pty) Ltd (EcoE) to undertake a Visual Impact Assessment for the proposed project.

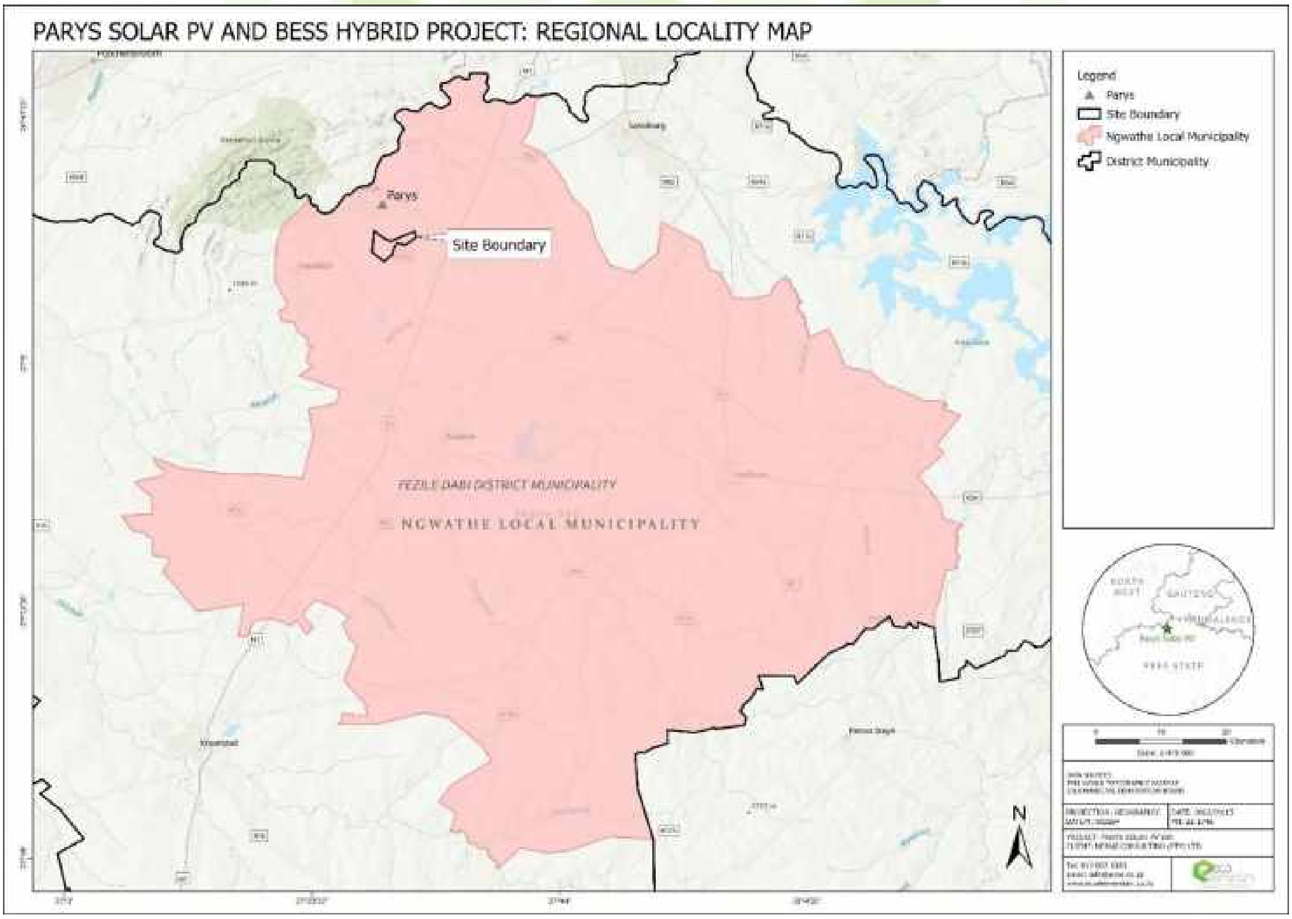

Figure 1.1: Regional Locality Map

2. SCOPE OF WORK

The scope of work for this Visual Analysis will include the following:

1. Describing the existing visual characteristics of the proposed site and its environment;
2. Viewshed and viewing distance determination using Geographic Information System (GIS) analysis up to 15 Kilometres (km) from the proposed structures.
3. Visual Exposure Analysis comprising the following aspects:

Terrain Slope;

- Slope angle is determined from the Digital Surface Model (DSM) and the location of the proposed structures given a ranking depending on the steepness of the slope.

Aspect of structure location;

- Aspect of the slope where the structures are to be built, are calculated from the DSM and given a ranking determined by the sun angle.

Landforms;

- Landform of the location of the proposed structures are determined from the DSM and ranked according to the type of landform. Structures built on certain landforms, e.g. ridges, will be more visible than structures built in valleys.

Slope Position of structure;

- Using GIS analysis, the position of the proposed structure is determined and ranked according to the position on the slope the structure is to be built.

Relative elevation of structure;

- Using the DSM, the elevation of the proposed structures relative to the surrounding elevation is determined and ranked according to the difference in height of the surrounding areas.

Terrain Ruggedness;

- The terrain ruggedness is determined from the DSM and given a ranking based on the homogeneousness of the terrain.

Viewer Sensitivity;

- The viewer sensitivity ranking of the surrounding areas is determined using various land cover and land use datasets and ranked according to the sensitivity of the related structures to the environment.

Overall Visual Impact;

- Combing all the above datasets, a final visual impact of the proposed structures is calculated.

4. Impact Identification and Ratings
5. Mitigation of Identified Visual Impacts

3. PROJECT DESCRIPTION

The proposed project will consist of PV solar panels, a BESS made up of a maximum of 45 shipping containers, 3 on-site substations, a collector substation, overhead powerlines, and ancillary infrastructure.

The height of the PV solar panels will be approximately 2 meters (m). The preferred panel option is a single axis tracking system which tracks the sun as it moves from east to west during the day. The trackers will be mounted on steel posts installed in the ground. The site would need to be cleared of all trees to prevent shading of the PV solar panels however, the ground between the panels will be left grassed.

Internal roads on the PV sites will have a 12 m reserve with a 4 m road width. Access roads from the PV sites to existing roads will have a 14 m reserve and 8 m road width. Fencing of the facility may be up to 3 m in height, details of the fencing are still to be finalized.

The maximum capacity of the BESS will be 45 MW. The technology will be the commercially proven solid state battery systems comprising of the Lithium-Ion technology. There will be up to a maximum of 45 shipping containers, each with a battery storage capacity of 1 MW. The approximate dimensions of the containers will be up to a maximum of 20 m in length, 3 m wide and 3 m high. The lithium in the technology is considered as hazardous/dangerous goods. Therefore, used batteries will be removed by suppliers for recycling off-site.

The electricity generated by the proposed Solar PV plant will be transferred to the national Eskom grid. A power line route is under consideration and will connect to the existing Eskom Parys 132/11 kV substation located to the north of the site through a 0.57 kilometre (km) single circuit twin conductor 132 kV line. The voltage of the electricity generated by the project will be transformed on site via a step-up transformer in an on-site substation that will be constructed by the applicant. The project's proposed overhead power lines will be aligned alongside property boundaries and existing power lines as far as possible.

Refer to Figure 3.1 overleaf showing the layout of the proposed PV plant and to Table 3-1 below which shows the heights of the proposed infrastructure used in the visual analysis. It is important to note that only the infrastructure expected to cause the most visual impact was included in the visual analysis. The potential visual impact of ancillary infrastructure is addressed in the impact assessment.

Table 3-1: Heights of the modelled infrastructure

Proposed Infrastructure	Height (m)
PV Solar Panels	2
BESS	3
Substations	10
Buildings	3
Powerlines	32

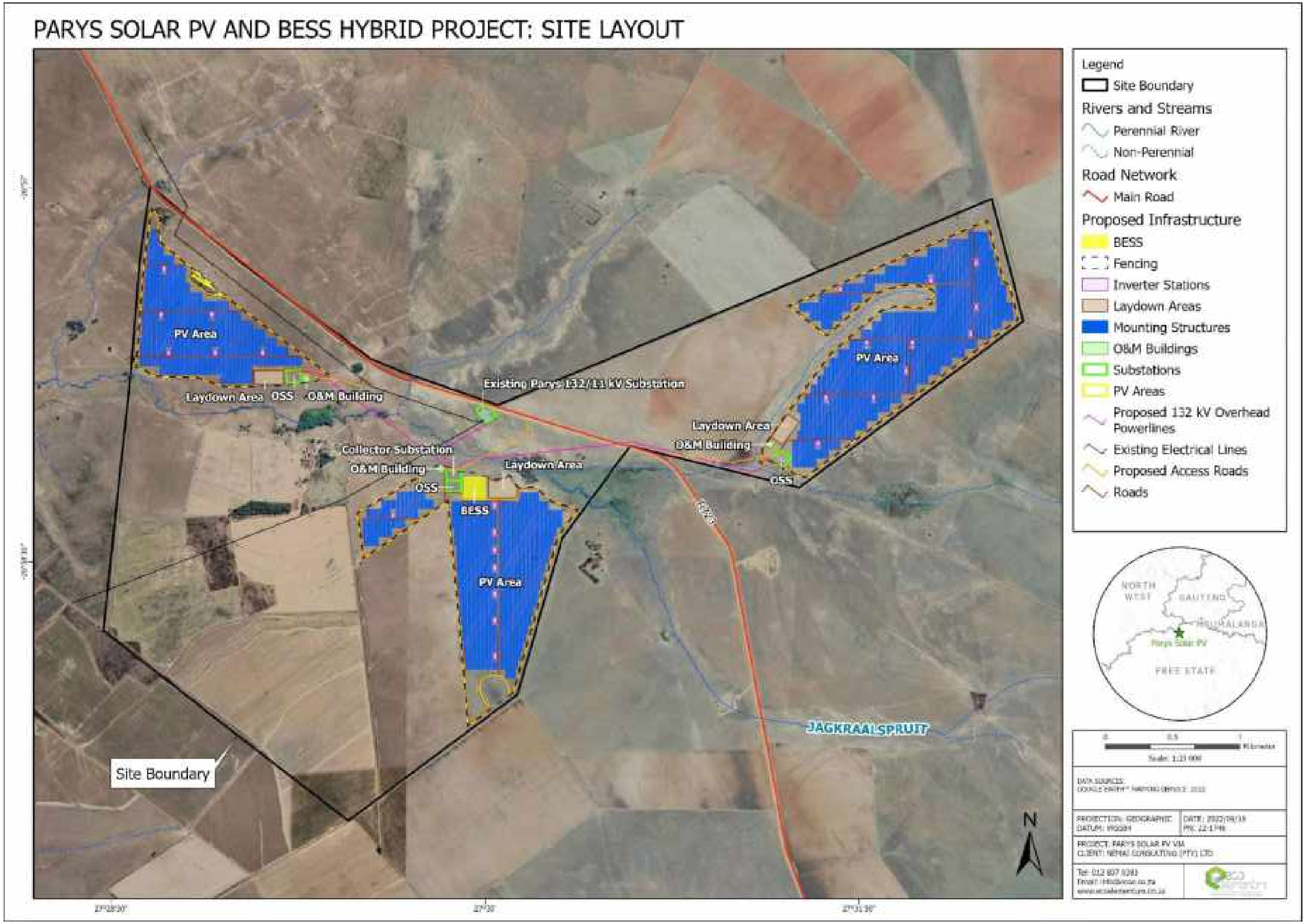

Figure 3.1: Site Layout

4. DESCRIPTION OF THE AFFECTED AREA AND ENVIRONMENT

This section describes the status of the receiving environment and will serve as a baseline for the assessment of the proposed infrastructure. A site visit was not conducted for the assessment due to time constraints. However, various data sources are referenced in the desktop analysis of the receiving environment.

4.1 TOPOGRAPHY

The general topography of the study area can be described as a relatively flat terrain with hills, which form part of the Vredefort Dome, running along the northern perimeter of the 15 km site buffer. Overall, the surface elevation varies between 1 326 meters above mean sea level (mamsl) and 1 647 mamsl within 15 km of the proposed project area. Figure 4.1 indicates the topography of the proposed site.

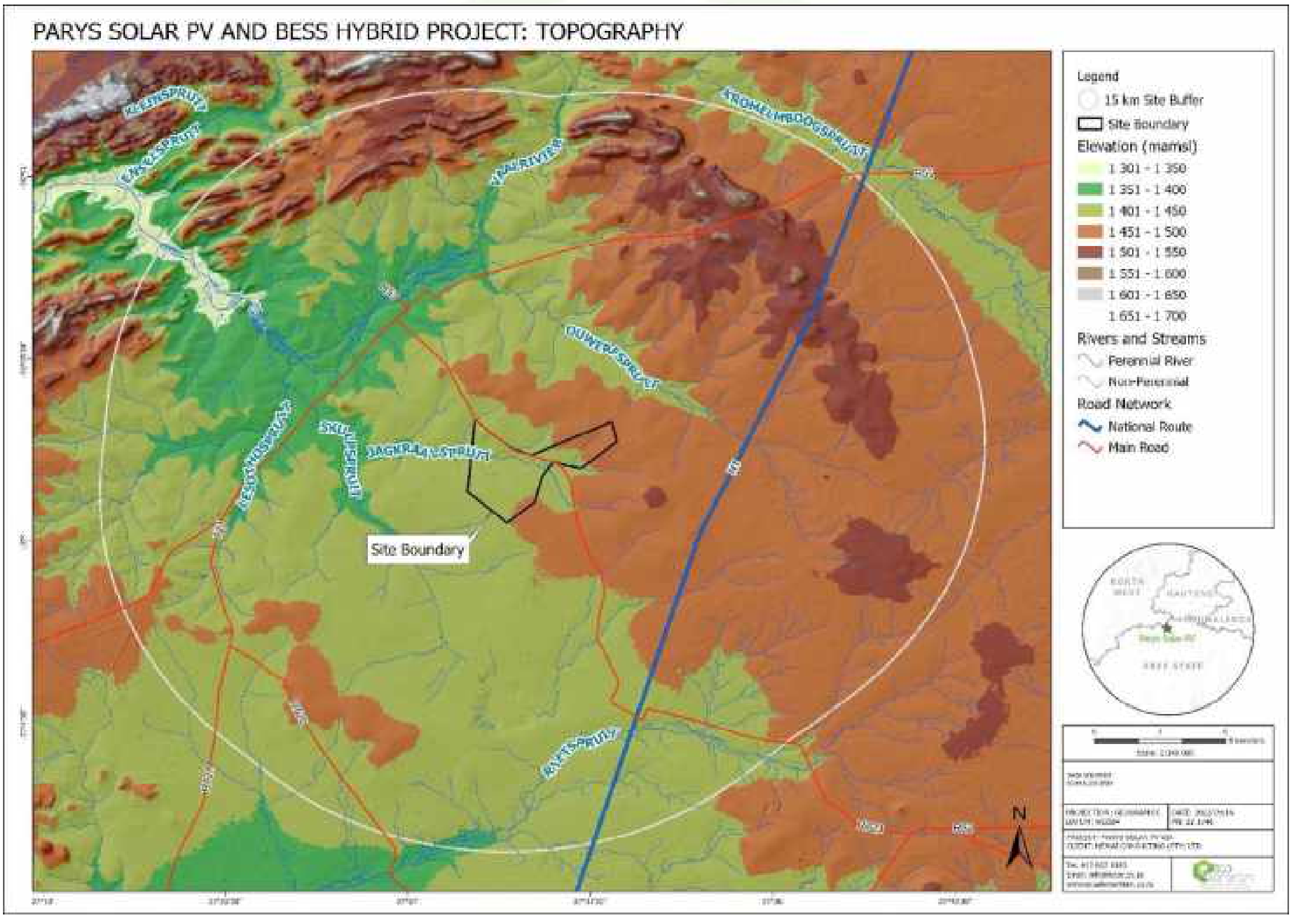

Figure 4.1: Topography

4.2 VEGETATION

Visual Absorption Capacity (VAC) is the capacity of the receiving environment to absorb the potential visual impact of the proposed infrastructure. The VAC is primarily a function of the surrounding vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing, sparse and patchy vegetation will have a low VAC.

Figure 4.2 below shows the 2018 national vegetation of the study area. The project site and surrounding areas are predominantly covered by different types of grasslands, namely the Vredefort Dome Granite Grassland, Central Free State Grassland, Soweto Highveld Grassland and Vaal-Vet Sandy Grassland. The hills towards the north of the project site are covered by the Soweto Highveld Grassland and Gold Reef Mountain Bushveld.

The two dominant vegetation types within 15 km of the project site are the Vredefort Dome Granite Grassland and the Central Free State Grassland types. The Vredefort Dome Granite Grassland and landscape features can be described as slightly undulating plains with short Themeda triandra-dominated grassland, though mostly grazed and often degraded (Mucina et al., 2006). Big boulders are conspicuous in the area, which creates micro-habitats for a variety of plant species (Mucina et al., 2006). The Central Free State Grassland vegetation type is described is also described as undulating plains supporting short grassland (Mucina et al., 2006). Therefore, it can be inferred that the surrounding vegetation of the area creates a low VAC for the proposed project. Figure 4.3 and Figure 4.4 overleaf shows images of the two main vegetation types as shown by Mucina., et al (2006).

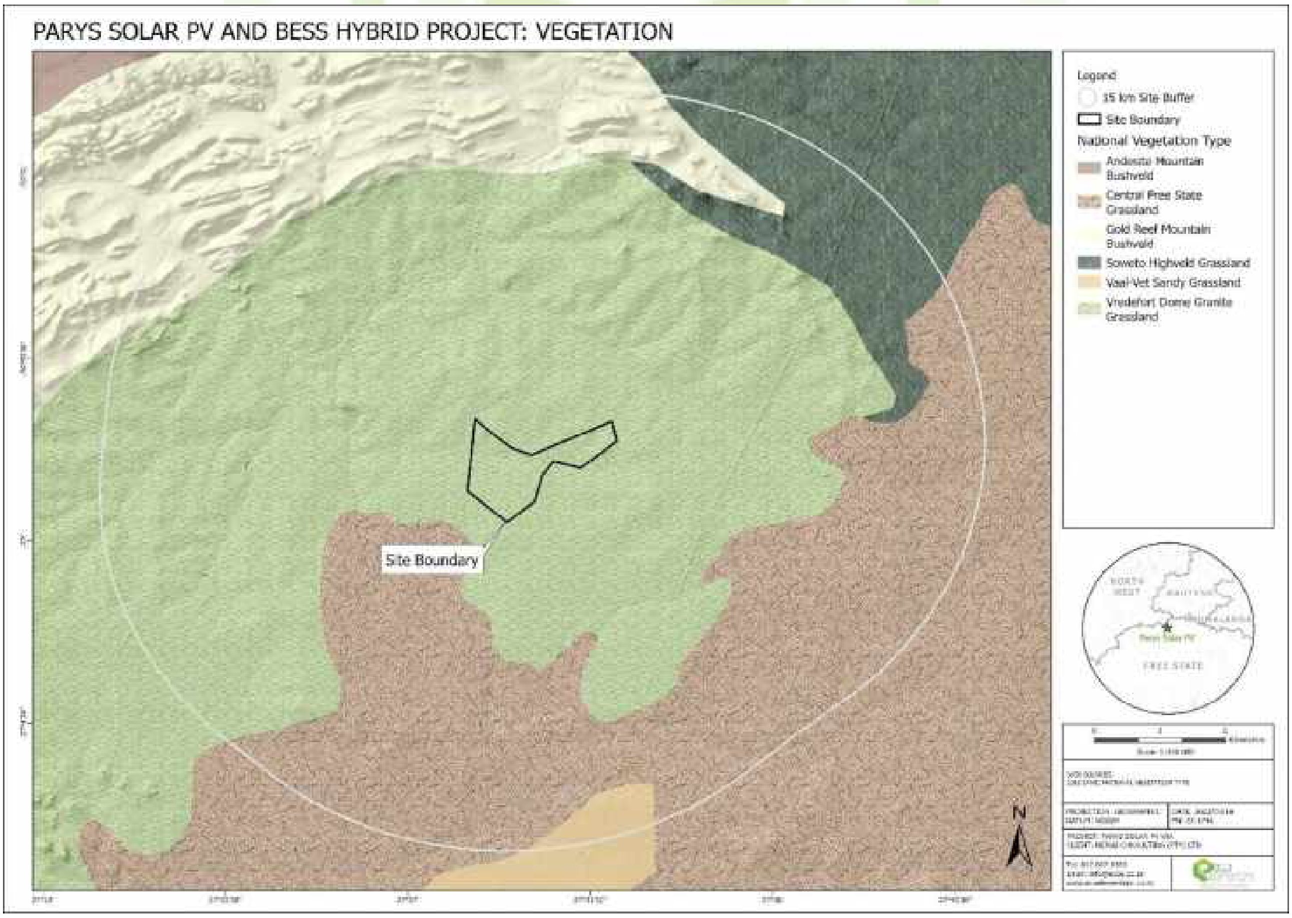

Figure 4.2: Vegetation

Figure 4.3: Vredefort Dome Granite Grassland (with a granite dome in the background) – Border region between the Free State and Northwest Provinces (Mucina et al., 2006; p385)

Figure 4.4: Typical Central Free State Grassland in well managed habitats – Along the N1 route south of Leeukop near Bloemfontein (Mucina et al., 2006; p381)

4.3 LANDCOVER

Figure 4.5 below shows the surrounding landcover of the study area. The landcover type within 15 km of the proposed project is dominated by cultivated land and natural grassland, with patches of fallow land and old fields. Formal residential areas are also located towards the north and west of the project area. According to the Ngwathe Municipality's Integrated Development Plan (IDP) for 2021-2026 (IDP, 2021), the landscape can be described as predominantly agricultural. The existing landcover therefore lends to the study areas low VAC.

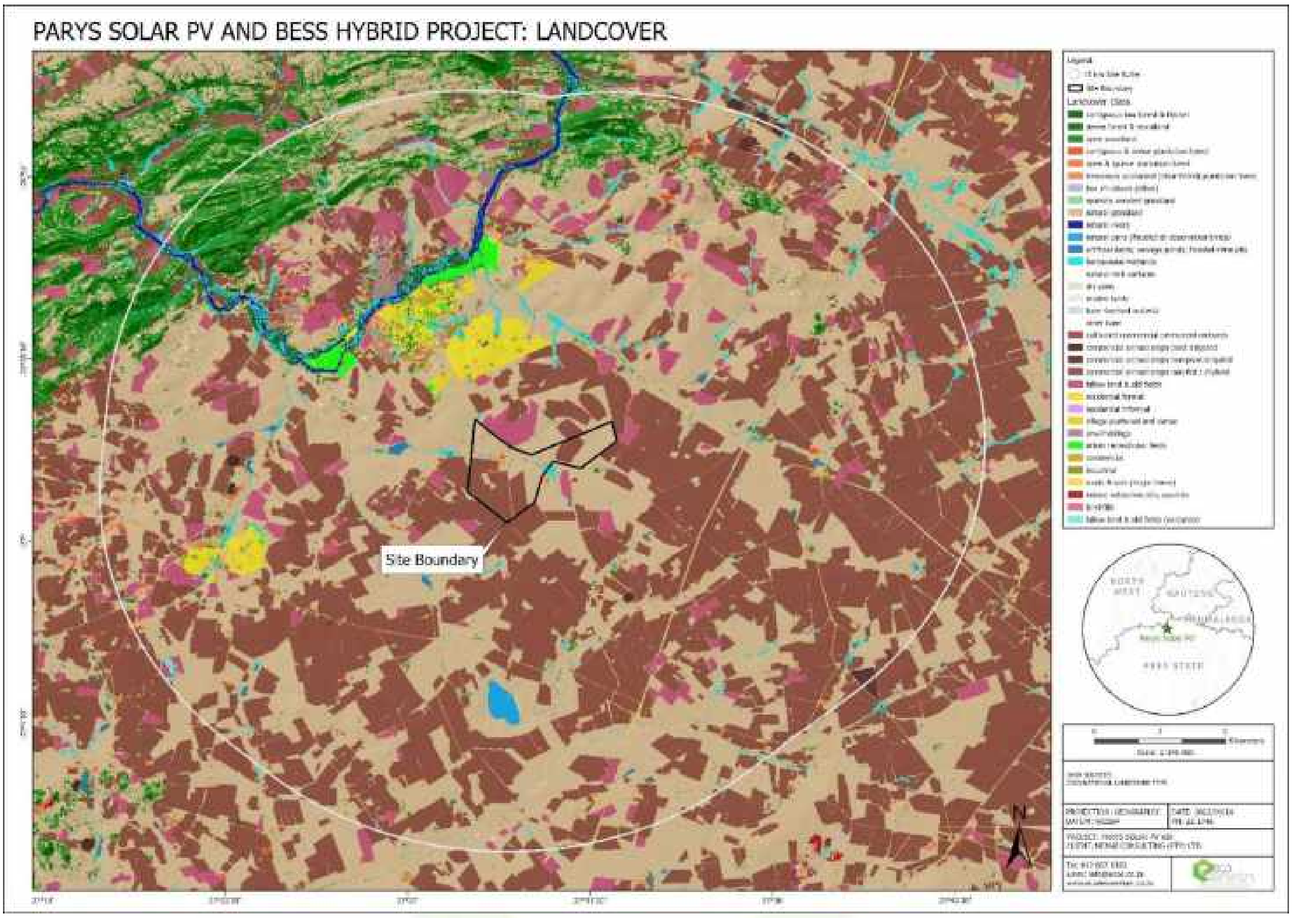

Figure 4.5: Landcover

4.4 Sensitive Receptors

From a desktop study of satellite imagery and available national data, potential sensitive receptors were identified within 15 km of the proposed operations and are presented in Figure 4.6 overleaf. Using satellite imagery, homesteads; schools; recreational facilities and tourist destinations were identified as potential sensitive receptors to the proposed project. It was noted that recreational activities and tourist destinations were mostly located along the Vaal River, and the homesteads and schools were scattered across the study area. It should be noted that the sensitive receptors in the area may differ from those identified as not all areas may have been identified from the imagery successfully.

Urban residential areas were also identified using the Statistics South Africa (StatsSA) sub-places database. The database indicates that 7 sub-places are located from the west to the north of the proposed site. These sub-places are Vredefort, Mokwallo, the Vaal de Grace Golf Estate, Schonkenville, Tumahole, Parys and the Parys Golf and Country Estate.

Two protected areas were identified north of the site, using the 2022 South African Protected Areas Database (SAPAD). These protected areas are namely the Vechthoek Private Nature Reserve and the Klein Paradys Bird Sanctuary, approximately 183 hectares (ha) and 46 ha in area respectively. The protected areas are considered potential sensitive receptors as they will most likely be visited by tourists. Tourists may be able to view the proposed development due to the use of optical instruments used for viewing distant objects.

The residents and tourists using the road networks surrounding the study area are also considered as sensitive receptors due to their potential momentary views of the proposed development. The identified road network includes the N1 (running along the east of the site, the R723 (traversing the site) and several other main roads and secondary roads servicing the farming communities and identified sub-places.

The identified homesteads, schools, recreational facilities, tourist destinations, urban residential areas and protected areas are expected to experience higher levels of visual impacts due to their static views of the proposed development, as compared to travellers using the road networks who are expected to experience lower levels of visual impacts due to their momentary views of the proposed development.

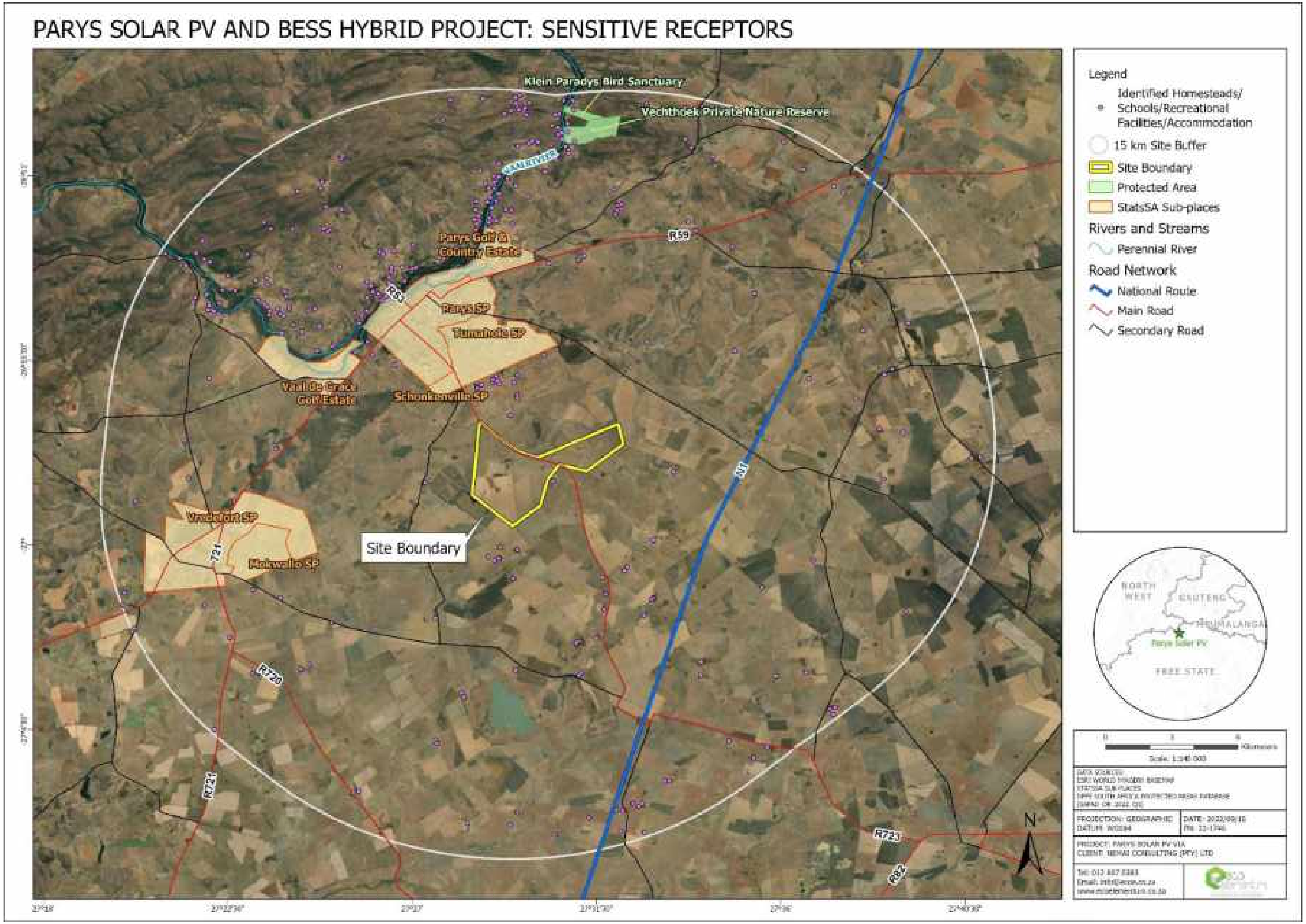

Figure 4.6: Sensitive Receptors

4.5 Sense Of Place

The concept of “a Sense of Place” does not equate simply to the creation of picturesque landscapes or pretty buildings, but to recognize the importance of a sense of belonging. Embracing uniqueness, as opposed to standardization, attains quality of place. In terms of the natural environment, it requires the identification, a response to and the emphasis of the distinguishing features and characteristics of landscapes. Different natural landscapes suggest different responses. The areas current sense of place was extracted from the Ngwathe Local Municipality’s 2021-2026 Integrated Development Plan (IDP) and the 2021/2022 IDP Review.

The proposed site is located approximately 3.5 km southeast of Parys, within the Ngwathe Local Municipality, situated within the northern part of the Fezile Dabi District Municipality. The economy of the region is mainly structured along agriculture, mining, and tourism (IDP, 2021/2022). Parys has exceptional and unique natural and environmental assets which makes it an exceptional tourism potential (IDP, 2021-2026). On the banks of the Vaal River there are number of guest houses, conference facilities and estates, restaurants and fast food outlets. The town has unique curio, antique and art shops which attract tourists from the Gauteng province and all over South Africa. Parys also has a well-developed airfield that supports commercial and tourism development in the area. The Vredefort Dome also presents exceptional tourism potential within the area (IDP, 2021-2026). Parys with its strong service character and prominent commercial and industrial components, will remain the main town and growth point of the region and will continue to render various services to the surrounding smaller towns and rural areas (IDP, 2021-2026). Given the above characteristics of the region, the study area can be described as having a mixed sense of place.

A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was also conducted for the local municipality, where one of the municipalities opportunities was identified as PV Power Generation. This opportunity aligns with one of the municipality’s goals over the next 5 years, which is to strategically focus on the installation of new infrastructure to ensure sustainable electricity to the region (IDP, 2021-2016).

Overall, from the desktop analysis, the proposed development is expected to alter the areas sense of place and will need to be carefully managed in order to not significantly conflict with the areas current sense of place. It is also important to note that the proposed solar plant is in line with the municipality’s goal to provide sustainable electricity to the region.

5. METHODOLOGY

The following methodology was followed to quantify the potential visual impacts of the proposed project.

5.1 Visual Impact Methodology

1. Viewshed and viewing distance was modelled using GIS analysis up to 15 km from the proposed structures utilizing ArcGIS Pro 2.9.3 and Spatial Analyst Extension.

2. In order to model the decreasing visual impact of the structures, concentric radii zones of 1 km to 15 km from the proposed mine activities were superimposed on the viewshed to determine the level of visual exposure. The closest zone to the proposed structures indicates the area of most significant impact, and the zone further than 10 km from the structures indicates the area of least impact. The visual ratings of the zones have been defined as follows:
   - < 1 km (very high);
   - 1 - 2 km (high);
   - 2 - 5 km (moderate);
   - 5 - 10 km (low);
   - 10 - 15 km (very low); and
   - > 15 km (insignificant).

3. A visual exposure analysis was conducted which included the following parameters:

– Terrain Slope
   - Slope angle was determined from the Digital Surface Model (DSM) and the location of the proposed structures given a ranking depending on the steepness of the slope;
   - Structures built on steep slopes are assumed to be more visible and exposed than those on flat surfaces.

– Aspect of structure location
   - Aspect of the slope where the structures are to be built, were calculated from the DSM and given a ranking determined by the sun angle.
   - Structures on flat surface are illuminated by the sun the whole day and thus visible from all directions. In the southern hemisphere structures on north facing slopes are less visible from the south, structures on east and west facing slopes are only illuminated during half of the day thus less visible where structures on the southern slopes are mostly in the shade.

– Landforms
   - Landform of the location of the proposed structures were determined from the DSM and ranked according to the type of landform. Structures built on certain landforms, e.g. ridges, will be more visible than structures built in valleys.

– Slope Position of structure
    - Using GIS analysis, the position of the proposed structures were determined and ranked according to the position on the slope the structure are to be built.

– Relative elevation of structures
    - Using the DSM, the elevation of the proposed structure relative to the surrounding elevation is determined and ranked according to the difference in height of the surrounding areas. Structures built on higher ground are more visible than those built in low lying areas.

– Terrain Ruggedness
    - The terrain ruggedness is determined from the DSM and given a ranking based on the homogeneousness of the terrain. Rugged terrain has a tendency to increase the visual absorption characteristics of the terrain.

– Visual Absorption Capacity (VAC)
    - To simulate the VAC of the landscape, land cover data of the area was assigned a VAC ranking. The visual exposure results and VAC rankings of the landscape were use in an algorithm to determine a quantitative visual exposure for each sensitive receptor.

– Overall Visual Impact
    - Combing all the above datasets, a final visual exposure ranking was determined for each of the identified sensitive receptor areas.

5.2 ASSUMPTIONS

- The core study area for the visual assessment can be defined as an area with a radius of not more than 10 km from the structures and a total study area with a radius of 15 km from the structures. This is because the visual impact of structures beyond a distance of 10 km would be so reduced that it can be considered negligible even if there is direct line of sight.

- It is assumed that there are no alternative locations for the structures and that the assessment, therefore, assessed only the proposed site.

- The assessment was undertaken during the planning stage of the project and is based on the information available at that time.

- The heights were assumed for the proposed infrastructure for which heights were not available at the time of the study.

- Only the infrastructure expected to cause the most visual impact was included in the visual analysis.

5.3 Limitations

- Visual perception is by nature a subjective experience, as it is influenced largely by personal values. For instance, what one viewer experiences as an intrusion in the landscape, another may regard as positive. Such differences in perception are greatly influenced by culture, education and socio-economic background. A degree of subjectivity is therefore bound to influence the rating of visual impacts. In order to limit such subjectivity, a combination of quantitative and qualitative assessment methods were used. A high degree of reliance has been placed on GIS-based analysis viewsheds, visibility analyses and on making transparent assumptions and value judgements, where such assumptions or judgements are necessary.

- The results generated in GIS cannot be guaranteed as 100% accurate. Some viewpoints, which are indicated on the viewshed as being inside of the viewshed, can be outside of the viewshed. This is due to the change of the natural environment by surrounding activities as well as natural vegetation that play a significant role and can have a positive or negative influence on the viewshed.

- The modelling of visibility is merely conceptual. Being based on the ALOS DSM and land cover data, it does not fully take into account the real-world effect of buildings, trees etc. that could shield the structures from being visible or could have changed over time. The viewshed analysis therefore signifies a worst-case scenario.

- Only the major infrastructure (in terms of height and area) were included in the visual analysis and not the proposed ancillary infrastructure. The expected visual impact of the ancillary infrastructure is generally less significant than the expected visual impact of the proposed PV Panels, substations and powerlines. However, the ancillary infrastructure may contribute to the cumulative expected visual of the proposed project therefore, the expected visual impacts of the proposed ancillary infrastructure is addressed in the Impact Assessment.

- A Glint and Glare Impact Assessment did not form part of the scope of work.

5.4 Legal Requirements

There are no specific legal requirements for visual impact assessments in South Africa. These impacts are, however required to be assessed by implication when the provisions of relevant acts governing environmental impacts management are considered.

6. CRITERIA USED IN THE ASSESSMENT OF IMPACTS

6.1 View Points And View Corridors

Viewpoints/sensitive receptors have been selected based on prominent viewing positions in the area. The selected viewpoints and view corridors were used as a basis for determining potential visual impacts of the proposed structures.

6.2 Visual Exposure

Visual exposure is based on distance from the project to selected viewpoints. Visual exposure or visual impact tends to diminish exponentially with distance. The visibility of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if the proposed structures were not visible, no visual impact would occur. Visual exposure was determined by the following variables:

- Slope angle;
- Aspect of slope;
- Landforms;
- Slope Position of structure;
- Relative elevation of structures; and
- Terrain ruggedness.

6.3 Landscape Integrity

Landscape integrity are visual qualities represented by the following qualities, which enhance the visual and aesthetic experience of the area:

- Intactness of the natural and cultural landscape;
- Lack of visual intrusions or incompatible structures; and
- Presence of a 'sense of place'.

6.4 Determine The Visual Absorption Capacity

Topography and built forms have the capacity to 'absorb' visual impact. The digital surface model utilised in the calculation of the visual exposure of the facility does not fully incorporate potential visual absorption capacity. It is therefore necessary to determine the VAC by means of the interpretation of the vegetation cover, landcover, topography and structures. Land cover was used in the ranking of the VAC for this study.

7. VIEWSHED AND VISUAL EXPOSURE RESULTS AND DISCUSSION

Figure 7.1 to Figure 7.7 shows the viewshed results for the proposed project.

7.1 TERRAIN SLOPE

Figure 7.1 below shows the slope angles of the terrain within the 15 km buffer area surrounding the proposed project. The results indicate that the proposed project will be built on gentle slope of less than 3.43 degrees across most of the project site.

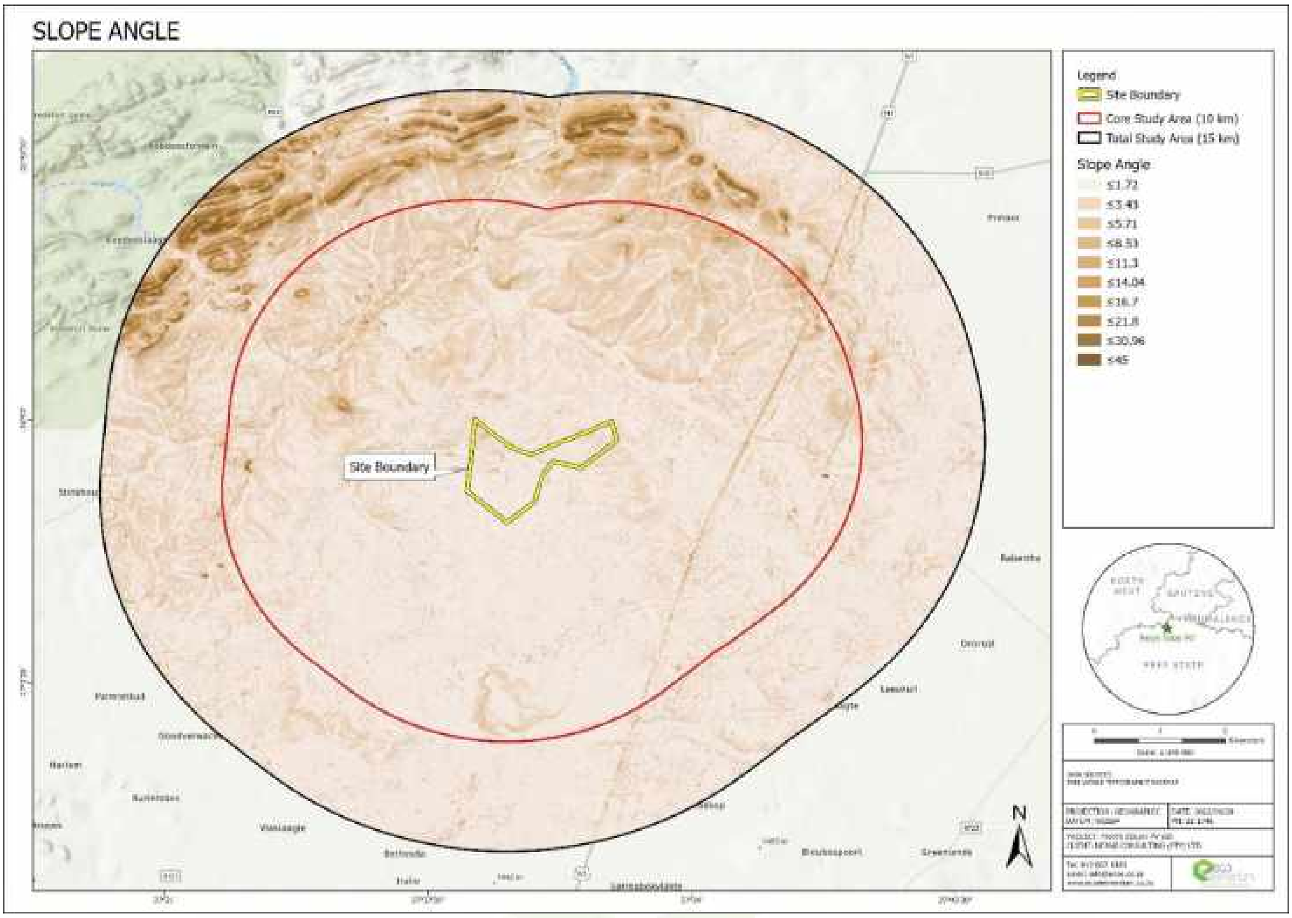

Figure 7.1: Slope Angles

7.2 Aspect Of The Slope

Figure 7.2 shows the slope aspect of the terrain within the 15 km buffer area surrounding the proposed project. The results indicate that the proposed site is situated on multidirectional slopes. Furthermore, since the site is located on a gentle slope/flat surface, the proposed infrastructure will be illuminated from sunrise to sunset.

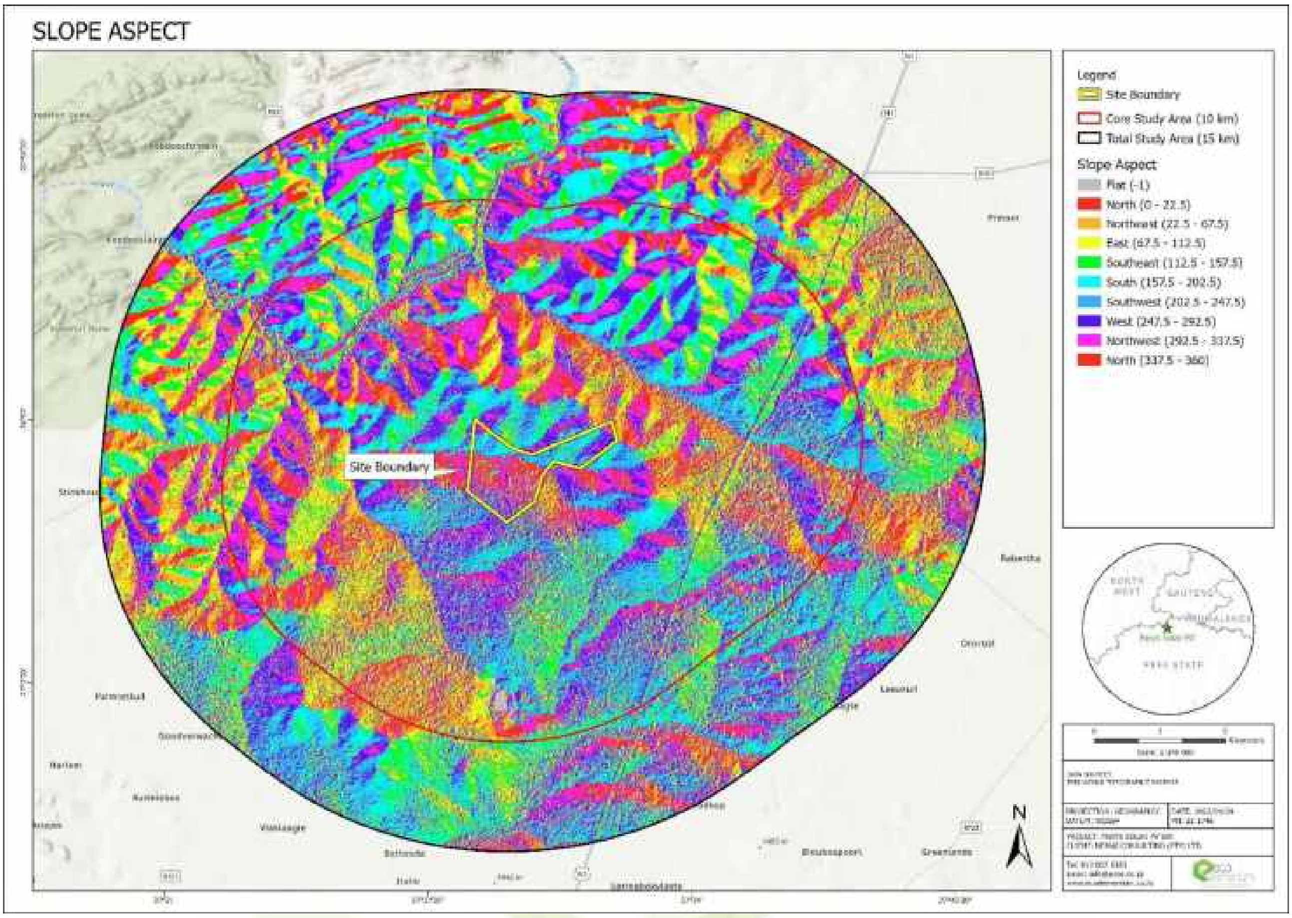

Figure 7.2: Slope Aspect

7.3 Terrain Ruggedness

The results of the terrain ruggedness shows that the study area has a low level of ruggedness. This may have the tendency to decrease the VAC characteristics of the terrain. The terrain is most rugged towards the north of the site buffer where the identified hills are located. Figure 7.3 shows the terrain ruggedness within 15 km of the proposed project area.

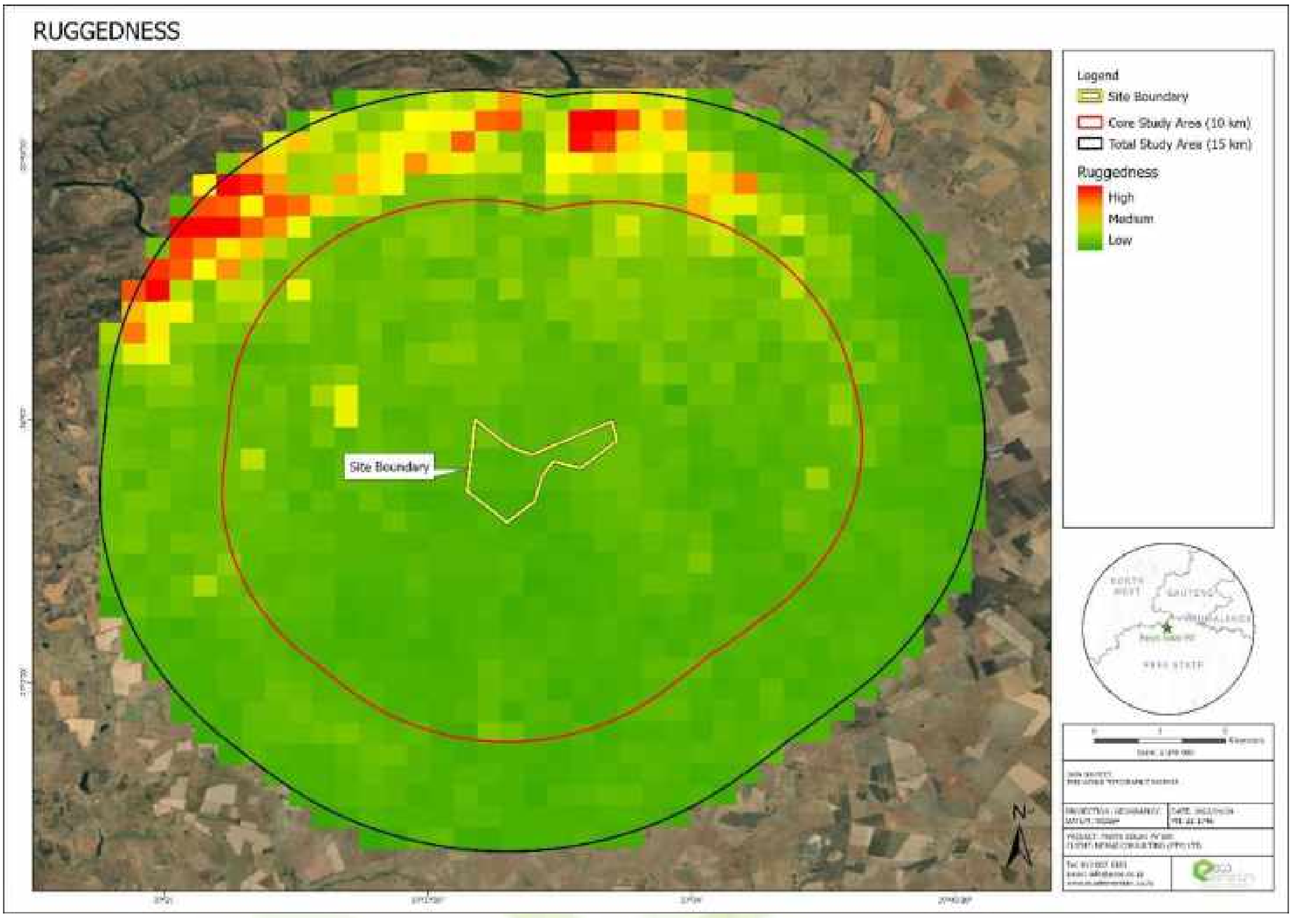

Figure 7.3: Terrain Ruggedness

7.4 RELATIVE ELEVATION

The results of the relative elevation shows that the proposed infrastructure will be built on lower lying areas. Figure 7.4 shows the relative elevation within 15 km of the proposed project.

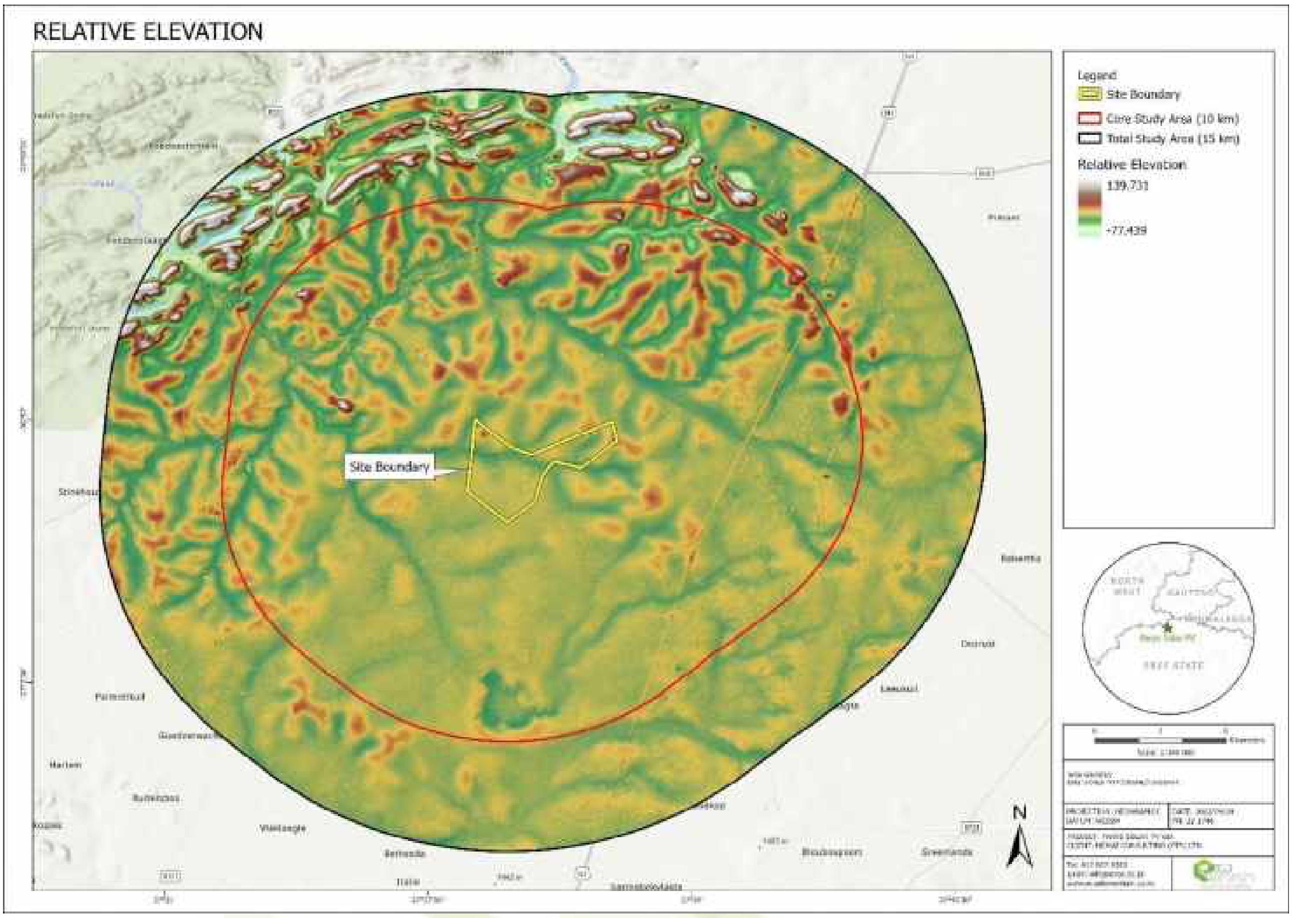

Figure 7.4: Relative Elevation

7.5 LANDFORMS

Figure 7.5 below indicates the landforms of the surrounding study area. The results indicate that most of the proposed infrastructure will be built on plains.

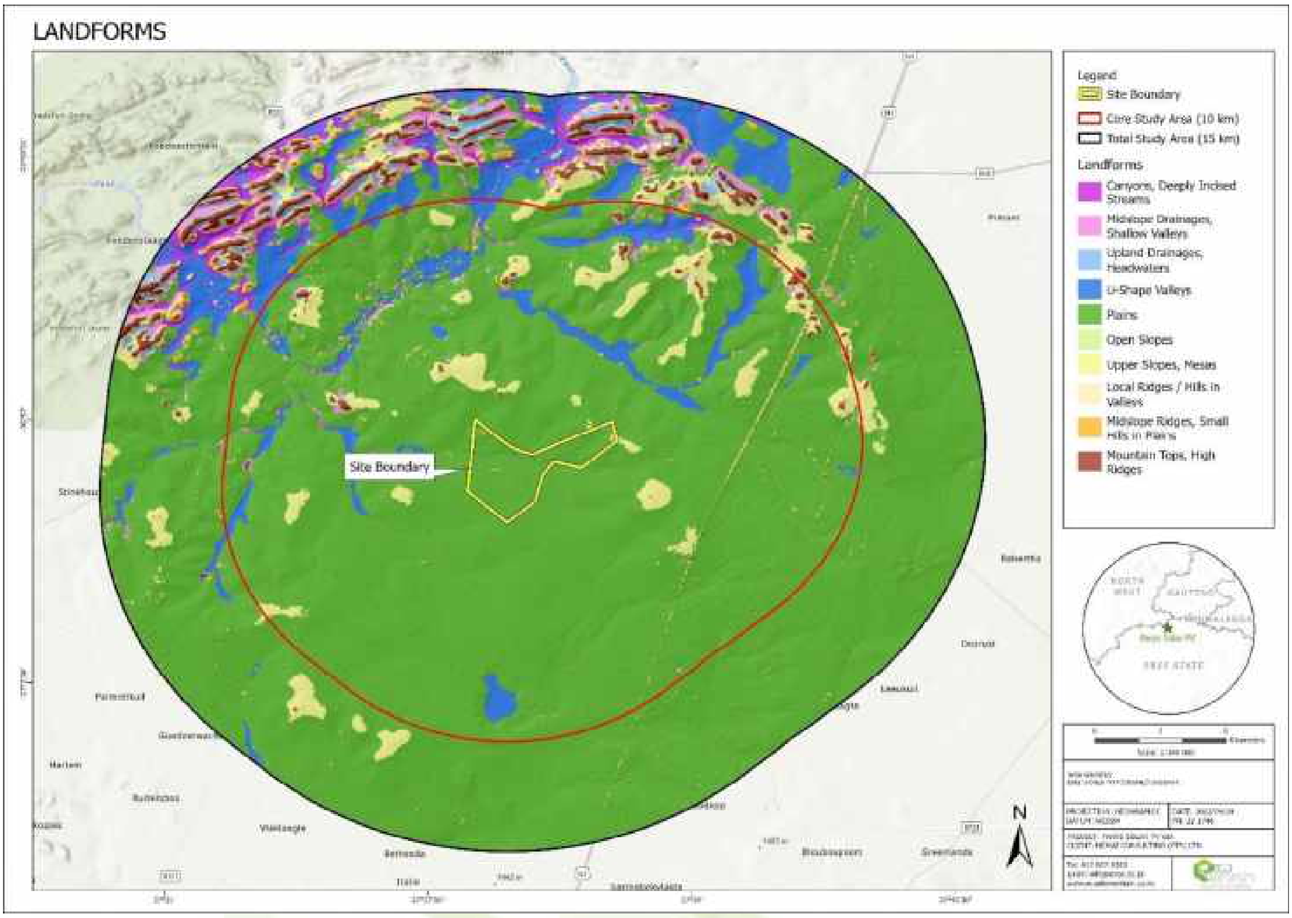

Figure 7.5: Landforms

7.6 Slope Position

The results of the slope position shown in Figure 7.6 below shows that the study area lies within valleys/cliff bases and on a mid-slope. The northern part of the 15 km site buffer lies mostly on ridges, upper slopes, mid-slopes and flat areas. The southern section of the study area comprises mostly of valleys/cliff bases.

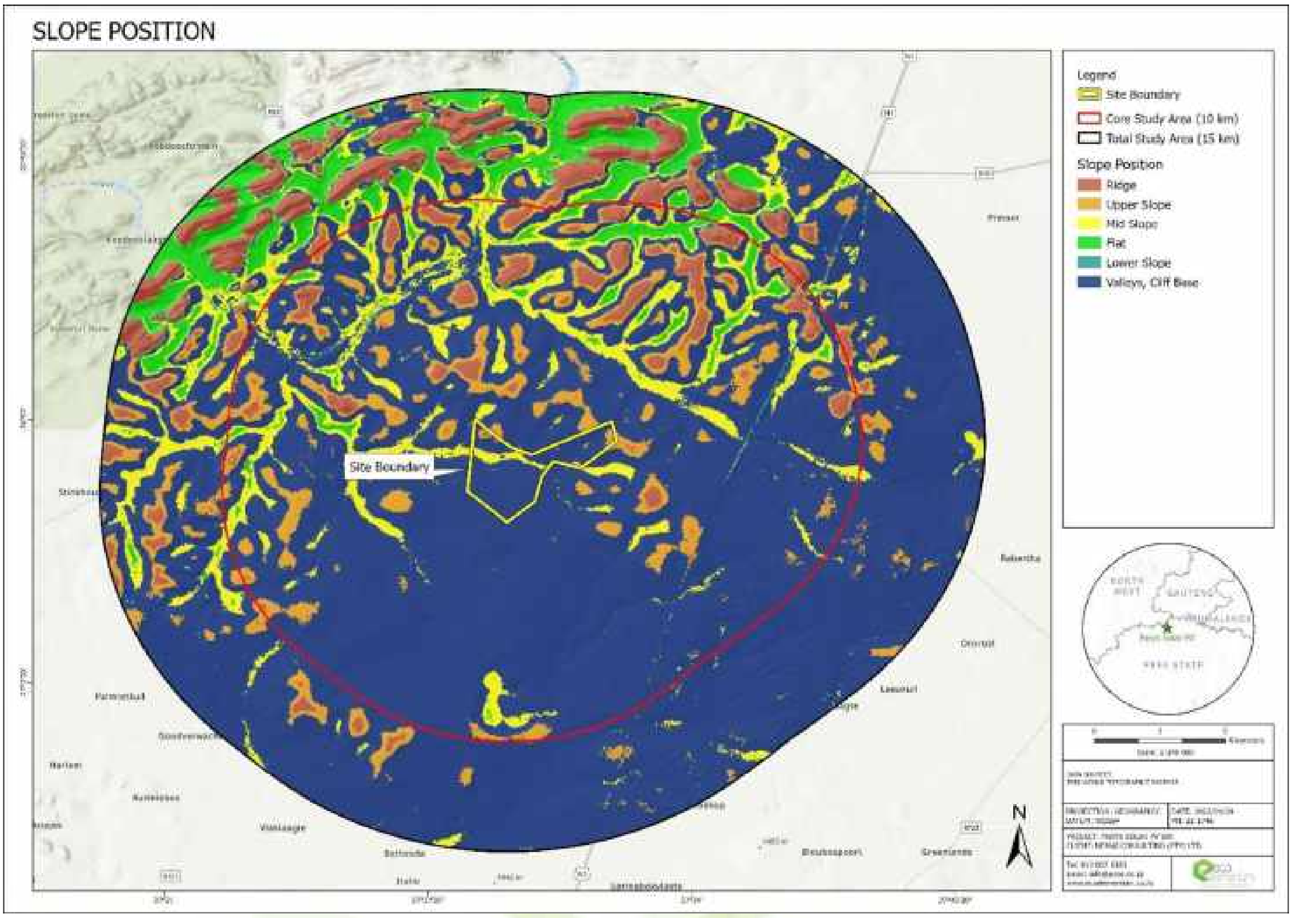

Figure 7.6: Slope Positions

7.7 LANDCOVER VAC

Figure 7.7 indicates the possible VAC of the study area calculated using the surrounding landcover. The results indicate that the study area has a low VAC therefore, the proposed infrastructure is expected not to blend in with the immediate surroundings.

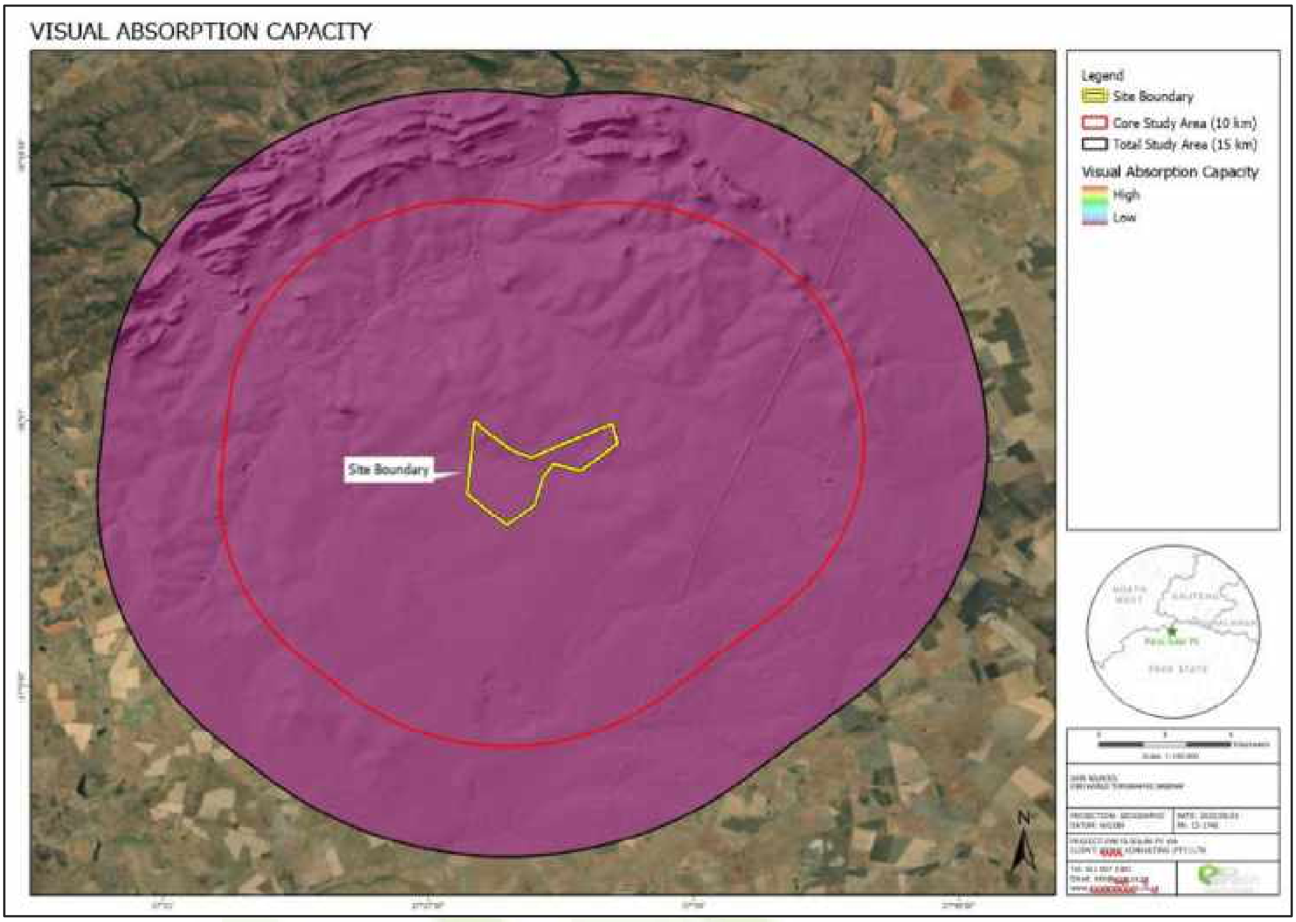

Figure 7.7: Potential VAC

7.8 VIEWSHED VISIBILITY

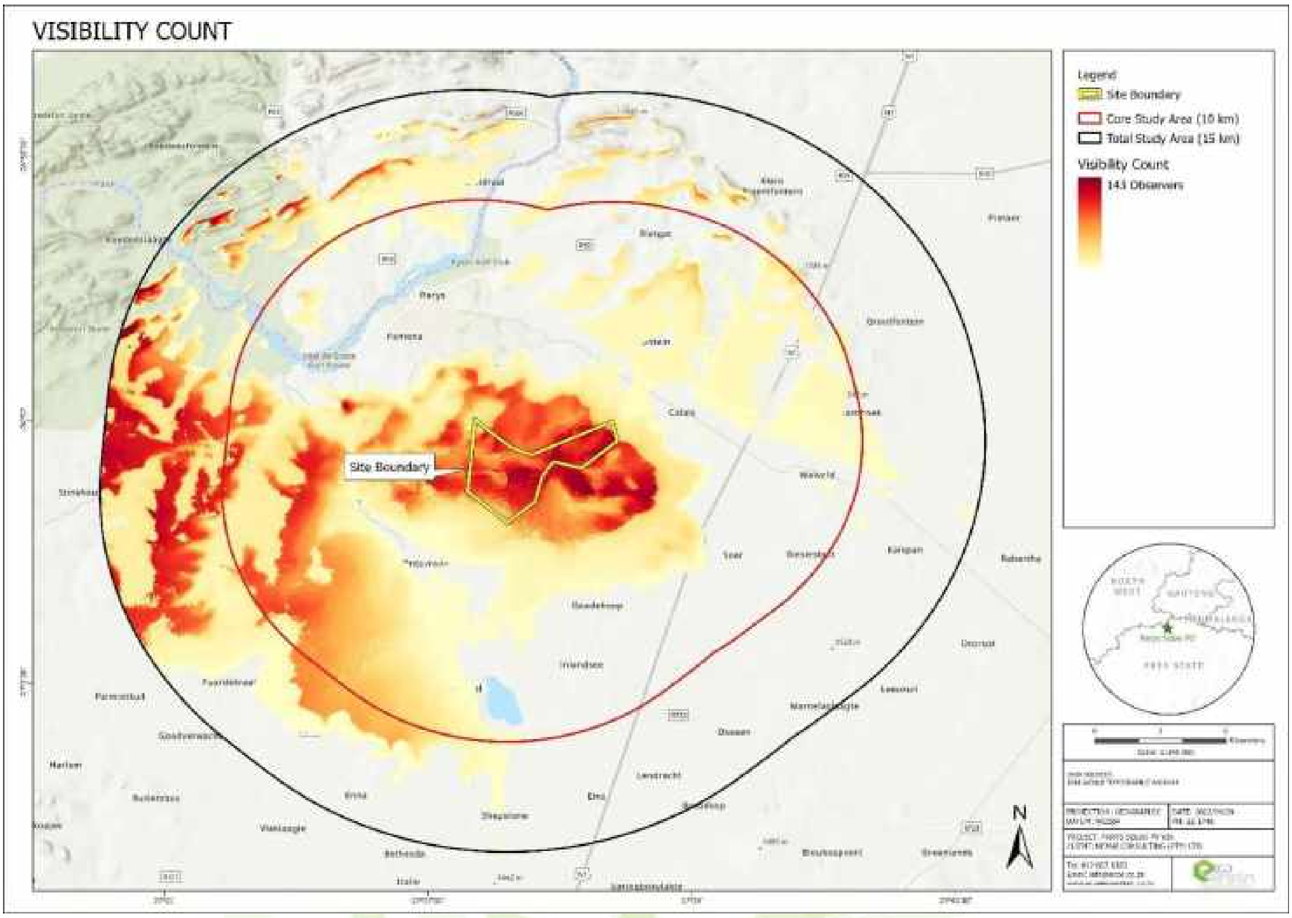

Figure 7.8: Viewshed Visibility Count – showing the number of observer points that may be visible from within 15 km of the proposed site

For the assessment of the visibility of the area, the proposed infrastructure was allocated 143 control points which were used as the observer points within the analysis. The viewshed shows the number of observer points that may be seen from any point within 15 km of the proposed project.

Figure 7.8 above indicates that the proposed project infrastructure is likely to be visible from the regions south to the east of the proposed site and from within the immediate vicinity of the site's boundary. Most of the proposed infrastructure is expected to be visible from the areas directly west of the project, within the core study area and total study area. A high number of observer points may also be visible from the hills located northwest and north of the site, beyond the core study area. A lower number of observer points are expected to be visible from the east of the site, and the development is expected to be screened from the areas further southeast of the site.

7.9 Viewshed Visibility – Distance Ranking

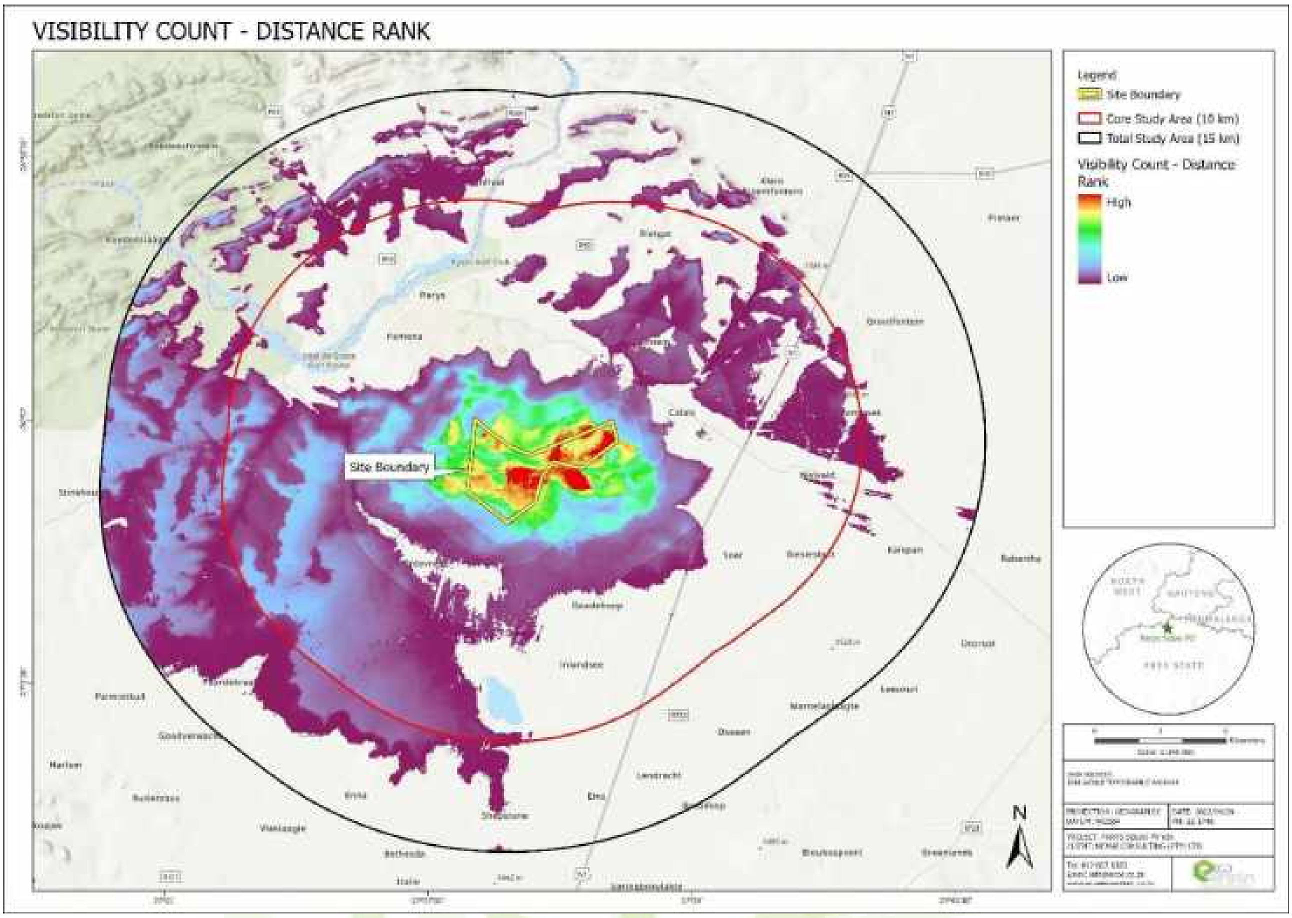

Figure 7.9: Visibility Count Distance Rank – showing the number of observer points that may be visible from within 15 km of the proposed site, ranked according to the distance from the proposed infrastructure

The results from the viewshed visibility are further ranked based on the distance from the centre of the proposed site. The distances are ranked according to Table 7-1 below.

Table 7-1: Visibility Rating

12 – 15 km	Very Low
9 – 12 km	Low
6 – 9 km	Medium
3 – 6 km	High
0 – 3 km	Very High

The results in Figure 7.9 shows that the visibility of the proposed infrastructure will be highest within the eastern and southern parts of the site boundary. The visibility impact decreases as the distance from the site increases.

7.10 Visual Exposure Ranking

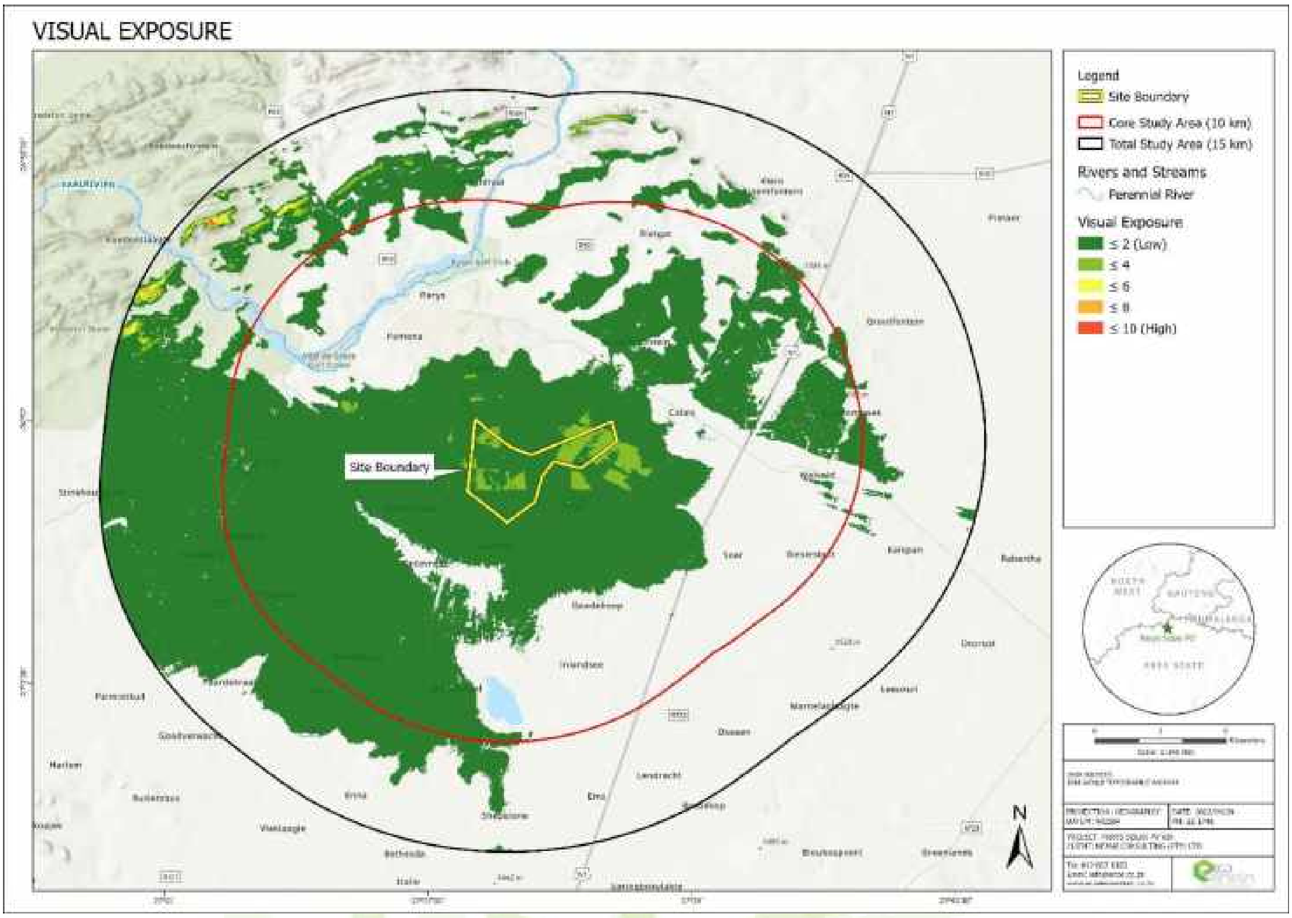

Figure 7.10: Visual exposure – showing the level of visual exposure which may be experienced within 15 km of the proposed site

The viewshed visibility and distance ranking is combined with the slope angle, slope aspect, slope position, ruggedness, relative elevation, landforms and landcover VAC to obtain a quantitative visual exposure ranking of all areas where the proposed infrastructure may potentially be visible from. Table 7-2 below indicates the visual exposure ranking.

Table 7-2: Visual Exposure Ranking

1 - 2	Very Low
3 - 4	Low
5 - 6	Medium
7 - 8	High
9 - 10	Very High

The overall visual exposure (refer to Figure 7.10 above) indicates that the areas surrounding the immediate study area, and the areas south to the east of the study area will experience some level of visual impact. The highest level of visual exposure is expected from the hills northwest and north of the site towards the edge of the total study area. Lower levels of visual impact are expected from the areas northeast, southwest and west of the site. No visual impact is expected from the areas southeast of the site approaching the edge of the core study area. Low to no levels of visual impact is expected along the Vaal River. Overall, the figure indicates that low levels of visual impact from the proposed project is expected.

7.11 VIEWPOINTS

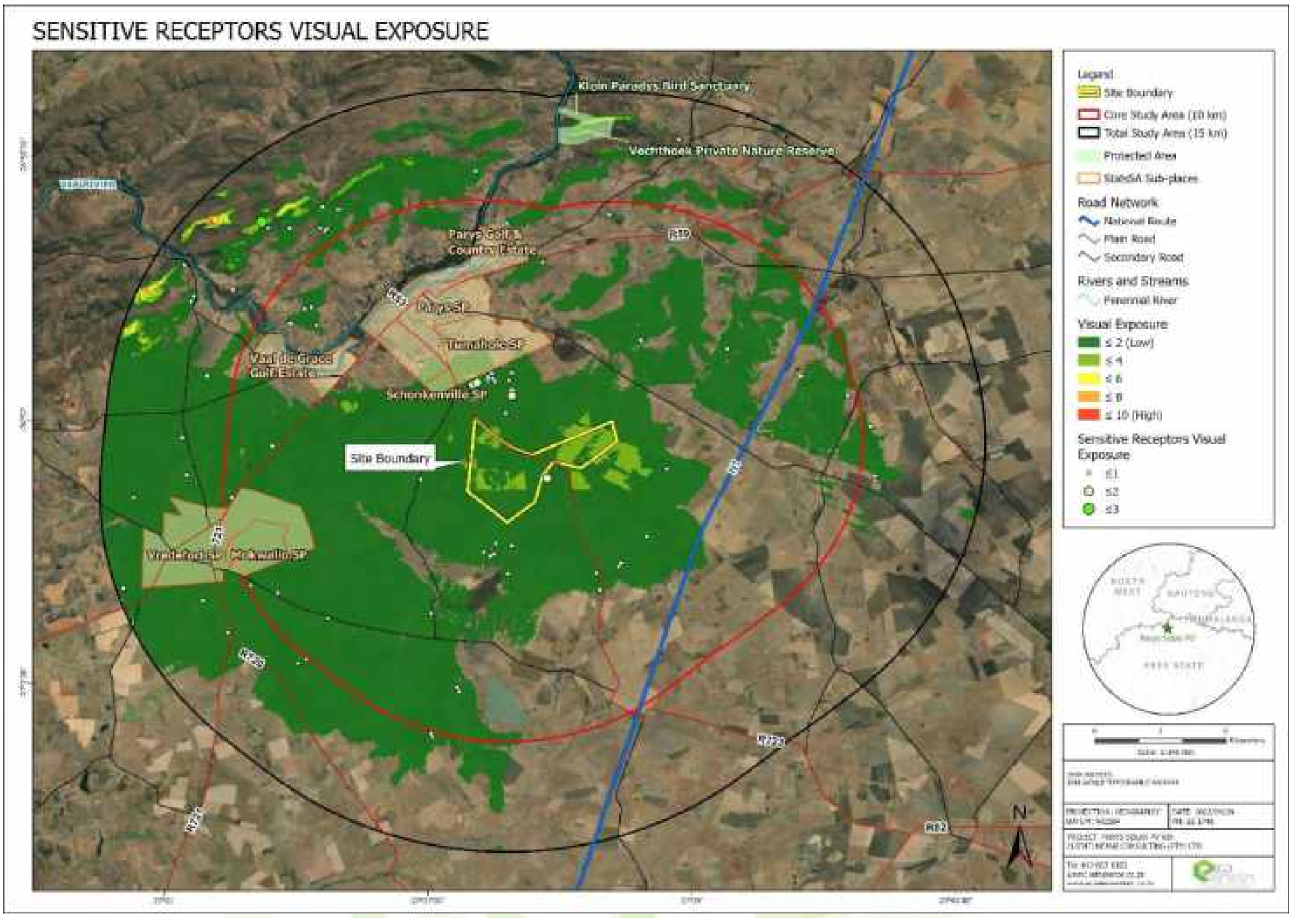

Figure 7.11: Visual exposure and sensitive receptors – showing the level of visual exposure potentially experienced by identified sensitive receptors

Each identified sensitive receptor is then overlaid on the visual exposure ranking. It is important to note that the GIS tools used to quantify the overall visual exposure levels potentially experienced by the identified sensitive receptors only incorporates the variables as described in this report. Factors such as real time and micro scale vegetation are not considered, thus the actual level of visual exposure may be lower or higher depending on the updated land use in the vicinity or latest vegetation growth or height on a micro and macro scale. The results are by no means a rating of visual quality; it is rather used to determine the likelihood of the proposed infrastructure being visible from the viewpoint receptors

Figure 7.11 above shows that the identified homesteads/schools/recreational facilities/accommodation are expected to experience low levels of visual exposure. The figure also indicates that the identified subplaces are expected to experience low to no levels of visual exposure. Furthermore, the Klein Paradys Bird Sanctuary is not expected to experience any level of visual exposure however, the northern boundary of the Vechthoek Private Nature Reserve is expected to experience medium levels of visual exposure. Lastly, the identified road network is expected to experience low to no levels of visual exposure.

Overall, the proposed project is expected to have a low visual impact on the identified sensitive receptors.

8. VISUAL IMPACT ASSESSMENT

8.1 Impact Criteria

The level of detail as depicted in the EIA regulations were fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

The impact assessment criteria used to determine the impact of the proposed development are as follows:

1. ***Severity*** of the impact;
1. **Spatial Scale** - The physical and spatial scale of the impact;
2. ***Duration*** - The lifetime of the impact, measured in relation to the lifetime of the proposed development;
3. ***Frequency of the Activity*** **–** How often do the activity take place;
4. ***Frequency of the incident/impact*** **–** How often does the activity impact on the environment;
5. ***Legal Issues*** **–** How is the activity governed by legislation; and
6. ***Detection*** **–** How quickly/easily the impacts/risks of the activity be detected on the environment, people and property.

To ensure uniformity, the assessment of potential impacts will be addressed in a standard manner so that a wide range of impacts is comparable. For this reason a clearly defined rating scale is provided for the specialist to assess impacts associated with the investigation.

Table 8-1: Assessment Criteria

SEVERITY	
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful / within a regulated sensitive area	5
SPATIAL SCALE	
Area specific (at impact site)	1
Whole site (entire surface right)	2
Local (within 5 km)	3
Regional / neighboring areas (5 km to 50 km)	4
National	5
DURATION	
One day to one month (immediate)	1
One month to one year (Short term)	2
One year to 10 years (medium term)	3
Life of the activity (long term)	4
Beyond life of the activity (permanent)	5
FREQUENCY OF THE ACTIVITY	
Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5
FREQUENCY OF THE INCIDENT/IMPACT	
Almost never / almost impossible / >20%	1

Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5
LEGAL ISSUES	
No legislation	1
Fully covered by legislation	5
DETECTION	
Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

8.1.1 Consequence

Consequence is determined by the following equation after the assessment of each impact.

Consequence = Severity + Spatial Scale + Duration

8.1.2 Likelihood

The Likelihood of the activity is then calculated based on frequency of the activity and impact, how easily it can be detected and whether the activity is governed by legislation. Thus:

Likelihood = Frequency of activity + frequency of impact + legal issues + detection

8.1.3 Risk

The risk is then based on the consequence and likelihood.

Risk = Consequence x likelihood

8.1.4 Impact Ratings

The impact is then rated according to the following table:

Table 8-2: Impact Rating Table

Rating	Class
1-55	(L) Low Risk
56-169	(M) Moderate Risk
170-300	(H) High Risk

8.2 VISUAL IMPACT ASSESSMENT

This section will attempt to quantify the identified potential visual impacts in their respective geographic locations. The potential visual impacts and visual impact ratings consider the viewshed and visual exposure results along with the potential visual impact on the study areas current sense of place.

8.2.1 Potential Construction Phase Visual Impacts

Table 8-3: Construction Phase Visual Impact Assessment

Nature of impacts:

- Visual intrusion due to the removal of vegetation, movement of construction vehicles and heavy machinery, presence of laydown areas and site clearance
- Light pollution due to night lighting
- Dust pollution due to site clearance and movement of construction vehicles and heavy machinery

		Unmitigated	Mitigated
Assessment Criteria	**Severity** [Insignificant / non-harmful (1); Small / potentially harmful (2); Significant / slightly harmful (3); Great / harmful (4); Disastrous / extremely harmful / within a regulated sensitive area (5)]	**3**	**2**
	Spatial Scale [Area specific (at impact site) (1); Whole site (entire surface right) (2); Local (within 5km) (3); Regional / neighbouring areas (5 km to 50 km) (4); National (5)]	**2**	**1**
	Duration [One day to one month (immediate) (1); One month to one year (Short term) (2); One year to 10 years (medium term) (3); Life of the activity (long term) (4); Beyond life of the activity (permanent) (5)]	**2**	**2**
	Frequency of Activity [Annually or less (1); 6 monthly (2); Monthly (3); Weekly (4); Daily (5)]	**5**	**5**
	Frequency of Incident/Impact [Almost never / almost impossible / >20% (1); Very seldom / highly unlikely / >40% (2); Infrequent / unlikely / seldom / >60% (3); Often / regularly / likely / possible / >80% (4); Daily / highly likely / definitely / >100% (5)	**3**	**2**
	Legal Issues [No legislation(1); Fully covered by legislation (5)]	**1**	**1**
	Detection [Immediately(1); Without much effort (2); Need some effort (3); Remote and difficult to observe (4); Covered (5)]	**3**	**3**
Consequence	Severity + Spatial Scale + Duration	**7**	**5**
Likelihood	Frequency of Activity + Frequency of impact + Legal issues + Detection	**12**	**11**
Risk	Consequence * Likelihood	**MODERATE (84)**	**LOW (55)**

Mitigation:

- Limit the construction footprint to only the development area
- Carefully plan to minimize the construction duration
- Regulate the speed of vehicles on site
- Implement dust suppression activities
- Plant indigenous vegetation surrounding the site where possible
- Choose lighting types that reduce spill light and glare
- Only focus light where it is needed

8.2.2 Potential Operational Phase Visual Impacts

Table 8-4: Operational Phase Visual Impact Assessment

Nature of impacts: - Change in visual/landscape character and sense of place due to the presence of the PV Panels and ancillary infrastructure - Visual intrusion from the movement of construction vehicles and heavy machinery - Light pollution due to night lighting, security lighting and navigational lighting - Visual impact on the identified sensitive receptors			
		Unmitigated	**Mitigated**
Assessment Criteria	**Severity** [Insignificant / non-harmful (1); Small / potentially harmful (2); Significant / slightly harmful (3); Great / harmful (4); Disastrous / extremely harmful / within a regulated sensitive area (5)]	3	2
	Spatial Scale [Area specific (at impact site) (1); Whole site (entire surface right) (2); Local (within 5km) (3); Regional / neighbouring areas (5 km to 50 km) (4); National (5)]	4	3
	Duration [One day to one month (immediate) (1); One month to one year (Short term) (2); One year to 10 years (medium term) (3); Life of the activity (long term) (4); Beyond life of the activity (permanent) (5)]	4	4
	Frequency of Activity [Annually or less (1); 6 monthly (2); Monthly (3); Weekly (4); Daily (5)]	5	5
	Frequency of Incident/Impact [Almost never / almost impossible / >20% (1); Very seldom / highly unlikely / >40% (2); Infrequent / unlikely / seldom / >60% (3); Often / regularly / likely / possible / >80% (4); Daily / highly likely / definitely / >100% (5)	4	3
	Legal Issues [No legislation(1); Fully covered by legislation (5)]	1	1
	Detection [Immediately(1); Without much effort (2); Need some effort (3); Remote and difficult to observe (4); Covered (5)]	3	3
Consequence	Severity + Spatial Scale + Duration	11	9
Likelihood	Frequency of Activity + Frequency of impact + Legal issues + Detection	13	12
Risk	Consequence * Likelihood	**MODERATE (143)**	**MODERATE (108)**
Mitigation:	- Retain/maintain natural vegetation within and around the development footprint where possible - Natural colours should be used on ancillary infrastructure so that they blend into the surrounding landscape - Implement dust suppression activities - All infrastructure should be always kept in a presentable condition - Choose lighting types that reduce spill light and glare - Only focus light where it is needed		

8.2.3 Potential Decommissioning Phase Visual Impacts

Table 8-5: Decommissioning Phase Visual Impact Assessment

Nature of impacts: - Visual intrusion and dust creation from the movement of construction vehicles and heavy machinery - Change in landscape character due to the removal of infrastructure			
		Unmitigated	**Mitigated**
Assessment Criteria	**Severity** [Insignificant / non-harmful (1); Small / potentially harmful (2); Significant / slightly harmful (3); Great / harmful (4); Disastrous / extremely harmful / within a regulated sensitive area (5)]	**3**	**2**
	Spatial Scale [Area specific (at impact site) (1); Whole site (entire surface right) (2); Local (within 5km) (3); Regional / neighbouring areas (5 km to 50 km) (4); National (5)]	**2**	**1**
	Duration [One day to one month (immediate) (1); One month to one year (Short term) (2); One year to 10 years (medium term) (3); Life of the activity (long term) (4); Beyond life of the activity (permanent) (5)]	**2**	**2**
	Frequency of Activity [Annually or less (1); 6 monthly (2); Monthly (3); Weekly (4); Daily (5)]	**5**	**5**
	Frequency of Incident/Impact [Almost never / almost impossible / >20% (1); Very seldom / highly unlikely / >40% (2); Infrequent / unlikely / seldom / >60% (3); Often / regularly / likely / possible / >80% (4); Daily / highly likely / definitely / >100% (5)	**3**	**2**
	Legal Issues [No legislation(1); Fully covered by legislation (5)]	**1**	**1**
	Detection [Immediately(1); Without much effort (2); Need some effort (3); Remote and difficult to observe (4); Covered (5)]	**3**	**3**
Consequence	Severity + Spatial Scale + Duration	**7**	**5**
Likelihood	Frequency of Activity + Frequency of impact + Legal issues + Detection	**12**	**11**
Risk	Consequence * Likelihood	**MODERATE (84)**	**LOW (55)**
Mitigation:	- Reduce the period of the decommissioning phase - Implement dust suppression activities - Revegetate areas with suitable indigenous vegetation - Where possible, reshape the area so that the resembles the pre-construction landscape - Remove as much infrastructure as possible - Ensure that residual infrastructure remains in good condition where possible - Implement monitoring programmes to monitor any rehabilitated areas for at least a year after closure		

8.2.4 Summary of The Visual Impact Assessment

The impact assessments in Table 8-3 to Table 8-5 above indicates that the proposed infrastructure will create a moderate negative visual impact on the surrounding areas during each phase of the activity. These impacts can be reduced after the recommended mitigation measures are implemented. However, the overall visual impact will remain as a moderate negative impact during the operational phase of the project. This is mainly due to permanent nature of the structures.

The construction phases of the proposed project is expected to be visible from the surrounding areas however, the time of exposure to these activities will be short. Therefore, the impacts on the sensitive receptors are expected to be lower after the mitigation measures have been implemented. For the operational phase, the visual impact of the infrastructure and construction vehicles can be reduced after the recommended mitigation measures are implemented however, the visual impact will remain as moderate. This is mostly due to the time of exposure to these activities being long-term. During the closure phase of the project, all moderate visual impacts can be lowered to a low negative impact.

Overall, the potential visual impacts of the proposed project can be lowered if the recommended mitigation measures are implemented however, the proposed project will have a moderate negative impact on the surrounding area during the operational phase, mainly due to the permanent nature of the structures.

8.2.5 Cumulative Visual Impacts

Cumulative visual impacts can result from additional changes to the landscape/visual amenity caused by the proposed development in conjunction with other existing developments (associated with or separate to it), or by actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect the way in which the landscape is experienced. Cumulative effects may be positive or negative. Where they comprise of a range of benefits, they may be considered to form part of the mitigation measures.

Cumulative effects can also arise from the inter-visibility (visibility) of a range of developments and/or the combined effects of individual components of the proposed development occurring in different locations or over a period of time. The separate effects of such individual components or developments may not be significant, but together they may create an unacceptable degree of adverse effects on visual receptors within their combined visual envelopes. Inter-visibility depends upon general topography, aspect, tree cover, elevation and distance, as this affects visual acuity, which is also influenced by weather and light conditions. (Institute of Environmental Assessment and The Landscape Institute, 1996).

Given the presence of existing powerlines, an Eskom substation and agricultural/farming activities within the study area, the proposed project is expected to increase the cumulative visual impact experienced by the identified sensitive receptors. The proposed solar plant is also expected to alter the sense of place of the study area and may set a precedent for future renewable energy plants. Although the development of new infrastructure to ensure sustainable electricity to the region forms part of the municipality's 5-year goal and the expected visual exposure of the proposed project is low, the proposed solar plant, in conjunction with any further renewable energy plants, will have a negative visual impact on the surrounding study area mainly due to the areas high scenic quality attributed to the presence of the Vredefort Dome and tourism along the Vaal River. Therefore, it is recommended that the environmental authorities consider the overall cumulative impact on the character and the areas sense of place before a final decision is taken with regard to the optimal number of renewable energy activities in the area.

8.2.6 Visual Impact Mitigation Measures

Mitigation measures may be considered in two categories:

- Primary measures that intrinsically comprise part of the development design through an iterative process. Mitigation measures are more effective if they are implemented from project inception when alternatives are being considered.
- Secondary measures designed to specifically address the remaining negative effects of the final development proposals.

Primary measures that will be implemented will mainly be measures that will minimise the potential visual impact by softening the visibility of the structures by "blending" with the surrounding areas. Such measures will include rehabilitation of the structures by re-vegetation. Secondary measures will include final rehabilitation, after care and maintenance of the vegetation and to ensure that the final landform is maintained.

Mitigation measures have been recommended for the proposed project and should be adhered to in order to lessen the visual impact as far as possible.

Considering the viewshed, visual exposure results and the visual impact assessment, the recommended Solar PV and BESS Hybrid project can proceed from a visual perspective provided that the recommended mitigation measures are adhered to. Furthermore, given that the proposed development is expected to alter the areas current sense of place, it must be carefully managed in order to not significantly conflict with the areas current sense of place.

9. CONCLUSION

The above assessment analysed the potential visual impacts that the proposed project may have on the surrounding area. From a visual perspective, the results indicate that the proposed infrastructure will create a moderate negative visual impact on the surrounding areas during each phase of the activity. These impacts can be reduced after the recommended mitigation measures are implemented. However, the overall visual impact will remain as a moderate negative impact during the operational phase of the project. This is mainly due to permanent nature of the structures.

Given the presence of existing powerlines, an Eskom substation and agricultural/farming activities within the study area, the proposed project is expected to increase the cumulative visual impact experienced by the identified sensitive receptors. The proposed solar plant is also expected to alter the sense of place of the study area and may set a precedent for future renewable energy plants. Although the development of new infrastructure to ensure sustainable electricity to the region forms part of the municipality's 5-year goal and the expected visual exposure of the proposed project is low, the proposed solar plant, in conjunction with any further renewable energy plants, will have a negative visual impact on the surrounding study area mainly due to the areas high scenic quality attributed to the presence of the Vredefort Dome and tourism along the Vaal River. Therefore, it is recommended that the environmental authorities consider the overall cumulative impact on the character and the areas sense of place before a final decision is taken with regard to the optimal number of renewable energy activities in the area.

Mitigation measures for each phase of the activity have also been recommended and should be adhered to in order to lessen the visual impact as far as possible.

Considering the viewshed, visual exposure results and the visual impact assessment, the recommended Solar PV and BESS Hybrid project can proceed from a visual perspective provided that the recommended mitigation measures are adhered to. Furthermore, given that the proposed development is expected to alter the areas current sense of place, it must be carefully managed in order to not significantly conflict with the areas current sense of place.

10. REFERENCES

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