SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD

PROPOSED CONSTRUCTION OF THE 132KV POWER LINE BETWEEN THE AUTHORISED LOERIESFONTEIN 3 PV SOLAR ENERGY FACILITY AND THE AUTHORISED DWARSRUG WIND ENERGY FACILITY AND FROM THE DWARSRUG WIND ENERGY FACILITY TO THE AUTHORISED NAROSIES SUBSTATION, NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

Visual Impact Assessment Report – Basic Assessment

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Confidentiality Statement

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VISUAL IMPACT ASSESSMENT REPORT – BASIC ASSESSMENT

Executive Summary

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as "Mainstream") is proposing the construction of a 132 kV overhead power lines between the proposed (and authorised) 100MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and proposed (and authorised) 140MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4); and between the Dwarsrug WEF and the proposed (and authorised) Narosies Substation (12/12/20/2049/3) located near Loeriesfontein in the Northern Cape Province of South Africa. The overall objective of the proposed development is to link the Loeriesfontein 3 PV SEF to the Dwarsrug WEF in order to create a hybrid renewable energy facility, which will ensure that electricity is constantly supplied to the national grid by at least one or both technologies (namely solar PV and wind), at any given time. The power line from the Dwarsrug WEF is proposed to tie the above mentioned hybrid renewable energy facility into the approved Narosies Substation to feed into the National grid.

The proposed overhead power line project will be subject to a Basic Assessment (BA) process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) (as amended) and Appendix 1 of the Environmental Impact Assessment (EIA) Regulations, 2014 promulgated in Government Gazette 40772 and GN R326, R327, R325 and R324 on 7 April 2017. This visual impact assessment (VIA) is being undertaken as part of the BA process.

The study area has a largely natural, untransformed visual character with some pastoral elements and as such, the proposed power line development would alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across the broader study area. The level of contrast is however significantly reduced by the presence of the operational Khobab and Loeriesfonein 2 WEFs with associated grid connection infrastructure, as well as Helios substation, existing high voltage power lines, the Granaatboskolk Road and rail infrastructure affecting mainly the central sector of the study area.

A broad-scale assessment of landscape sensitivity, based on the physical characteristics of the study area, economic activities and land use that predominates, determined that the area would have a **low** visual sensitivity. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that would potentially be impacted by a proposed development.

The area is not typically valued for its tourism significance and no formal protected areas or recognised tourism routes were identified in the area. In addition, there is limited human habitation resulting in relatively few potentially sensitive receptors across the entire extent of the study area.

The Visual Impact Assessment (VIA) identified seven (7) potentially sensitive receptors in the study area, i.e. within 5kms from the outer boundary of the combined power line assessment corridors, all of which are farmsteads. None of these receptors are considered to be Sensitive Receptors as they are not linked to leisure/nature-based tourism activities in the area. They are however regarded as potentially sensitive visual receptors as they are located within a mostly natural setting and the proposed development will likely alter natural vistas experienced from these dwellings.

All of the identified receptors were assessed in terms of SiVEST's receptor impact rating matrix and this showed that five (5) potentially sensitive receptors will be subjected to moderate levels of visual impact as a result of the proposed power lines, while the remaining two (2) receptors will be subjected to low levels of visual impact. It was noted however, that all of these receptors are located on application sites for adjacent existing and renewable energy projects, including the existing Khobab and Loeriesfontein 2 WEFs, the proposed Kokerboom 3 WEF and the proposed Hantam Solar PV Energy Facility. As such the owners / occupants of these farmsteads are not expected to perceive the proposed power lines in a negative light.

The overall impact rating revealed that the proposed development is expected to have a negative low visual impact rating during construction, operation and decommissioning phases with a number of mitigation measures available to prevent any additional visual impacts.

Several renewable energy developments are being proposed within a 35 km radius of the combined power line assessment corridors. These renewable energy developments have the potential to cause large scale visual impacts and the location of several such developments in close proximity to each other could significantly alter the sense of place and visual character in the broader region. It was however determined that only six (6) of these would have any significant impact on the landscape within the study area. These facilities include the existing Khobab and Loeriesfontein 2 WEFs, the proposed Dwarsrug and Kokerboom 3 WEFs and the proposed Loeriefontein 3 and Hantam SEFs. These facilities and the associated grid connection infrastructure will alter the inherent sense of place and introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts. In light of this, cumulative impacts have been rated as negative medium during both construction and operation phases of the project. It is however anticipated that

these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures stipulated for each of these developments by the visual specialists. It is important to note, however, that the renewable energy facilities located in close proximity to each other could potentially be seen as one large renewable energy complex rather than separate developments. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the cumulative impacts on the landscape.

No fatal flaws were identified for any of the proposed power line corridors and all three corridors were found to be favourable.

From a visual perspective therefore, the proposed 132 kV overhead power lines between the proposed (and authorised) 100MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and proposed (and authorised) 140MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4); and between the Dwarsrug WEF and the proposed (and authorised) Narosies Substation is deemed acceptable and the Environmental Authorisation (EA) should be granted. SiVEST is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	**Section 1.3.** Specialist CV's are included in **Appendix B**
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	**Appendix B**
(c) an indication of the scope of, and the purpose for which, the report was prepared;	**Section 1.1.** **Appendix A**
(cA) an indication of the quality and age of base data used for the specialist report;	**Section 1.4.** **Section 1.5.**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	**Section 6.** . **Section 8.**
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**Section 1.4** **Section 2.**
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	**Section 1.4.** **Appendix E**
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	**Section 6.**
(g) an identification of any areas to be avoided, including buffers;	**Section 6.3.** **Section 8.**
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	**Section 6.3.**
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Section 2.**
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;	**Section 8.5** **Section 9**
(k) any mitigation measures for inclusion in the EMPr;	**Section 8.5.**
(l) any conditions for inclusion in the environmental authorisation;	No specific conditions relating to the visual environment need to be included in the

	environmental authorisation (EA)
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	**Section 8.5**
(n) a reasoned opinion— i. whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	**Section 10.1**
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	**N/A** -No feedback has yet been received from the public participation process regarding the visual environment
(p) any other information requested by the competent authority	**N/A**. No information regarding the visual study has been requested from the competent authority to date.
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	**N/A**

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VISUAL IMPACT ASSESSMENT REPORT – BASIC ASSESSMENT

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GLOSSARY OF TERMS

ABBREVIATIONS

BA	Basic Assessment
DBAR	Draft Basic Assessment Report
DM	District Municipality
DoE	Department of Mineral Resources and Energy
DEM	Digital Elevation Model
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EMP	Environmental Management Plan
FBAR	Final Basic Assessment Report
GIS	Geographic Information System
HA	Hectares
HIA	Heritage Impact Assessment
I&AP	Interested and/or Affected Party
IPP	Independent Power Producer
LM	Local Municipality
kV	Kilovolt
MW	Megawatt
NEMA	National Environmental Management Act
NGI	National Geo-Spatial Information
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
O&M	Operation and Maintenance
PPA	Power Purchase Agreement
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SANBI	South African National Biodiversity Institute
SEF	Solar Energy Facility
VIA	Visual Impact Assessment
VR	Visual Receptor
WEF	Wind Energy Facility

DEFINITIONS

Anthropogenic feature: An unnatural feature resulting from human activity.

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

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

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

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

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

Study area / Visual assessment zone; The study area or visual assessment zone is assumed to encompass a zone of 5km from the outer boundary of the proposed Solar PV Facility application site.

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

Viewshed / Visual Envelope: The geographical area which is visible from a particular location.

Visual character: The pattern of physical elements, landforms and land use characteristics that occur consistently in the landscape to form a distinctive visual quality or character.

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

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

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

Visual receptors: An individual, group or community that is subject to the visual influence of the proposed development but is not necessarily adversely impacted by it. They will typically

include commercial activities, residents and motorists travelling along routes that are not regarded as scenic.

Visual sensitivity: The inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (visual character), spatial distribution of potential receptors, and the likely value judgements of these receptors towards the new development, which are usually based on the perceived aesthetic appeal of the area.

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VISUAL IMPACT ASSESSMENT REPORT – BASIC ASSESSMENT

1 INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as "Mainstream") is proposing the construction of a 132 kV overhead power lines between the proposed (and authorised) 100MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and proposed (and authorised) 140MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4); and between the Dwarsrug WEF and the proposed (and authorised) Narosies Substation (12/12/20/2049/3) located near Loeriesfontein in the Northern Cape Province of South Africa.

The proposed power line project is subject to a Basic Assessment (BA) process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) (as amended) and Appendix 1 of the Environmental Impact Assessment (EIA) Regulations, 2014 promulgated in Government Gazette 40772 and GN R326, R327, R325 and R324 on 7 April 2017. The competent authority for this BA is the national Department of Environment, Forestry and Fisheries (DEFF). Specialist studies have been commissioned to assess and verify the proposed development under the new Gazetted specialist protocols[1].

1.1 Scope and Objectives

This visual impact assessment (VIA) is being undertaken as part of the BA process. The aim of the VIA is to identify potential visual issues associated with the proposed 132kV power lines, as well as to determine the potential extent of visual impacts. This is done by characterising the visual environment of the area and identifying areas of potential visual sensitivity that may be subject to visual impacts. This visual assessment focuses on the potential sensitive visual

[1] Formally gazetted on 20 March 2020 (GN No. 320)

receptor locations and provides an assessment of the magnitude and significance of the visual impacts associated with the proposed development.

1.2 Terms of Reference

The terms of reference for this VIA are included in **Appendix A**.

1.3 Specialist Credentials

This VIA was undertaken by Kerry Schwartz, a GIS specialist with more than 20 years' experience in the application of GIS technology in various environmental, regional planning and infrastructural projects undertaken by SiVEST. Kerry's GIS skills have been extensively utilised in projects throughout South Africa and in other Southern African countries. Kerry has also been involved in the compilation of VIA reports. Kerry's relevant VIA project experience is listed in the table below.

Table 1: Relevant project experience

Environmental Practitioner	SiVEST (Pty) Ltd – Kerry Schwartz
Contact Details	kerrys@sivest.co.za
Qualifications	BA (Geography), University of Leeds 1982
Expertise to carry out the Visual Impact Assessment.	**Visual Impact Assessments:** ▪ VIAs (BA) for the proposed Gromis WEF and associated Grid Connection Infrastructure, near Komaggas, Northern Cape Province. ▪ VIAs (BA) for the proposed Komas WEF and associated Grid Connection Infrastructure, near Komaggas, Northern Cape Province. ▪ VIAs (Scoping and Impact Phase) for the proposed Mooi Plaats, Wonderheuvel and Paarde Valley solar PV plants near Noupoort in the Northern and Eastern Cape Provinces. ▪ VIAs (Scoping and Impact Phase) for the proposed Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province. ▪ VIAs (Scoping and Impact Phase) for the proposed Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province. ▪ VIA for the proposed Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province. ▪ VIAs (Scoping and Impact Phase) for the proposed Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province. ▪ VIA (EIA) for the proposed Paulputs WEF near Pofadder in the Northern Cape Province.

	▪ VIA (EIA) for the proposed development of the Rondekop WEF near Sutherland in the Northern Cape Province. ▪ VIA (BA) for the proposed development of the Tooverberg WEF near Touws Rivier in the Western Cape Province. ▪ VIA (BA) for the proposed development of the Kudusberg WEF near Sutherland, Northern and Western Cape Provinces. ▪ VIA (Scoping and Impact Phase) for the proposed development of the Kuruman Wind Energy Facility near Kuruman, Northern Cape Province. ▪ VIA (Scoping and Impact Phase) for the proposed development of the Phezukomoya Wind Energy Facility near Noupoort, Northern Cape Province. ▪ VIA (Scoping and Impact Phase) for the proposed development of the San Kraal Wind Energy Facility near Noupoort, Northern Cape Province. ▪ VIAs (Scoping and Impact Phase) for the proposed Graskoppies Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIAs (Scoping and Impact Phase) for the proposed Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIAs (Scoping and Impact Phase) for the proposed Ithemba Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIAs (Scoping and Impact Phase) for the proposed Xha! Boom Wind Farm near Loeriesfontein, Northern Cape Province ▪ Visual Impact Assessments for 5 Solar Power Plants in the Northern Cape ▪ Visual Impact Assessments for 2 Wind Farms in the Northern Cape ▪ Visual Impact Assessment for Mookodi Integration Project (132kV distribution lines) ▪ Landscape Character Assessment for Mogale City Environmental Management Framework

A Full CV is attached as **Appendix B**.

1.4 Assessment Methodology

The proposed power lines are located within an area that has already assessed for several different VIAs undertaken in respect of renewable energy and associated power line development. Details of these studies are provided in Section 1.5 below. Accordingly, this VIA has been based on a desktop-level assessment supported by information drawn from other relevant VIAs.

1.4.1 Physical landscape characteristics

Physical landscape characteristics such as topography, vegetation and land use are important factors influencing the visual character and visual sensitivity of the study area. Baseline information about the physical characteristics of the study area was sourced from spatial databases provided by NGI, the South African National Biodiversity Institute (SANBI) and the South African National Land Cover Dataset (Geoterraimage – 2018). The characteristics identified via desktop analysis were then verified using information drawn from other VIAs undertaken in the area.

1.4.2 Identification of sensitive receptors

Visual receptor locations and routes that are sensitive and/or potentially sensitive to the visual intrusion of the proposed development were assessed in order to determine the impact of the proposed development on each of the identified receptor locations. Information pertaining to visual receptors was largely drawn from visual assessments conducted in the general vicinity of the proposed development. Details of these studies are provided in Section 1.5 below.

1.4.3 Fieldwork and photographic review

Given that the proposed grid connection infrastructure is located within project areas already assessed for several renewable energy VIAs, it was not considered necessary to undertake any additional fieldwork. Fieldwork undertaken for these VIAs has therefore been used to inform this assessment. These studies include VIAs for grid connection infrastructure for the Graskoppies, Hartebeest Leegte, Ithemba and !Xha Boom WEFs, as well the Dwarsrug WEF and associated grid connection infrastructure (Section 1.5). Fieldwork for these projects involved:

- verification of the landscape characteristics identified via desktop means;
- conducting a photographic survey of the study area;
- verification, where possible, of the sensitivity of visual receptor locations identified via desktop means;
- elimination of receptor locations that are unlikely to be influenced by the proposed development;
- identification of any additional visually sensitive receptor locations within the study area; and
- providing inputs for the impact rating assessment of visually sensitive receptor locations (where possible).

1.4.4 Visual / Landscape Sensitivity

The power line assessment corridors were assessed using GIS technology to identify any specific areas of potential visual sensitivity, these being areas where the establishment of a

new power line would result in the greatest probability of visual impacts on potentially sensitive visual receptors.

In addition, the National Environmental Screening Tool (https://screening.environment.gov.za/screeningtool/) was examined to determine any relative landscape sensitivity in respect of the proposed development.

1.4.5 Impact Assessment

A rating matrix was used to objectively evaluate the significance of the visual impacts associated with the proposed development, both before and after implementing mitigation measures. Mitigation measures were identified (where possible) to minimise the visual impact of the proposed development. The rating matrix made use of several different factors including geographical extent, probability, reversibility, irreplaceable loss of resources, duration and intensity, in order to assign a level of significance to the visual impact of the project.

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

1.4.6 Consultation with I&APs

Continuous consultation with Interested and Affected Parties (I&APs) undertaken during the public participation process will be used (where available) to help establish how the proposed development will be perceived by the various receptor locations and the degree to which the impact will be regarded as negative. Although I&APs have not yet provided any feedback in this regard, the report will be updated to include relevant information as and when it becomes available. If no relevant comments are received requiring the report to be updated, the report will automatically inform the final BA report.

1.5 Source of Information

The main sources of information utilised for this VIA included:

- Project description for the proposed power line development provided by Mainstream;
- Elevation data from 25m Digital Elevation model (DEM) from the National Geo-Spatial Information (NGI);
- 1:50 000 topographical maps of South Africa from the NGI;

- Land cover and land use data extracted from the 2018 South African National Land-Cover Dataset provided by GEOTERRAIMAGE;
- Vegetation classification data extracted from the South African National Biodiversity Institute's (SANBI's) VEGMAP 2018 dataset;
- Google Earth Satellite imagery 2020;
- South African Renewable Energy EIA Application Database from Department of Environmental Affairs (incremental release Quarter 2 2020);
- The National Web-Based Environmental Screening Tool, Department of Environment, Forestry and Fisheries (DEFF);
- VIA for the proposed Graskoppies On-site IPP Substation, Linking Substation and Associated 132kV Power Line (14/12/16/313/1/1869), SiVEST 2017;
- VIA for the proposed Hartebeest Leegte On-site IPP Substation, Linking Substation and Associated 132kV Power Line (14/12/16/313/1/1868), SiVEST 2017;
- VIA for the proposed Ithemba On-site IPP Substation, Linking Substation and Associated 132kV Power Line (14/12/16/313/1/1867), SiVEST 2017;
- VIA for the proposed !Xha Boom On-site IPP Substation, Linking Substation and Associated 132kV Power Line (14/12/16/313/1/1870), SiVEST 2017;
- VIA for the proposed Dwarsrug WEF and associated grid connection infrastructure (4/12/16/3/3/2/690), SiVEST 2015;

2 ASSUMPTIONS AND LIMTATIONS

- Power lines are very large structures by nature and could impact on receptors that are located relatively far away, particularly in areas of very flat terrain. Given the nature of the receiving environment and the height of the various components of the proposed development, the study area or visual assessment zone is assumed to encompass a zone of 5 km from the outer boundary of the combined power line assessment corridors. This 5 km limit on the visual assessment zone relates to the importance of distance when assessing visual impacts. Although the proposed development may still be visible beyond 5 km, the degree of visual impact would diminish considerably and as such the need to assess the impact on potential receptor locations beyond this distance would not be warranted.

- As previously stated, information pertaining to visual receptors is largely drawn from visual assessments conducted in the general vicinity of the proposed development. Details of these studies are provided in **Section 1.5.** Receptor identification for all of these studies involved a combination of desktop assessment as well as field-based observations. Initially Google Earth imagery was used to identify potential receptors within the study area and where possible, these receptor locations were verified and assessed during site visits undertaken in December 2016 and also in September 2014. Current Google Earth imagery was examined to verify and / or update the receptor identification.

- Due to the extent of the respective study areas for previous VIA projects and access limitations, it was not possible to visit or verify every potentially sensitive visual receptor location. As such, several broad assumptions have been made in terms of the likely sensitivity of the receptors to the proposed development. It should be noted that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility, the economic dependency of the occupants on the scenic quality of views from the facility and on people's perceptions of the value of "Green Energy". Sensitive receptor locations typically include sites such as tourism facilities and scenic locations within natural settings which are likely to be adversely affected by the visual intrusion of the proposed development. Thus, the presence of a receptor in an area potentially affected by the proposed development does not necessarily mean that any visual impact will be experienced.

- The potential visual impact at each visual receptor location was assessed using a matrix developed for this purpose. The matrix is based on three main parameters relating to visual impact and, although relatively simplistic, it provides a reasonably accurate indicative assessment of the degree of visual impact likely to be experienced at each receptor location as a result of the proposed development. It is however important to note the limitations of quantitatively assessing a largely subjective or qualitative type of impact and as such the matrix should be seen merely as a representation of the likely visual impact at a receptor location.

- In light of the fact that it was not possible to visit every potentially sensitive visual receptor location, the receptor impact rating was undertaken primarily via desktop means. Accordingly, all the receptors identified were regarded as being potentially sensitive to the visual impacts associated with the proposed power lines and were assessed as part of the VIA.

- For the purposes of the VIA, all analysis is based on a worst-case scenario where power line tower heights are assumed to be 25m.

- Due to the varying scales and sources of information; maps may have minor inaccuracies. Terrain data for the study area derived from the National Geo-Spatial Information (NGI)'s 25m DEM is fairly coarse and somewhat inconsistent and as such, localised topographic variations in the landscape may not be reflected on the Digital Elevation Model (DEM).

- No viewsheds were generated for this visual study, as the topography within the study area is relatively flat and no detailed contours were available. Within this context, minor topographical features, vegetative screening, or man-made structures would be the most important factors influencing the degree of visibility and these would not be reflected in the viewsheds.

- No feedback regarding the visual environment has been received from the public participation process to date. Any feedback from the public during the review period of

the Draft Basic Assessment Report (DBAR) will however be incorporated into further drafts of this report, if relevant.

- This study includes an assessment of the potential cumulative impacts of other renewable energy developments on the existing landscape character and on the identified sensitive receptors. This assessment is based on the information available at the time of writing the report and where information has not been available, broad assumptions have been made as to the likely impacts of these developments.

- SiVEST made every effort to obtain information for the surrounding planned renewable energy developments (including specialist studies, assessment reports and Environmental Management Programmes). However some of the documents are not currently publicly available for download. The available information was factored into the cumulative impact assessment (**Section 8.4**).

- No visualisation modelling was undertaken for the proposed development as this is not normally required for linear infrastructure. This can however be provided should the Public Participation process identify the need for this exercise.

- It should be noted that the site visits for previous VIAs in the area were undertaken during the late winter and also mid-summer. During winter months, the visual impact of the proposed development may be greater as the surrounding vegetation is expected to provide less potential screening than in the late summer months. The study area is however typically characterised by low levels of rainfall all year round and therefore the season is not expected to affect the significance of the visual impact of the proposed development.

- Clear weather conditions tend to prevail throughout most of the year in this area, and in these clear conditions, power lines and associated infrastructure would present a greater contrast with the surrounding landscape than they would on a cloudy overcast day. Clear weather conditions were experienced during the different site visits and these factors were taken into consideration when undertaking this VIA.

3 TECHNICAL DESCRIPTION

3.1 Project Location

The proposed power lines are located approximately 60 km north- of Loeriesfontein, in the Hantam Local Municipality in the Northern Cape. (**Figure 1**).

The proposed power line corridors will affect the following properties:

- Remainder of the Farm Brakpan No 212 (RE/212);
- Portion 1 of the Farm Brakpan No 212 (1/212);
- Remainder of the Farm Aan De Karee Doorn Pan No 213 (RE/213);

- Portion 1 of the Farm Aan De Karee Doorn Pan No 213 (1/213);
- Portion 2 of the Farm Aan De Karee Doorn Pan No 213 (2/213);
- Portion 3 of the Farm Aan De Karee Doorn Pan No 213 (3/213);
- Remainder of the Farm Sous No 226 (RE/226);
- Portion 3 of the Farm Sous No 226 (3/226), and
- Narosies No 228 (228).

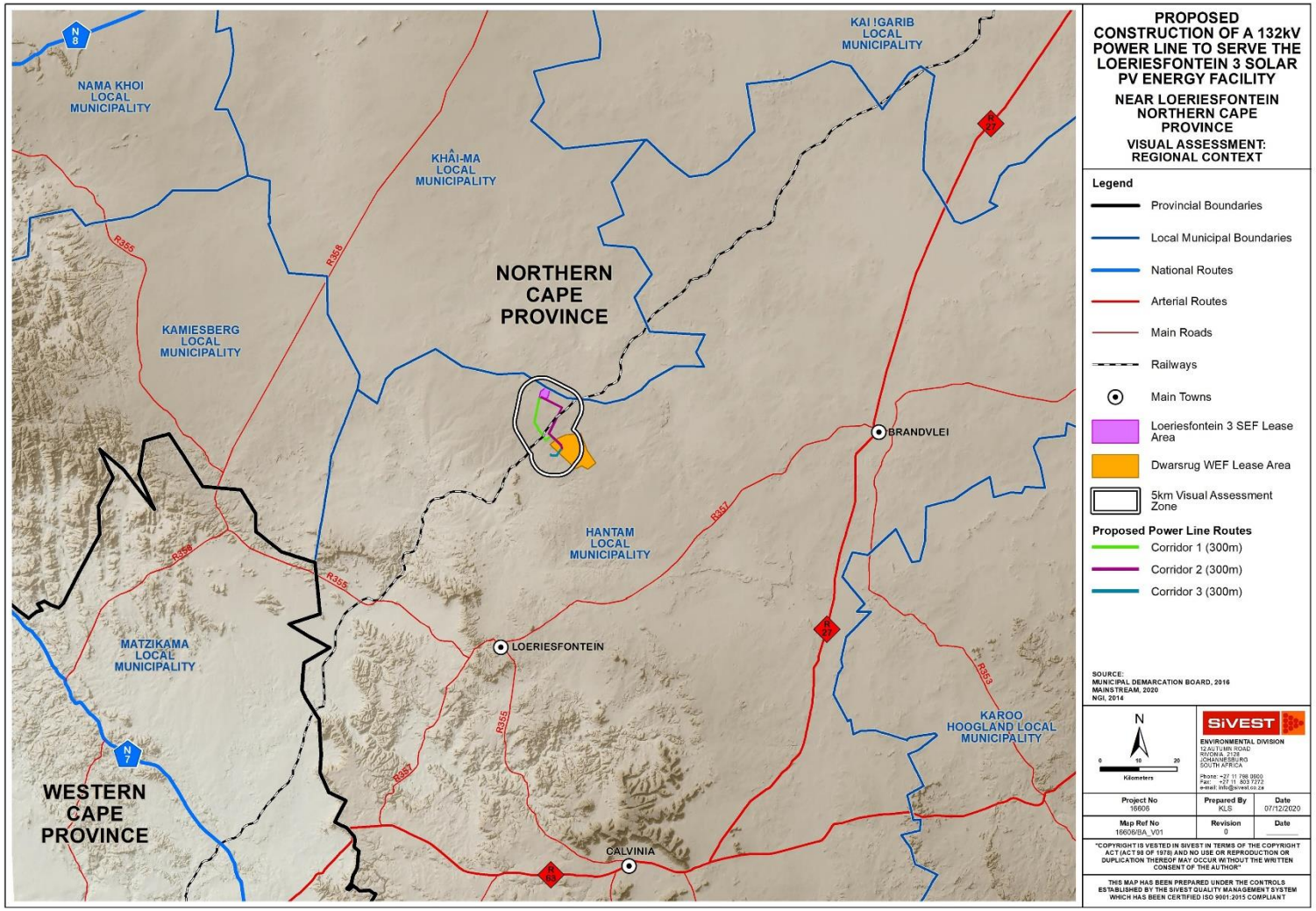


Figure 1: Proposed Power Line Routes Ain the Regional Context

3.2 Project Technical Details

Mainstream is proposing the construction of a 132kV grid connection between the approved substation at the authorised 100MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and approved substation at the authorised 140MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4), located near Loeriesfontein in the Hantam Local Municipality, Namakwa District in the Northern Cape Province of South Africa.

The power line from the Loeriesfontein 3 PV SEF to the Dwarsrug WEF is proposed to link the SEF to the WEF in order to create a hybrid renewable energy facility, which will ensure that electricity is constantly supplied to the national grid by at least one or both technologies (namely solar PV and wind), at any given time. The power line from the Dwarsrug WEF is proposed to tie the above mentioned hybrid renewable energy facility into the approved Narosies Substation to feed the National grid.

3.2.1 Route Alternatives

Two (2) power line alternatives will be assessed to link the Loeriesfontein 3 PV SEF to the Dwarsrug WEF and a single power line is proposed to link these two (2) facilities to the National grid from the Dwarsrug WEF. All three (3) power line route alignments will be assessed within a 300m wide assessment corridor (150m on either side of power line). The power line alternatives which are being proposed and assessed are shown in **Figure 2** below.

The power line alternatives are being considered and assessed as part of the BA process and will be refined to avoid identified environmental sensitivities.

3.2.2 'No-Go' Alternative

The 'no-go' alternative is the option of not constructing the power line project, which would prevent the realisation of the hybrid facility and thus prevent electricity generated from renewable sources being fed into the national grid. This alternative would result in no additional environmental impact other than that assessed during the BA for the Renewable Energy (RE) facilities.

The 'no-go' option is a feasible option; however, this would prevent the hybrid facility from contributing to the environmental, social and economic benefits associated with the development of the renewables sector.

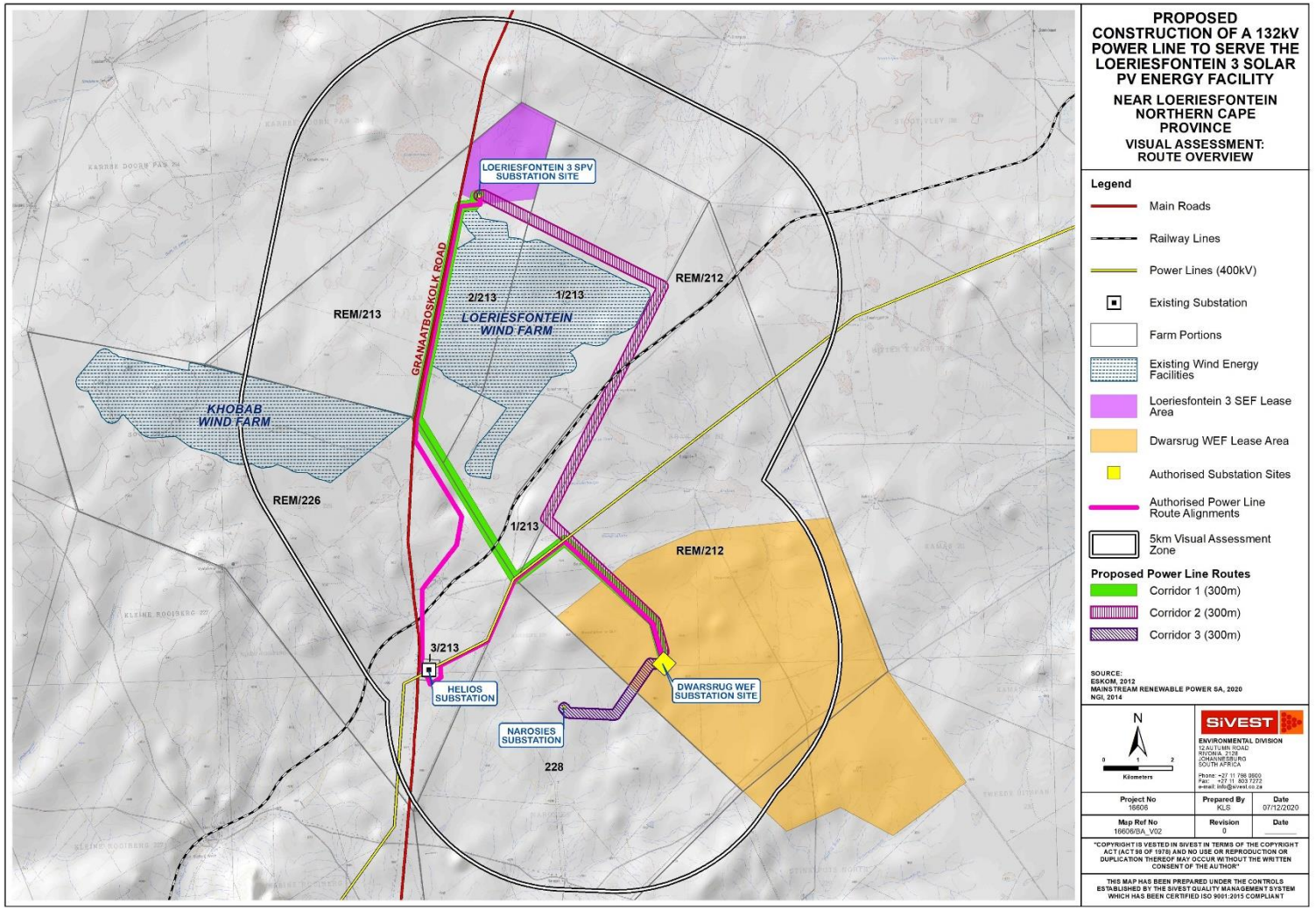


Figure 2: Overview of Power Line Routes

4 LEGAL REQUIREMENTS AND GUIDELINES

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

In terms of the NEMA and the EIA Regulations 2014 (as amended), the proposed development includes listed activities is subject to a BA process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) (as amended) and Appendix 1 of the EIA Regulations, 2014 promulgated in Government Gazette 40772 and GN R326, R327, R325 and R324 on 7 April 2017. The competent authority for this BA is the national Department of Environment, Forestry and Fisheries (DEFF).

As part of this BA process, the need for a VIA to be undertaken has been identified in order to assess the visual impact of the proposed grid connection infrastructure. The VIA must adhere to the requirements for specialist studies as stipulated in Appendix 6 of the NEMA EIA Regulations, 2014, as amended;

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

- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003); and
- National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

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

5 FACTORS INFLUENCING VISUAL IMPACT

5.1 Subjective experience of the viewer

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

5.2 Visual environment

Power lines are not features of the natural environment but are rather a representation of human (anthropogenic) alteration. As such, this type of development is likely to be perceived as visually intrusive when placed in largely undeveloped landscapes that have a natural scenic quality and where tourism activities, based upon the enjoyment of (or exposure to) the scenic or aesthetic character of the area, are practiced. Residents and visitors to these areas could perceive the power lines to be highly incongruous in this context and may regard these features as an unwelcome intrusion which degrade the natural character and scenic beauty of the area, and which could potentially even compromise the practising of tourism activities in the area. The experience of the viewer is however highly subjective and there are those who may not perceive features such as power lines as a visual intrusion.

The presence of other anthropogenic features associated with the built environment may not only obstruct views but also influence the perception of whether a development is a visual impact. In industrial areas for example, where other infrastructure and built form already exists, the visual environment could be considered to be 'degraded' and thus the introduction of new power lines into this setting may be considered to be less visually intrusive than if there was no existing built infrastructure visible.

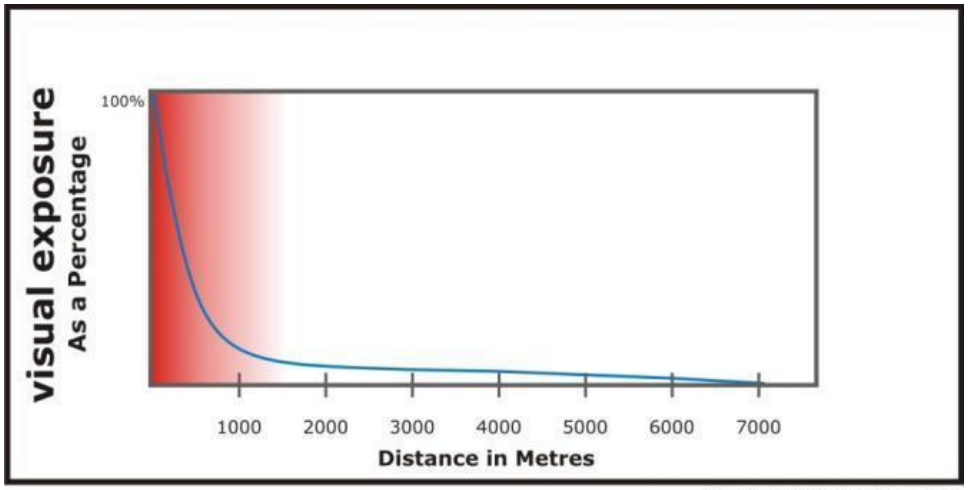
5.3 Type of visual receptor

Visual impacts can be experienced by different types of receptors, including people living, working or driving along roads within the viewshed of the proposed development. The receptor type in turn affects the nature of the typical 'view', with views being permanent in the case of a residence or other places of human habitation, or transient in the case of vehicles moving along a road. The nature of the view experienced affects the intensity of the visual impact experienced.

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

5.4 Viewing distance

Viewing distance is a critical factor in the experiencing of visual impacts, as beyond a certain distance, even large developments tend to be much less visible, and difficult to differentiate from the surrounding landscape. The visibility of an object is likely to decrease exponentially as one moves away from the source of impact, with the impact at 1 000m being considerably less than the impact at a distance of 500m **(Figure 3)**.



SOURCE: Hull, RB; Bishop, ID

Figure 3: Conceptual representation of diminishing visual exposure over distance

6 VISUAL CHARACTER AND SENSITIVITY OF THE STUDY AREA

Defining the visual character of an area is an important factor in the assessment of visual impacts as it establishes the visual baseline or existing visual environment in which the development would be constructed. The visual impact of a development is measured by establishing the degree to which the development would contrast with, or conform to, the visual character of the surrounding area. The inherent sensitivity of the area to visual impacts or visual sensitivity is thereafter determined, based on the visual character, the economic importance of the scenic quality of the area, inherent cultural value of the area and the presence of visual receptors.

Physical and land use related characteristics, as outlined below, are important factors contributing to the visual character of an area.

6.1 Physical and Land Use Characteristics

6.1.1 Topography

The topography across much of the study area is characterised by a flat to gently undulating landscape, typical of much of the Karoo (**Figure 4**). In the wider area, the Klein and Groot Rooiberg koppies form an area of localised hilly topography to the south and south-west of the study area (**Figure 5)**. Immediately north of the site, the presence of a number of large pans indicate that the topography is very flat and thus very poorly drained.

Maps showing the topography and slopes within and in the immediate vicinity of the combined assessment area are provided in **Figure 6** and **Figure 7** below**.**

Figure 4: Typical flat to gently undulating topography in the study area.

Figure 5: View towards the Klein and Groot Rooiberg Koppies.

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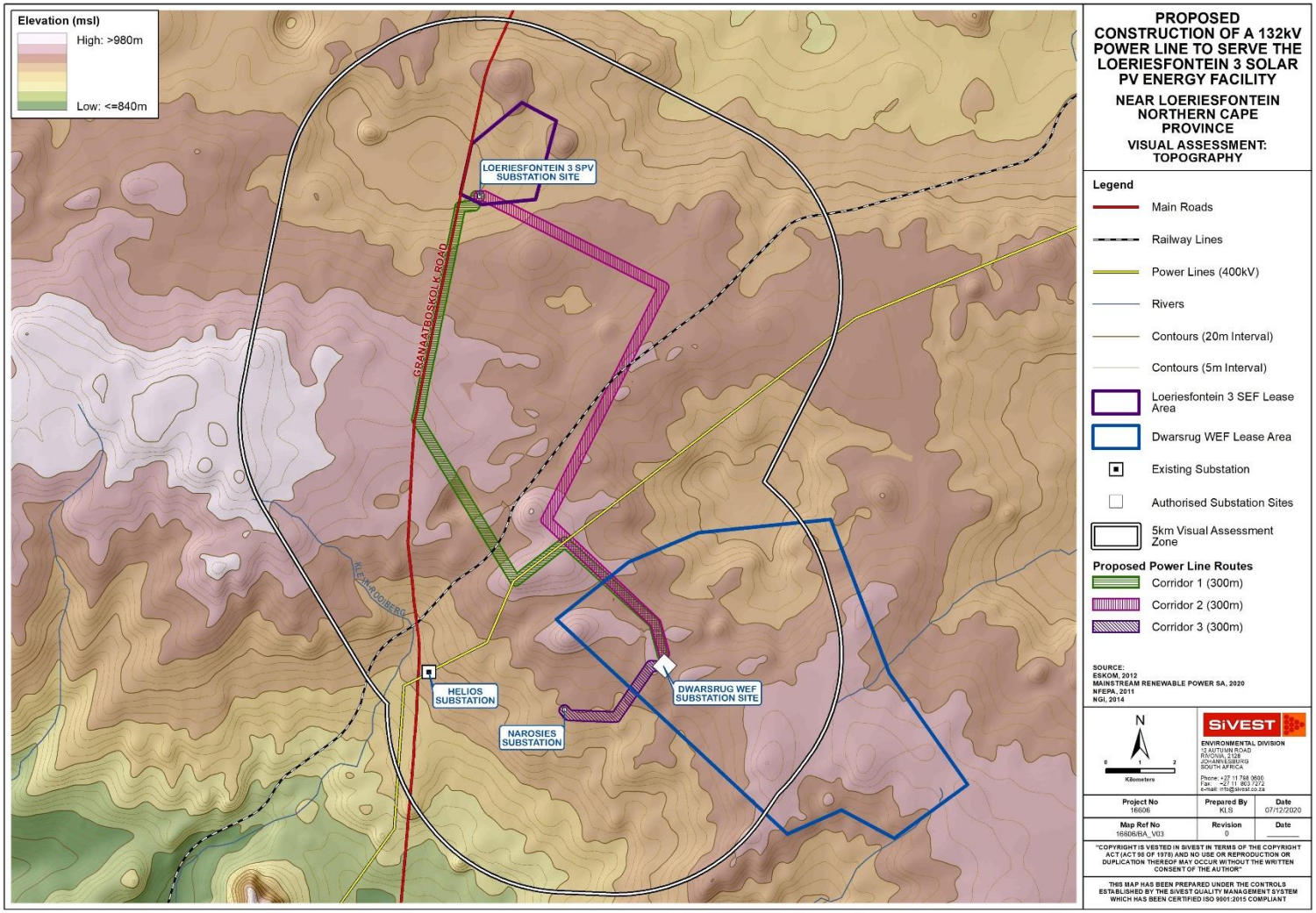

Figure 6: Topography in the study area

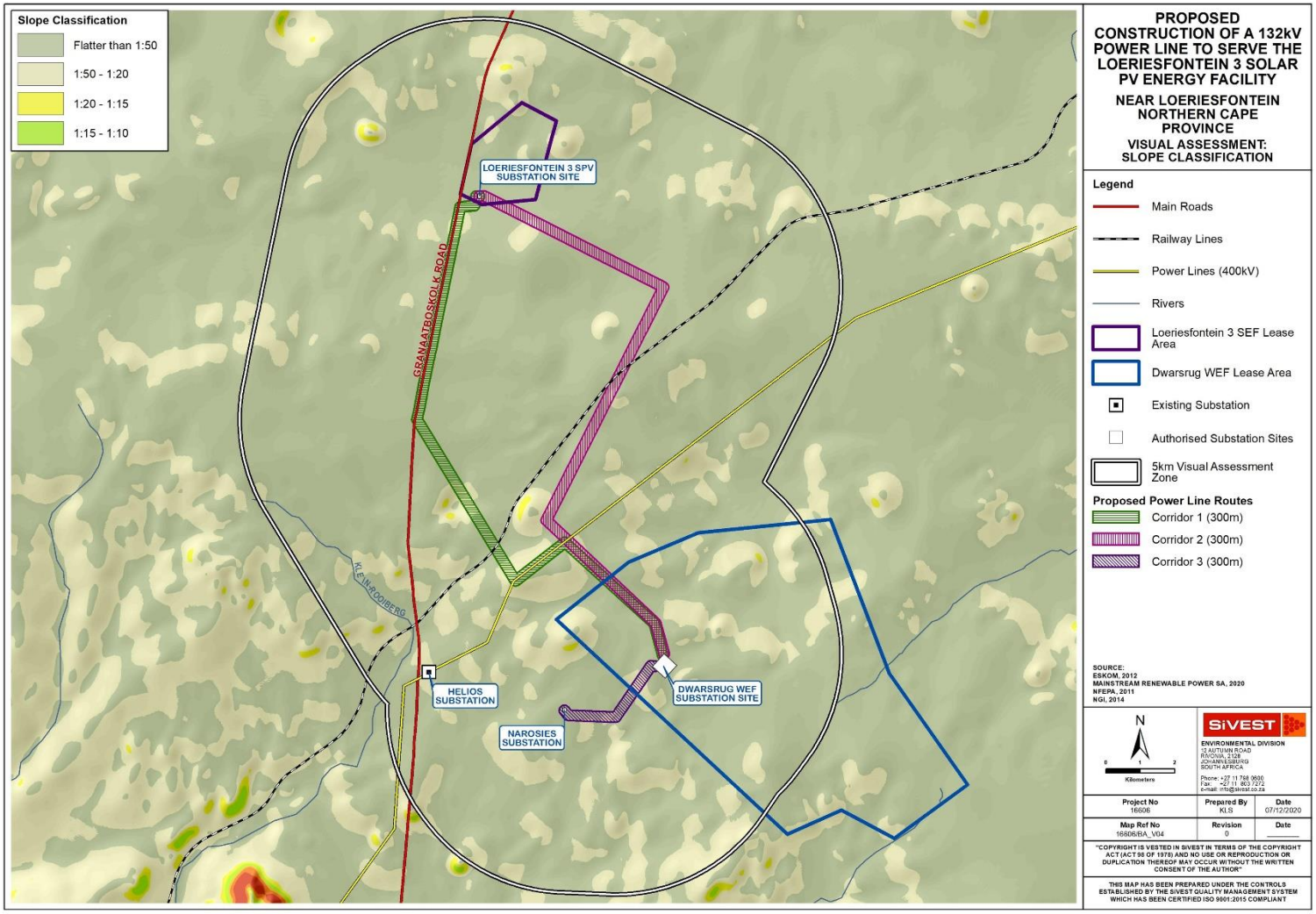

Figure 7: Slope classification in the study area

Visual Implications

The flat terrain that occurs across most of the study area results in generally wide-ranging vistas throughout the study area (**Figure 8**), and the horizon is usually visible across an entire 360º arc of the viewer. Bearing in mind that power line towers are relatively large structures (towers could potentially be up to 25 m in height), these elements of the grid connection could be visible from a relatively extensive area around the grid connection infrastructure.

Figure 8: Generally wide-ranging vistas experienced across the study area.

6.1.2 Vegetation

According to Mucina and Rutherford (2012), the dominant vegetation class across the study area is Bushmanland Basin Shrubland (**Figure 9**) which is characterised by dwarf shrubland dominated by a mixture of low sturdy and spiny shrubs. The aridity of the area has restricted the vegetation to low shrubs around 30-40 cm in height, distributed uniformly across the landscape, except in areas of disturbance where patches of bare earth occur (**Figure 10**) (Mucina & Rutherford, 2006). Western Bushmanland Klipveld occurs on the north-western boundary of the study area, while Bokkeveld Sandstone Fynbos is present on the south-western boundary.

Bushmanland Vloere occurs in and around the salt pans in the eastern and northern sectors of the study area, and is largely characterised by dwarf shrubs with some loose thicket evident is some areas.

Figure 9: Typical vegetation cover prevalent across the study area

Figure 10: Patches of bare earth in the study area.

Some tree species occur within certain parts of the study area (**Figure 11**). In certain areas, man has had an impact on the natural vegetation, especially around some farmsteads, where

over many years, tall exotic trees and other typical garden plants have been established (Error! R eference source not found.).

Figure 11: Examples of tree species found in parts of the study area

Figure 12: Example of tall trees established around a farm house

Much of the study area however is still characterised by natural low shrubland with transformation limited to a few isolated areas where pastoral activities such as livestock rearing are taking place.

Vegetation classifications across the study area are shown in **Figure 13** below.

Visual Implications

The natural short vegetation cover will offer no visual screening. Parts of the visual assessment zone are however characterised by the presence of some tree species which occur naturally in some areas. These trees contribute to the overall natural character of the study area while also providing some limited form of screening from the proposed development. In addition, tall exotic trees occurring in close proximity to farmhouses may screen views of the proposed development from these locations.

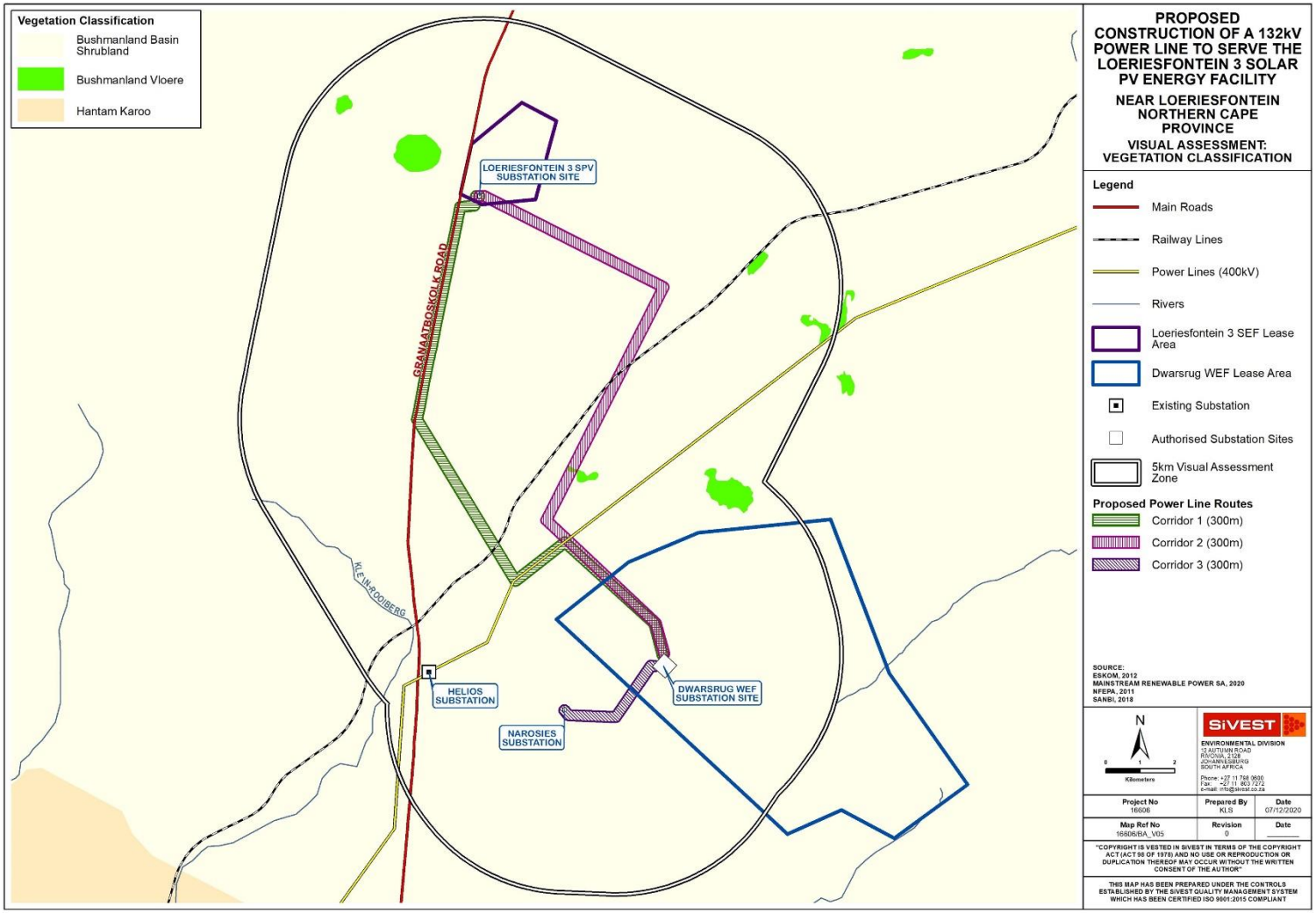

Figure 13: Vegetation Classification in the Study Area

6.1.3 Land Use

According to the South African National Land Cover dataset (GeoTerra Image 2018), much of the visual assessment area is classified as “barren land” with some small, isolated patches of shrubland, grassland and forested land (**Figure 14**). These “barren” areas include natural rock surfaces, dry pans, eroded lands and bare riverbeds.

Agricultural activity in the area is severely restricted by the arid nature of the local climate and livestock rearing (sheep) is the dominant activity (**Figure 15**). As such, the natural vegetation has been retained across much of the study area.

The nature of the climate and the corresponding land use has resulted in low densities of livestock and relatively large farm properties across the area. Thus the area has a very low density of rural settlement, with relatively few scattered farmsteads in evidence and the area is therefore regarded as largely uninhabited. Built form in much of the study area is limited to isolated farmsteads, including farm worker’s dwellings and ancillary farm buildings, gravel access roads, telephone lines, fences and windmills (**Figure 16**).

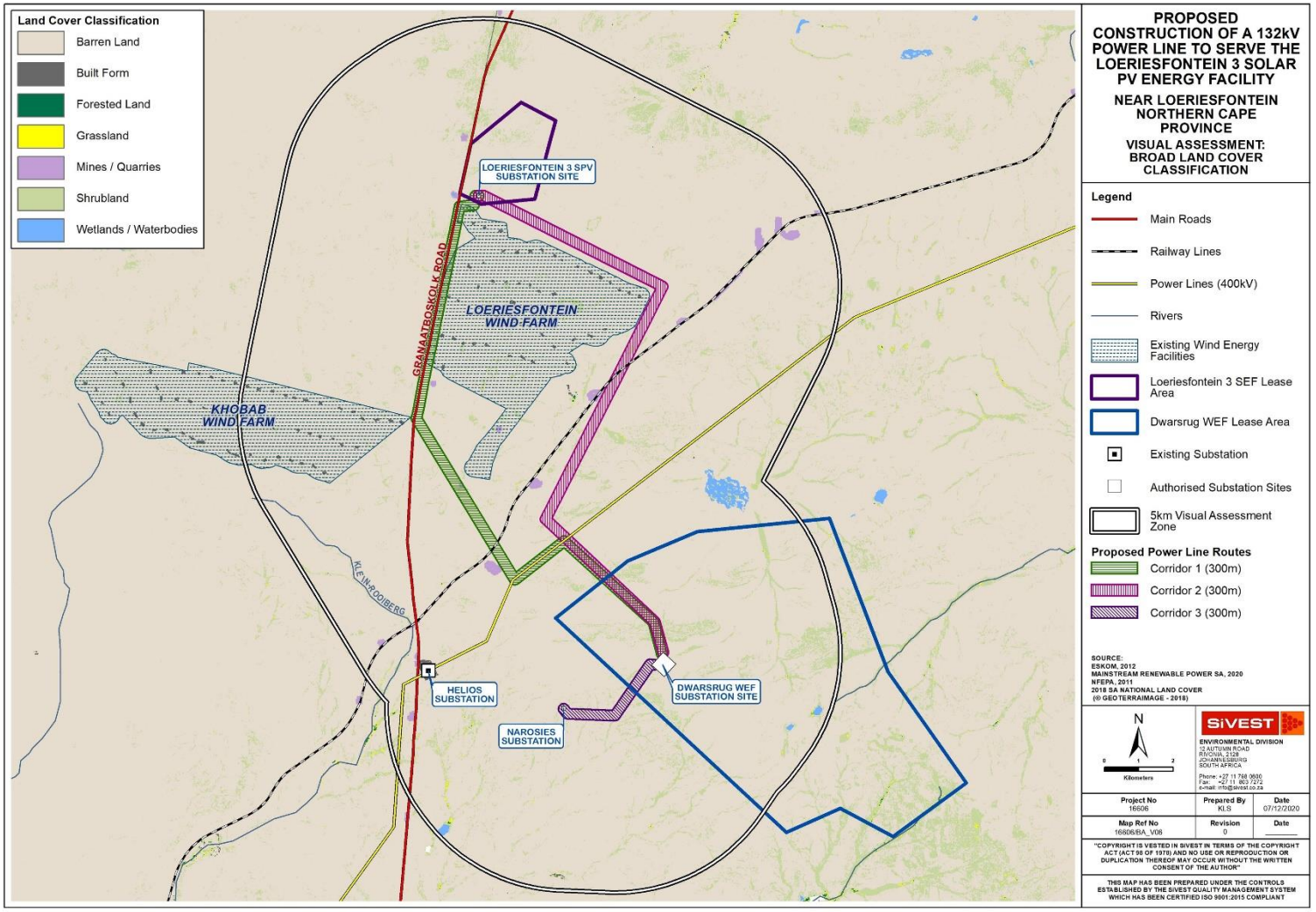

Figure 14: Land Cover Classification of the study area

Figure 15: Sheep farming activities in the study area

Figure 16: Example of isolated farmstead and associated farm infrastructure typically found within the study area.

The study area is however traversed by a secondary road, known locally as the Granaatboskolk Road, which links Loeriesfontein with Granaatboskolk some 38kms north-east of the study area. In addition, a railway line (**Figure 17**) and 400kV power lines (**Figure 18**) traverse the study area, running in a south-west to north east direction. Further limited human influence on the landscape is evident in the study area where small-scale mining/quarrying activities occur, mostly scattered along the Granaatboskolk Road and the railway line.

Figure 17: View of the railway line which traverses the study area.

Figure 18: View of high voltage power lines in the study area

Built form and human influence on the landscape become more evident in the central sector of the study area where high voltage power lines feed into the Helios 400kV Substation. The tall steel structures of the substation, as well as the high voltage power line towers are highly visible from various parts of the study area (**Figure 19**). Also present in this area are the the Khobab and Loeriesfontein 2 Wind Farms (**Figure 20**) which commenced operation in 2017, as well as the on-site Khobab (**Figure 21**) and Loeriesfontein 2 onsite substations. Each of these developments includes some 61 wind turbines with associated infrastructure as well as 132kV grid connections to Helios Substation. All of this development in combination has resulted in a significant level of transformation of the natural environment in this part of the study area.

The closest built-up area is the small town of Loeriesfontein which is situated approximately 60km south of the proposed development. This small town is well outside the visual assessment zone and thus not expected to have an impact on the visual character of the study area.

Figure 19: Helios Substation

Figure 20: Operational wind turbines at Loeriesfontein 2 Wind Farm

Figure 21: Khobab Wind Farm onsite substation.

Visual Implications

Sparse human habitation and the predominance of natural vegetation cover across much of the study area would give the viewer the general impression of a largely natural setting with some pastoral elements. In addition, there are no towns or settlements in the study area and thus, there are very low levels of human transformation and visual degradation across much of the study area.

Significant elements of human transformation are however present in the central sector of the study area, including high voltage power lines, Helios Substation and the Khobab and Loeriesfontein 2 Wind Farms and their associated infrastructure. These elements are considered to have degraded the visual character in this area significantly (**Figure 22**).

Figure 22: Rail infrastructure adjacent to Loeriesfontein 2 WEF forming degrading elements in the landscape.

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

6.2 Visual Character and Cultural Value

The physical and land use-related characteristics of the study area as described above contribute to its overall visual character. Visual character however largely depends on the level of change or transformation from a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural undisturbed landscape. Visual character is also influenced by the presence of built infrastructure such as buildings, roads and other objects such as telephone or electrical infrastructure. The visual character of an area largely determines the **sense of place** relevant to the area. This is the unique quality or character of a place, whether natural, rural or urban which results in a uniqueness, distinctiveness or strong identity.

The predominant land use in the area (sheep farming) has not transformed the natural landscape across much of the study area to any significant degree and there are no towns or built-up areas in the study area influencing the overall visual character. Thus there are low levels of human transformation and visual degradation across a significant portion of the study area and the natural character has been retained.

There are however prominent anthropogenic elements in the study area which include a large electrical substation (Helios), associated high voltage power lines, railway infrastructure and two operational WEFs and their associated infrastructure, namely Khobab and Loeriesfontein 2. The presence of this infrastructure is an important factor in this context, as the introduction of the proposed power line would result in less visual contrast where other anthropogenic elements are already present.

The presence of the operational WEFs and the associated 132kV power lines is a significant factor in the visual character of the study area. WEFs and their associated infrastructure typically consist of very large structures which are highly visible. As such, these facilities have significantly altered the visual character and baseline in the central sector of the study area, resulting in a more industrial-type visual character.

It is important to note that several renewable energy facilities (solar and wind) are proposed within relatively close proximity to the proposed power line. These facilities and their associated infrastructure, typically consist of very large structures which are highly visible. As such, these facilities will further alter the visual character and baseline in the study area if constructed towards a more industrial-type visual character. Although this will lessen the degree to which the proposed power line would contrast with the elements and form in the surrounding environment, the cumulative impact on each sensitive receptor location would increase. This is discussed in more detail in **Section 8.4** below.

The greater area surrounding the proposed development is an important component when assessing visual character. The area can be considered to be typical of a Karoo or “platteland” landscape that would characteristically be encountered across the high-lying dry western and

central interior of South Africa. Much of South Africa's dry Karoo interior consists of wide open, uninhabited spaces sparsely punctuated by scattered farmsteads and small towns. Over the last couple of decades an increasing number of tourism routes have been established in the Karoo and in a context of increasing urbanisation in South Africa's major centres, the Karoo is being marketed as an undisturbed getaway. Examples of this may be found in the "Getaway Guide to Karoo, Namaqualand and Kalahari" (Moseley and Naude-Moseley, 2008).

The typical Karoo landscape can be considered a valuable 'cultural landscape' in the South African context. Although the cultural landscape concept is relatively new, it is becoming an increasingly important concept in terms of the preservation and management of rural and urban settings across the world (Breedlove, 2002). In 1992 the World Heritage Committee[2] adopted the following definition for cultural landscapes:

Cultural landscapes represent the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.

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

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

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

In light of this, it is important to assess whether the introduction of new power lines into the study area would be a degrading factor in the context of the natural Karoo character of the landscape. Broadly speaking, visual impacts on the cultural landscape in the area around the proposed development would be reduced by the fact that the area is relatively remote and there

[2] UNESCO, 2005. Operational Guidelines for the Implementation of the World Heritage Convention. UNESCO World Heritage Centre. Paris

are very few tourism or nature-based facilities in the study area. In addition, although the proposed development will be visible from the Granaatboskolk road, this route does not form part of a designated scenic / tourism route. In addition, this type of development is not considered to be a significant degrading factor in the context of the natural Karoo character of the study area, as electrical infrastructure forms part of the typical form present within the Karoo landscape (**Figure 23**)

A more detailed assessment of the potential impacts of the proposed power lines on the cultural landscape has been included in the Heritage Impact Assessment (HIA) undertaken by PGS Heritage in respect of the proposed project.

Figure 23: View of a typical Karoo landscape, which includes electrical infrastructure (Kay, 2014)

6.3 Visual Sensitivity

Visual sensitivity can be defined as the inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (i.e. topography, landform and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (Oberholzer: 2005). A viewer's perception is usually based on the perceived aesthetic appeal of an area and on the presence of economic activities (such as recreational tourism) which may be based on this aesthetic appeal.

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

Based on the criteria in the matrix (**Table 2**), the visual sensitivity of the area is broken up into a number of categories, as described below:

i) **High** - The introduction of a new development such as a power line would be likely to be perceived negatively by receptors in this area; it would be considered to be a visual intrusion and may elicit opposition from these receptors.
ii) **Moderate** – Receptors are present, but due to the nature of the existing visual character of the area and likely value judgements of receptors, there would be limited negative perception towards the new development as a source of visual impact.
iii) **Low** - The introduction of a new development would not be perceived to be negative, there would be little opposition or negative perception towards it.

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

Table 2: Environmental factors used to define visual sensitivity of the study area

FACTORS	DESCRIPTION	RATING									
		LOW									*HIGH*
		1	2	3	4	5	6	7	8	9	10
Pristine / natural / scenic character of the environment	Study area is largely natural with areas of scenic value and some pastoral elements.										
Presence of sensitive visual receptors	Relatively few sensitive receptors have been identified in the study area.										
Aesthetic sense of place / visual character	Visual character is typical of Karoo Cultural landscape.										
Irreplaceability / uniqueness / scarcity value	Although there are areas of scenic value within the study area, these are not rated as highly unique.										
Cultural or symbolic meaning	Much of the area is typical of a Karoo Cultural landscape.										
Protected / conservation areas in the study area	No protected or conservation areas were identified in the study area.										
Sites of special interest present in the study area	No sites of special interest were identified in the study area.										
Economic dependency on scenic quality	Few tourism/leisure-based facilities in the area										
International / regional / local status of the environment	Study area is typical of Karoo landscapes										
**Scenic quality under threat / at risk of change	Introduction of grid connection infrastructure will alter the visual character and sense of place. In addition, the development of other renewable energy facilities in the broader area as planned or under construction will introduce an increasingly industrial character, giving rise to significant cumulative impacts										

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

Low				Moderate					High
10	20	30	40	50	60	70	80	90	100

Based on the above factors, the total score for the study area is 39, which according to the scale above, would result in the area being rated as having a low visual sensitivity. It should be stressed that the concept of visual sensitivity has been utilised indicatively to provide a broad-scale indication of whether the landscape is likely to be sensitive to visual impacts, and is based on the physical characteristics of the study area, economic activities and land use that predominates. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs.

No formal protected areas, leisure-based tourism activities or sensitive receptor locations were identified in the study area and relatively few potentially sensitive receptors were found to be present.

As previously stated, no viewsheds or visibility analyses were generated for this visual study, as the topography within the study area is relatively flat and no detailed contours were available. In this context, the most important factors influencing the degree of visibility are the presence of screening vegetation and / or man-made structures. Considering the relatively flat terrain in the study area, and the lack of any significant vegetative screening or built form, it is expected that elements of the power line development as proposed would be visible from all identified potentially sensitive receptors. As such, no areas along the route alignment are considered to be significantly more sensitive than any other areas.

In assessing visual sensitivity, the Landscape Theme of the National Environmental Screening Tool was used to identify any landscape sensitivity for the development of grid connection infrastructure in this area. The tool does not however identify any landscape sensitivities in respect of the proposed power line development.

6.4 Visual Absorption Capacity

Visual absorption capacity is the ability of the landscape to absorb a new development without any significant change in the visual character and quality of the landscape. The level of absorption capacity is largely based on the physical characteristics of the landscape (topography and vegetation cover) and the level of transformation present in the landscape.

Although the flat topography and lack of built form across much of the study area would reduce the visual absorption capacity, this would be offset by the significant degree of transformation in sectors of the study area resulting from the Helios substation and associated high voltage power lines, rail infrastructure and the presence of the Khobab and Loeriesfontein 2 WEFs.

Visual absorption capacity in the study area is therefore rated as moderate

7 TYPICAL VISUAL IMPACTS ASSOCIATED WITH AND POWER LINES

In this section, the typical visual issues related to the establishment of 132kV power lines are discussed

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

It is assumed that the type of towers being considered for this development include self-supporting suspension monopole structures for relatively straight sections of the line and angle strain towers where the route alignment bends to a significant degree. Maximum tower height is expected to be 25m (equivalent in height to an eight storey building). Although a power line tower structure would be less visible than a building, the height of the structure means that the tower would still typically be visible from a considerable distance. Visibility would be increased by the fact that the power line comprises a series of towers mostly arranged in a linear alignment.

As described above, a power line could be perceived to be highly incongruous in the context of a largely natural landscape. The height and linear nature of the power line will exacerbate this incongruity, as the towers may impinge on views within the landscape. In addition, the practice of clearing any taller vegetation from areas within the power line servitude can increase the visibility and incongruity of the power line. In a largely natural, bushier setting, vegetation clearance will cause fragmentation of the natural vegetation cover, thus making the power line more visible and drawing the viewer's attention to the power line servitude.

Sensitivity to visual impacts is typically most pronounced in areas set aside for conservation of the natural environment (such as protected natural areas or conservancies), or in areas in where the natural character or scenic beauty of the area attracts visitors (tourists). In this instance however, the area is not typically valued for its tourism significance and no formal protected areas, leisure-based tourism activities or recognised tourism routes were identified in the area.

Conversely, the presence of other anthropogenic objects associated with the built environment may "degrade" the visual environment and thus the introduction of new power lines into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible. In this context therefore, the presence of the Helios substation and the

existing high voltage power lines and rail infrastructure traversing the study area, in conjunction with the Khobab and Loeriesfontein 2 WEFs, is expected to lessen the visual contrast associated with the introduction of a new power line.

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

- The location of the development in the landform setting – i.e. in a valley bottom or on a ridge top. In the latter example the development would be much more visible and would "break" the horizon;
- The presence of macro- or micro-topographical features, built form or vegetation that would screen views of the development from a receptor location;
- The presence of existing, similar features in the area and their alignment in relation to the proposed new development; and
- Temporary factors such as weather conditions (presence of haze, rainfall or heavy mist) which would affect visibility.

In this instance, the proposed power lines are intended to serve the proposed hybrid energy facility incorporating the Loeriesfontein 3 PV SEF and the proposed Dwarsrug WEF, and link into the proposed Narosies substation which will serve the proposed Hantam SEF. As such, the power lines will only be built if these proposed energy facilities are developed. The power lines are therefore likely to be perceived to be part of the greater hybrid energy facility and the visual impact will be relatively minor when compared to the visual impact associated with the facility as a whole.

8 SENSITIVE VISUAL RECEPTORS

A sensitive visual receptor location is defined as a location from where receptors would potentially be impacted by a proposed development. Adverse impacts often arise where a new development is seen as an intrusion which alters the visual character of the area and affects the 'sense of place'. The degree of visual impact experienced will however vary from one receptor to another, as it is largely based on the viewer's perception.

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

The identification of sensitive receptors is typically based on a number of factors which include:

- the visual character of the area, especially taking into account visually scenic areas and areas of visual sensitivity;
- the presence of leisure-based (especially nature-based) tourism in an area;
- the presence of sites or routes that are valued for their scenic quality and sense of place;
- the presence of homesteads / farmsteads in a largely natural setting where the development may influence the typical character of their views; and
- feedback from interested and affected parties, as raised during the public participation process conducted as part of the BA study.

Viewing distance is also a critical factor in the experiencing of visual impacts. As the visibility of the development would diminish exponentially over distance (refer to **section 5.4** above), receptor locations which are closer to the proposed development would experience greater adverse visual impacts than those located further away.

The degree of visual impact experienced will however vary from one inhabitant to another, as it is largely based on the viewer's perception. Factors influencing the degree of visual impact experienced by the viewer include the following:

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

8.1 Receptor Identification

As mentioned, information pertaining to visual receptors was largely drawn from other visual assessments conducted in the general vicinity of the proposed development (**Section 1.5**). This information was verified for the purposes of this VIA using current Google Earth Imagery.

Only seven (7) potentially sensitive visual receptor locations were identified within the study area, all of which appear to be existing farmsteads (**Figure 24**). These farmsteads are regarded as potentially sensitive visual receptors as they are located within a remote, mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the residents' sentiments toward the proposed development are unknown.

No leisure or nature-based activities were identified in the study area and none of the identified receptor locations were considered to be sensitive receptors.

In many cases, roads along which people travel, are regarded as sensitive receptors. There are however no main or arterial roads in the study area. The primary thoroughfare in the study area is the Granaatboskolk Road, a gravel Secondary road which traverses the study area in a south to north direction, linking the town of Loeriesfontein with Granaatboskolk to the north. This road is used primarily as an access route by the local farmers and is therefore not valued or utilised for its scenic or tourism potential. As a result, this road is not considered to be visually sensitive.

Other roads in the study area are primarily farm access roads and do not form part of any scenic tourist routes and are therefore not regarded as visually sensitive.

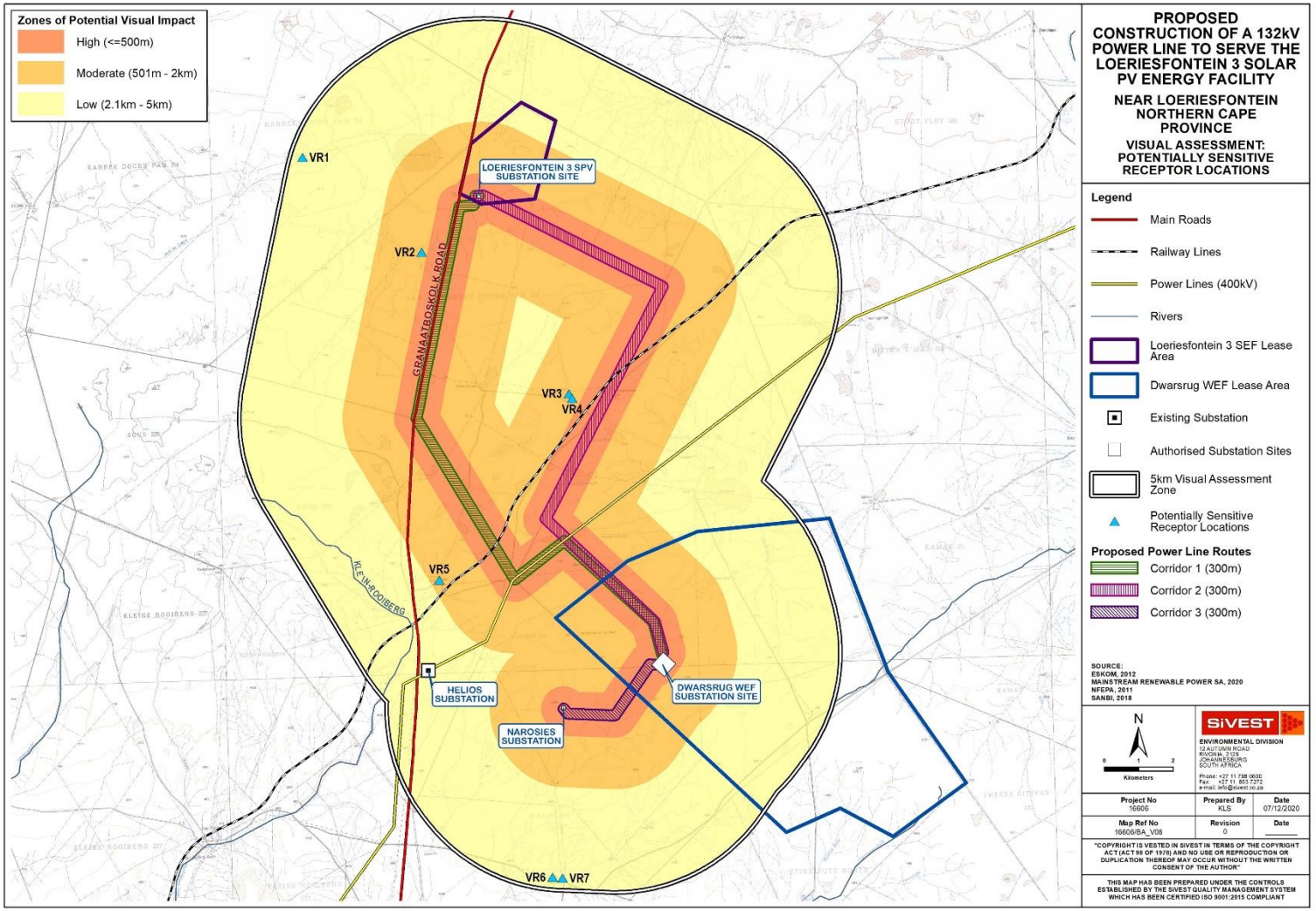

Figure 24: Potentially sensitive receptor locations within 5kms of the proposed development

8.2 Receptor Impact Rating

In order to assess the impact of the proposed power line development on the identified potentially sensitive receptor locations, a matrix that takes into account a number of factors has been developed and is applied to each receptor location.

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

- Distance of a receptor location away from the proposed development (zones of visual impact);
- Presence of screening elements (topography, vegetation etc.);
- Visual contrast of the development with the landscape pattern and form.

These factors are considered to be the most important factors when assessing the visual impact of a proposed development on a potentially sensitive receptor location in this context. It should be noted that this rating matrix is a relatively simplified way of assigning a likely representative visual impact, which allows a number of factors to be considered. Experiencing visual impacts is however a complex and qualitative phenomenon and is thus difficult to quantify accurately. The matrix should therefore be seen as a representation of the likely visual impact at a receptor location. Part of its limitation lies in the quantitative assessment of what is largely a qualitative or subjective impact.

As described above, the distance of the viewer / receptor location from the development is an important factor in the context of experiencing visual impacts which will have a strong bearing on mitigating the potential visual impact. A high impact rating has been assigned to receptor locations that are located within 500m of the proposed development. Beyond 5km, the visual impact of a power line diminishes considerably, as the development would appear to merge with the elements on the horizon. Any visual receptor locations beyond this distance have therefore not been assessed as they fall outside the study area and would not be visually influenced by the proposed development.

Zones of visual impact for the proposed development were therefore delineated according to distance from the proposed power line assessment corridors. Based on the height and project, the distance intervals chosen for the zones of visual impact are as follows:

- 0 - 500m (high impact zone);
- 500m – 2km (moderate impact zone);
- 2km - 5km (low impact zone).

The presence of screening elements is an equally important factor in this context. Screening elements can be vegetation, buildings and topographic features. For example, a grove of trees or a series of low hills located between a receptor location and an object could completely shield the object from the receptor. As such, where views of the proposed development are completely

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

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

In order to determine the likely visual compatibility of the proposed development, the study area was classified into the following zones of visual contrast, as depicted in **Figure 25**.

- **High –** undeveloped / natural / rural areas.
- **Moderate-**
  - areas within 500m of existing 400kV power lines;
  - areas within 250m of other existing power lines, railway infrastructure and Granaatboskolk Road; and
  - areas between 1 and 3kms from Khobab WEF and Loeriesfontein 2 WEF development areas.
- **Low –**
  - areas within 500m of Helios substation;
  - areas within 1km of Khobab WEF and Loeriesfontein 2 WEF development areas; and
  - areas within 100m of mining/quarrying activities.

The receptor impact rating matrix returns a score which in turn determines the visual impact rating assigned to each receptor location (**Table 3**) below.

Table 3: Rating scores

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

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

Table 4: Visual assessment matrix used to rate the impact of the proposed development on potentially sensitive receptors

	VISUAL IMPACT RATING			
VISUAL FACTOR	**HIGH**	**MODERATE**	**LOW**	**<u>OVERRIDING FACTOR</u>: NEGLIGIBLE**
Distance of receptor away from proposed development	<= 500m **Score 3**	500m < 2km **Score 2**	2km < 5km **Score 1**	>5km
Presence of screening factors	No / almost no screening factors – development highly visible **Score 3**	Screening factors partially obscure the development **Score 2**	Screening factors obscure most of the development **Score 1**	Screening factors completely block any views towards the development, i.e. the development is not within the viewshed
Visual Contrast	**High contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 3**	**Moderate contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 2**	**Corresponds** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 1**	

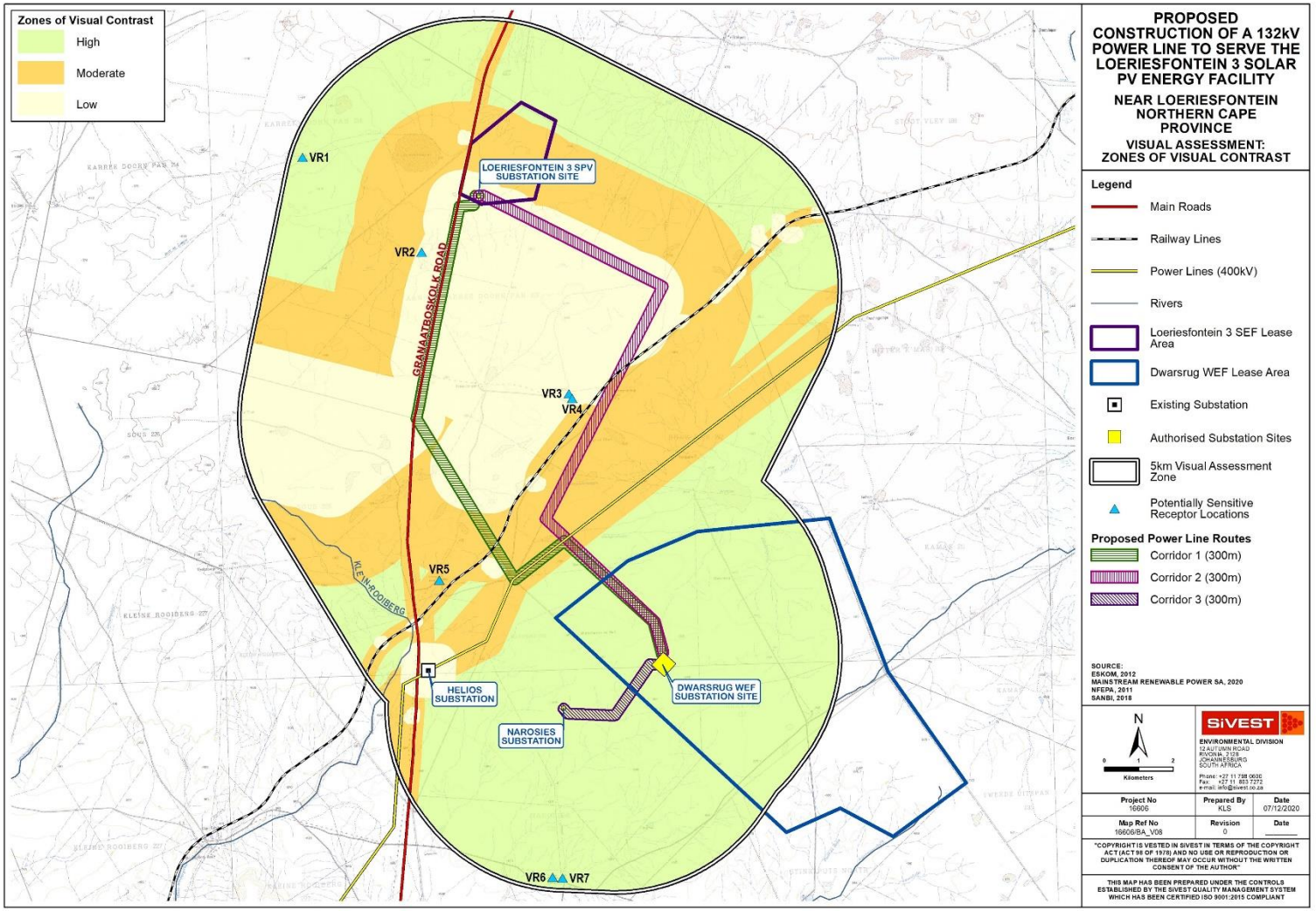

Figure 25: Zones of visual contrast in the study area

Table 5 below presents a summary of the overall visual impact of the proposed 132kV power lines on each of the potentially sensitive visual receptor locations identified within 5kms of the proposed development.

Table 5: Summary Receptor Impact Rating

Receptor Number	Distance to nearest Corridor Alternative		Screening	Contrast	OVERALL IMPACT RATING
VR 1 – Farmstead	Low (1)	4.6km	High (3)	High (3)	**MODERATE (7)**
VR 2 – Farmstead	Mod (2)	0.7km	Mod (2)	Low (1)	**MODERATE (5)**
VR 3 – Farmstead	Low (1)	4.0km	Mod (2)	Low (1)	**LOW (4)**
VR 4 – Farmstead	Low (1)	4.0km	Mod (2)	Low (1)	**LOW (4)**
VR 5 – Farmstead	Mod (2)	1.7km	High (3)	Mod (2)	**MODERATE (7)**
VR 6 – Farmstead	Low (1)	4.6km	High (3)	High (3)	**MODERATE (7)**
VR 7 – Farmstead	Low (1)	4.6km	High (3)	High (3)	**MODERATE (7)**

The table above shows that none of the potentially sensitive receptors would experience high levels of visual impacts as a result of the proposed power line development. Five (5) receptor locations are expected to experience moderate levels of impact, while the remaining two (2) receptor locations are expected to experience low levels of impact as a result of the power line development.

It is however known that all of these receptors are located on application sites for adjacent existing and renewable energy projects, including the existing Khobab and Loeriesfontein 2 WEFs, the proposed Kokerboom 3 WEF and the proposed Hantam Solar PV Energy Facility. As such the owners / occupants of these farmsteads are not expected to perceive the proposed power lines in a negative light.

8.3 Night-time Impacts

The visual impact of lighting on the nightscape is largely dependent on the existing lighting present in the surrounding area at night. The night scene in areas where there are numerous light sources will be visually degraded by the existing light pollution and therefore additional light sources are unlikely to have a significant impact on the nightscape. In contrast, introducing new light sources into a relatively dark night sky will impact on the visual quality of the area at night. It is thus important to identify a night-time visual baseline before exploring the potential visual impact of the proposed development at night.

Much of the study area is uninhabited and as a result, relatively few light sources are present. At night, much of the study area is characterised by a picturesque dark starry sky and the visual character of the night environment is considered to be mostly 'unpolluted' and pristine. The town of Loeriesfontein is also too far away to have an impact on the night scene. It must however be noted that some light pollution is likely to emanate from the operational and security lighting at Helios substation and also from the Khobab and Loeriesfontein 2 WEFs and this would reduce the impacts of any additional lighting in the area. Other prominent light sources within the study area at night are largely restricted to isolated lighting from the surrounding farmsteads and residential dwellings, as well as transient light from passing cars travelling along the Granaatboskolk Road.

However, power lines and associated towers or pylons are not usually lit up at night and, thus the proposed development is not expected to result in any additional light pollution.

8.4 Cumulative Impacts

Although it is important to assess the potential visual impacts of the proposed power lines specifically, it is equally important to assess the potential cumulative visual impact that could materialise if other renewable energy facilities (both wind and solar facilities) and associated infrastructure projects are developed in the broader area. Cumulative impacts occur where existing or planned developments, in conjunction with the proposed development, result in significant incremental changes in the broader study area. In this instance, such developments would include renewable energy facilities and associated infrastructure development.

These renewable energy facilities and their associated infrastructure have the potential to cause large scale visual impacts and the location of several such developments in close proximity to each other could significantly alter the sense of place and visual character in the broader region. Although power lines are relatively small developments when compared to renewable energy facilities as a whole, they may still introduce a more industrial character into the landscape, thus altering the sense of place.

Thirteen (13) renewable energy projects were identified within a 35 km radius of the proposed development as shown in **Figure 26** below. These projects, as listed in **Table 6** below, were identified using the DEFF's Renewable Energy EIA Application Database for SA in conjunction with information provided by Independent Power Producers (IPPs) operating in the broader region. It should be noted that this list is based on information available at the time of writing this report and as such there may be some omissions or inaccuracies. It is assumed that all of these renewable energy developments will include grid connection infrastructure, although details of the proposed infrastructure were not available for all of these projects at the time of writing this report.

The relatively large number of renewable energy facilities within the surrounding area and their potential for large-scale visual impacts could significantly alter the sense of place and visual character in the broader region, as well as exacerbate the visual impacts on surrounding visual receptors, once constructed.

Table 6: Renewable energy developments proposed within a 35km radius of the proposed power lines

Project	Current status of EIA/development	Proponent	Technology	Capacity
Dwarsrug Wind Farm	EA issued	Mainstream Renewable Power Developments (Pty) Ltd	Wind	140MW
Khobab Wind Farm	Operational	Mainstream Renewable Power Developments (Pty) Ltd	Wind	140MW
Loeriesfontein 2 Wind Farm	Operational	Mainstream Renewable Power Developments (Pty) Ltd	Wind	140MW
Graskoppies Wind Farm	EA Issued	Mainstream Renewable Power Developments (Pty) Ltd	Wind	235MW
Hartebeest Leegte Wind Farm	EA Issued	Mainstream Renewable Power Developments (Pty) Ltd	Wind	235MW
Ithemba Wind Farm	EA Issued	Mainstream Renewable Power Developments (Pty) Ltd	Wind	235MW
!Xha Boom Wind Farm	EA Issued	Mainstream Renewable Power	Wind	235MW

		Developments (Pty) Ltd		
Loeriesfontein PV3 Solar Energy Facility	EA issued	Mainstream Renewable Power Developments (Pty) Ltd	Solar	100MW
Hantam PV Solar Energy Facility	EA issued	Solar Capital (Pty) Ltd	Solar	Up to 525MW
PV Solar Power Plant	EA issued	BioTherm Energy (Pty) Ltd	Solar	70MW
Kokerboom 1 Wind Farm	Environmental Impact Assessment (EIA) underway	Business Venture Investments No. 1788 (Pty) Ltd (BVI)	Wind	240MW
Kokerboom 2 Wind Farm	Environmental Impact Assessment (EIA) underway	Business Venture Investments No. 1788 (Pty) Ltd (BVI)	Wind	240MW
Kokerboom 3 Wind Farm	Environmental Impact Assessment (EIA) underway	Business Venture Investments No. 1788 (Pty) Ltd (BVI)	Wind	240MW

These projects include ten (10) WEFs and three (3) Solar PV Facilities. Although the different technologies are expected to have different impacts, all renewable energy developments and associated grid connection infrastructure are relevant as they contribute to the alteration of the visual character of the area.

Seven (7) of the proposed renewable energy facilities identified are located outside the 5 km visual assessment zone and as such, it is not anticipated that these developments will result in any significant cumulative impacts affecting the landscape or the visual receptors within the visual assessment zone.

The remaining six (6) proposed facilities however all intersect with the visual assessment zone for the proposed power lines, these being the existing Khobab and Loeriesfontein 2 WEFs, the proposed Dwarsrug and Kokerboom 3 WEFs and the proposed Loeriefontein 3 and Hantam SEFs. It is known that all of these renewable energy developments include power line connection infrastructure, although it is not known whether all these proposed power lines will be constructed. Due to the relatively flat terrain in the area and the lack of screening vegetation, wind turbines, PV arrays and the associated power line infrastructure is expected to be visible to most of the visual receptors in the assessment area. As such, it is expected that the visual receptors would experience exacerbated visual impacts should all of these developments ultimately be constructed.

These projects are all located on adjoining farm portions and are in relatively close proximity to Helios substation and existing high voltage power lines and it is assumed that grid connection infrastructure for all of these projects would include 132kV power lines connecting into Helios substation. Although the Dwarsrug and Kokerboom 3 WEFs, and the Loeriesfontein 3 and Hantam SEFs have not yet been developed, Khobab WEF and Loeriesfontein 2 WEF and the

associated power lines are now operational and the landscape has already undergone noticeable change, which will be exacerbated with further renewable energy facility development in the area. Impacts of this transformation will however be reduced by the fact the landscape in the vicinity of these proposed developments has already been disturbed by the operational WEFs and the presence of Helios substation and the existing power lines.

An examination of the literature available for the environmental assessments undertaken for many of these renewable energy applications showed that the visual impacts identified and the recommendations and mitigation measures provided are largely consistent with those identified in this report. Where additional, relevant mitigation measures were provided in respect of the other renewable energy applications, these have been incorporated into this report where relevant.

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

In addition, it is possible that the renewable energy facilities located in close proximity to each other could be seen as one large renewable energy complex rather than separate developments. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the cumulative impacts on the landscape.

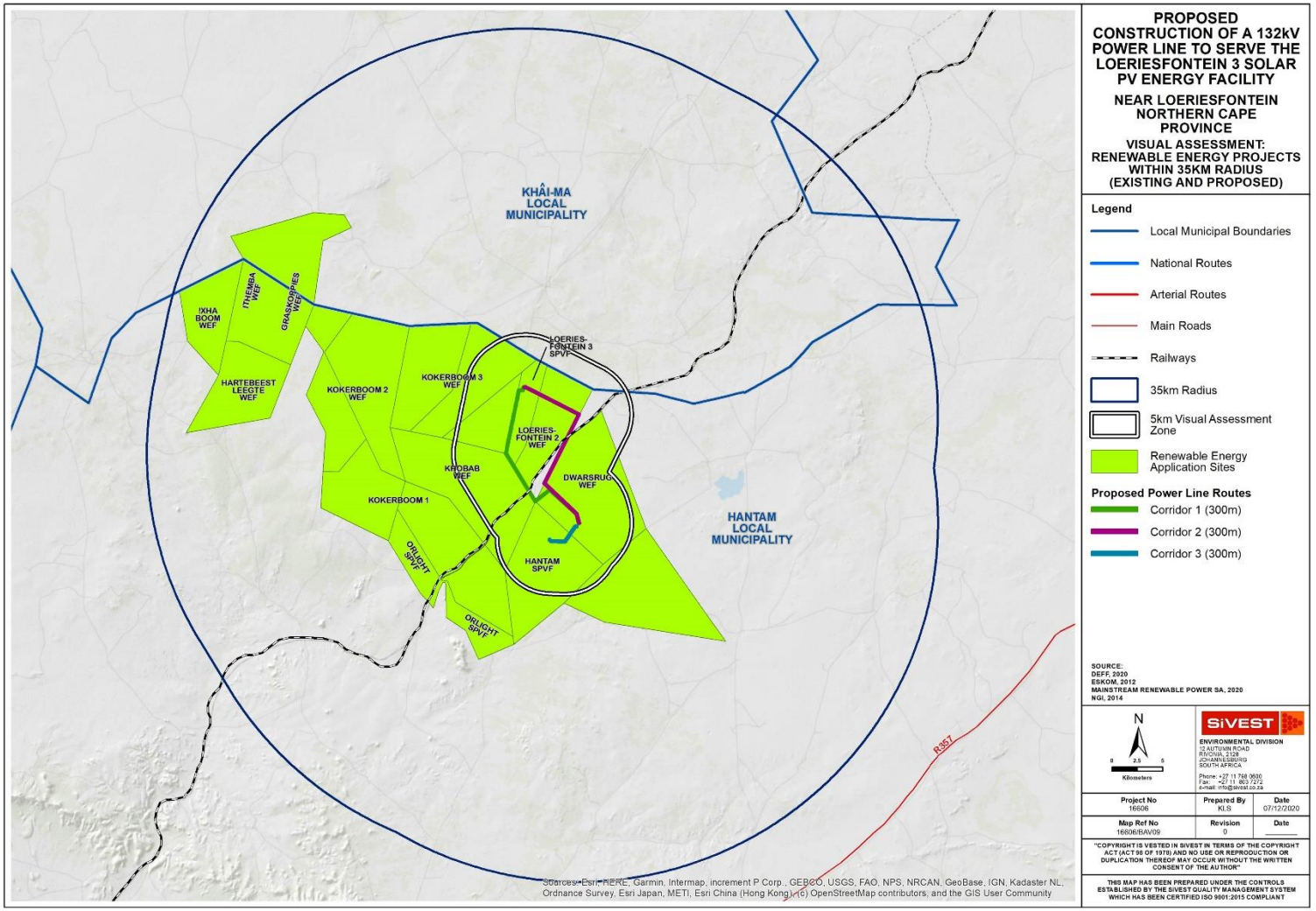

Figure 26: Renewable energy facilities proposed within a 35km radius of the proposed Power Lines.

8.5 Overall Visual Impact Rating

The EIA Regulations, 2014 (as amended) require that an overall rating for visual impact be provided to allow the visual impact to be assessed alongside other environmental parameters. **Table 6 and 7** below present the impact matrix for visual impacts associated with the proposed construction and operation of the proposed 132kV power lines. Preliminary mitigation measures have been determined based on best practice and literature reviews.

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

Table 7: Impact Rating for 132kV Loeriesfontein - Dwarsrug Power Lines

132kV LOERIESFONTEIN - DWARSRUG POWER LINE																				
ENVIRONMENTAL PARAMETER	**ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE**	**ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION**									**RECOMMENDED MITIGATION MEASURES**	**ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION**								
		E	**P**	**R**	**L**	**D**	**I / M**	**TOTAL**	**STATUS (+ OR -)**	**S**		**E**	**P**	**R**	**L**	**D**	**I / M**	**TOTAL**	**STATUS (+ OR -)**	**S**
Construction Phase (Direct Impacts)																				
▪ Potential alteration of the visual character and sense of place ▪ Potential visual impact on receptors in the study area	▪ Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction. ▪ Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment. ▪ Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.	2	3	1	2	1	2	18	-	Low	▪ Carefully plan to minimise the construction period and avoid construction delays. ▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Vegetation clearing should take place in a phased manner. ▪ Maintain a neat construction site by removing rubble and waste materials regularly. ▪ Make use of existing gravel access roads where possible. ▪ Limit the number of vehicles and trucks travelling to and from the construction site, where possible. ▪ Ensure that dust suppression techniques are implemented:	2	2	1	2	1	2	14	-	Low

											▪ on all access roads; ▪ in all areas where vegetation clearing has taken place; ▪ on all soil stockpiles.									
Operational Phase																				
▪ Potential alteration of the visual character and sense of place. ▪ Potential visual impact on receptors in the study area. ▪ Potential visual impact on the night time visual environment.	▪ The proposed power lines could alter the visual character of the surrounding area and expose sensitive visual receptor locations to visual impacts. ▪ The decommissioning activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. ▪ The night time visual environment will be altered if any lighting is placed on pylon structure.	2	4	2	2	3	1	13	-	Low	▪ As far as possible, limit the number of maintenance vehicles using access roads. ▪ Where possible, avoid placing lights on pylon structures. ▪ Non-reflective surfaces should be utilised where possible.	2	4	2	2	3	1	13	-	Low
Decommissioning Phase																				
▪ Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process; ▪ Potential visual impacts of increased dust emissions from decommissioning activities and related traffic; and ▪ Potential visual intrusion of any remaining infrastructure on the site.	▪ Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts. ▪ Decommissioning activities may be perceived as an unwelcome visual intrusion. ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning activities may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment. ▪ Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed	2	3	1	2	1	2	18	-	Low	▪ All infrastructure that is not required for post-decommissioning use should be removed. ▪ Carefully plan to minimize the decommissioning period and avoid delays. ▪ Maintain a neat decommissioning site by removing rubble and waste materials regularly. ▪ Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase.	2	2	1	1	1	2	14	-	Low

	areas could result in dust which would have a visual impact.										▪ Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required.									
Cumulative																				
▪ Potential alteration of the visual character and sense of place in the broader area. ▪ Potential visual impact on receptors in the study area. ▪ Potential visual impact on the night time visual environment.	▪ Additional renewable energy and associated grid connection infrastructure developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts. ▪ Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings. ▪ Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes. ▪ The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities and associated substations in the broader area.	3	3	2	3	3	2	28	-	Medium	▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. ▪ Vegetation clearing should take place in a phased manner. ▪ As far as possible, limit the number of maintenance vehicles using access roads. ▪ Where possible, avoid placing lights on pylon structures. ▪ Non-reflective surfaces should be utilised where possible.	3	3	2	2	2	2	24	-	Medium

Table 8: Impact Rating for 'No-Go' Alternative

NO-GO ALTERNATIVE																				
ENVIRONMENTAL PARAMETER	**ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE**	**ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION**									**RECOMMENDED MITIGATION MEASURES**	**ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION**								
		E	**P**	**R**	**L**	**D**	**I / M**	**TOTAL**	**STATUS (+ OR -)**	**S**		**E**	**P**	**R**	**L**	**D**	**I / M**	**TOTAL**	**STATUS (+ OR -)**	**S**
▪ Potential alteration of the visual character and sense of place in the broader area. ▪ Potential visual impact on receptors in the study area. ▪ Potential visual impact on the night time visual environment.	▪ If the 132kV power lines is not developed in this area, there will be no change in the visual character or the sense of place. There will be no visual impacts on receptors or on the night-time visual environment.	NIL	NIL	NIL	NIL	NIL	NIL	NIL	-	NIL	▪ N / A	NIL	NIL	NIL	NIL	NIL	NIL	NIL	-	Low

9 COMPARATIVE ASSESSMENT OF ALTERNATIVES

Based on technical considerations, only one (1) power line corridor route (Corridor 3) is being assessed for the section of the proposed power line connecting the Dwarsrug WEF to the approved Narosies substation to feed into the National grid. Accordingly, no comparative assessment is required in respect of this route alignment. Corridor 3 has however been assessed from a visual perspective and no fatal flaws were identified.

Two (2) power line corridor route alternatives are being assessed for the section of the proposed power line which connects the Loeriesfontein 3 PV SEF to the Dwarsrug WEF. These alternatives, as described in Section **3.2.1** and depicted in **Figure 2**, have been comparatively assessed to determine which of the alternatives would be preferred from a visual perspective.

Preference ratings for each alternative are provided in **Table 9** below. The alternatives are rated as “preferred”; “favourable”, “least-preferred” or “no-preference”. The degree of visual impact and the preference rating has been determined based on the following factors:

- The location of each proposed power line corridor route alignment alternative in relation to areas of high elevation, especially ridges, koppies or hills;
- The location of each proposed power line corridor route alternative in relation to sensitive visual receptor locations; and
- The location of each proposed power line corridor route alternative in relation to areas of natural vegetation (clearing site for the development worsens the visibility).

Key

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

Table 9: Comparative Assessment of Power Line Corridor Route Alternatives

Alternative	Preference	Reasons (incl. potential issues)
POWER LINE CORRIDOR ROUTE ALTERNATIVES		
Power Line Corridor 1	Favourable	▪ Corridor 1 is located on relatively flat terrain and as such would only be moderately exposed on the skyline. ▪ The closest potentially sensitive receptor to this corridor is 660m away, this being VR2. The visual impacts from Corridor 1 affecting this receptor are therefore rated as moderate. As VR2 is located on the Kokerboom 3 WEF application site however, the owners are not expected to

Alternative	Preference	Reasons (incl. potential issues)
		perceive the proposed power line in a negative light. ▪ The remaining receptors are all more than 1.7kms away and thus would only be subjected to moderate or low levels of impact. Here again, all of these receptors are located on application sites for other renewable energy projects and as such the owners are not expected to perceive the proposed power line in a negative light. ▪ Much of the western section of this corridor is in close proximity to the Loeriesfontein 2 WEF and the associated power lines. As such this section of the route alignment is already largely transformed from its natural state. This would lessen the impacts of the new power line in this area. ▪ In light of the above, there are no fatal flaws associated with Corridor 1 and this corridor is considered favourable from a visual perspective.
Power Line Corridor 2	Favourable	▪ Corridor 2 is located on relatively flat terrain and as such would only be moderately exposed on the skyline. ▪ The closest potentially sensitive receptors to this corridor are 888m and 735m away, these being VR3 and VR4 respectively. The visual impacts from Corridor 2 affecting these receptors are therefore rated as moderate. As both of these receptors are located on the Loeriesfontein 2 WEF application site however, the owners are not expected to perceive the proposed power line in a negative light. ▪ The remaining receptors are all more than 2kms away and thus would only be subjected to low or negligible levels of impact. Here again, all of these receptors are located on application sites for other renewable energy projects and as such the owners are not expected to perceive the proposed power line in a negative light. ▪ Much of the eastern and northern sections of this corridor are in close proximity to the Loeriesfontein 2 WEF and the associated power lines. As such this section of the route alignment is already largely transformed from its natural state. This would lessen the impacts of the new power line in this area. ▪ In light of the above, there are no fatal flaws associated with Corridor 2 and this

Alternative	Preference	Reasons (incl. potential issues)
		corridor is considered favourable from a visual perspective.

9.1 No Go Alternative

The 'No Go' alternative is essentially the option of not developing power lines in this area. The area would thus retain its visual character and sense of place and no visual impacts would be experienced by any locally occurring receptors.

10 CONCLUSION

A VIA has been conducted to assess the magnitude and significance of the potential visual impacts associated with the construction of proposed 132 kV power lines between the Loeriesfontein 3 PV SEF, the Dwarsrug WEF and the proposed Narosies Substation on the adjacent Hantam SEF development site. Overall, sparse human habitation and the predominance of natural vegetation cover across much of the study area would give the viewer the general impression of a largely natural, untransformed setting with some pastoral elements. As such, the proposed power lines would alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across much of the broader study area. The level of contrast is however significantly reduced by the presence of the operational Khobab and Loeriesfontein 2 WEFs with associated grid connection infrastructure, as well as the Helios substation, existing high voltage power lines, the Granaatboskolk Road and rail infrastructure affecting mainly the central sector of the study area.

The area is not however typically valued for its tourism significance and there is limited human habitation resulting in relatively few potentially sensitive receptors in the area. A total of seven (7) potentially sensitive receptors were identified in the study area, all of which are farmsteads. None of these receptors are considered to be Sensitive Receptors as they are not linked to leisure/nature-based tourism activities in the area.

All of the identified receptors were assessed in terms of SiVEST's receptor impact rating matrix and this showed that five (5) potentially sensitive receptors will be subjected to moderate levels of visual impact as a result of the proposed power lines, while the remaining two (2) receptors will be subjected to low levels of visual impact. It was noted however, that all of these receptors are located on application sites for adjacent existing and renewable energy projects, including the existing Khobab and Loeriesfontein 2 WEFs, the proposed Kokerboom 3 WEF and the proposed Hantam Solar PV Energy Facility. As such the owners / occupants of these farmsteads are not expected to perceive the proposed power lines in a negative light

An overall impact rating was also conducted in order to allow the visual impact to be assessed alongside other environmental parameters. The assessment revealed that impacts associated with the proposed 132kV power lines will be of low significance during construction, operation and decommissioning phases with a number of mitigation measures available.

Although other renewable energy developments and infrastructure projects, either proposed or in operation, were identified within a 35km radius of the proposed development, it was determined that only six (6) of these would have any significant impact on the landscape within the visual assessment zone. These facilities include the existing Khobab and Loeriesfontein 2 WEFs, the proposed Dwarsrug and Kokerboom 3 WEFs and the proposed Loeriefontein 3 and Hantam SEFs. These facilities and the associated grid connection infrastructure will alter the inherent sense of place and introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts.

From a visual perspective, the further concentration of renewable energy facilities with associated grid connection infrastructure as proposed will inevitably change the visual character of the area and alter the inherent sense of place, introducing an increasingly industrial character into the broader area, and resulting in significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures stipulated for each of these developments by the visual specialists in their respective reports. In light of this and the relatively low level of human habitation in the study area however, cumulative impacts have been rated as medium. It is important to note, however, that the renewable energy facilities located in close proximity to each other could potentially be seen as one large renewable energy complex rather than separate developments. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the cumulative impacts on the landscape.

No fatal flaws were identified for any of the proposed power line corridors and all three corridors were found to be favourable.

10.1 Visual Impact Statement

It is SiVEST's opinion that the visual impacts associated with the proposed 132 kV overhead power lines between the proposed (and authorised) 100MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and proposed (and authorised) 140MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4); and between the Dwarsrug WEF and the proposed (and authorised) Narosies Substation are of low to moderate significance. Given the low level of human habitation and the relative absence of sensitive receptors, the project is deemed acceptable from a visual impact perspective and the EA should be granted for the BA application. SiVEST is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

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