VISUAL IMPACT ASSESSMENT FOR LEEUWBOSCH 3 PV ENERGY FACILITY

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EXECUTIVE SUMMARY

The Visual Impact Assessment (VIA) conducted for the proposed Leeuwbosch 3 Solar Photovoltaic Energy Facility (SPEF) found that much of the study area has a partly natural visual character with some rural or pastoral elements. As such, solar PV facilities 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. However, areas in close proximity to the Leeuwbosch 3 SPEF application site exhibit high levels of human transformation resulting from urban and infrastructural development (such as the Kgakala Township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line). These elements have resulted in a significant degree of landscape degradation, and thus the introduction of Solar PV facilities into this setting would be considered to be less visually intrusive than if there was no existing built infrastructure visible.

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. However, 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 visually sensitive receptors were identified within the study area. This is most likely due to the fact that the study area is not typically valued or utilised for its tourism significance. Additionally, the R502 and R504 regional roads, which traverse the visual assessment zone, are used almost exclusively as local access roads and do not form part of any scenic tourist routes and are not specifically valued or utilised for their scenic or tourism potential.

A total of thirty-two (32) potentially sensitive receptors were however identified, all of which appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the residents' sentiments toward the proposed development are unknown. The receptor impact rating conducted in respect of these potentially sensitive receptors found that none of these potentially sensitive receptors are expected to experience high levels of visual impact from the proposed SPEFs. Twenty-six (26) receptors are however expected to experience moderate levels of visual impact, while the remaining six (6) receptors are only expected to experience low levels of impact from the proposed SPEF.

The overall impact rating revealed that the Leeuwbosch 3 SPEF is expected to have a (negative) low visual impact rating during both construction and decommissioning phases. During operation, visual impacts from the solar PV facility arrays would be of (negative) medium significance with relatively few mitigation measures available to reduce the visual impact. Impacts from the associated infrastructure would however be of (negative) low significance during operation.

Five other renewable energy developments and infrastructure projects, either proposed or in operation, were identified within a 30km radius of the proposed Leeuwbosch 3 SPEF, namely Leeuwbosch 1 and Leeuwbosch 2 SPEFs, Wildebeestkuil 1 and Wildebeestkuil 2 SPEFs and Bokamoso

Solar. It was determined that all of these would impact on the landscape within the visual assessment zone. These projects, in conjunction with the proposed Leeudoringstad Solar Plant Substation, located on the Leeuwbosch 3 SPEF application site, 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. 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 light of this and the significant degree of human transformation and landscape degradation evident in close proximity to the proposed developments, cumulative impacts have been rated as medium.

No design and layout alternatives were considered and assessed as part of this VIA as these were considered as part of a previous BA process. As such the PV development area, and associated infrastructure have been placed to avoid site sensitivities previously identified.

From a visual perspective therefore, the proposed Leeuwbosch 3 SPEF is deemed acceptable and the Environmental Authorization (EA) should be granted. SLR 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) AND ENVIRONMENTAL IMPACT 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
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	**Section 1.2** Specialist CV's are included in **Appendix A**
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 C**
(cA) an indication of the quality and age of base data used for the specialist report;	**Section 1.3**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	**Section 5 & 6**
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**Section 1.3**
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	**Section 1.3**
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 6.2** **Section 6.5**
g) an identification of any areas to be avoided, including buffers;	**Section 6.2** **Section 6.5**
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 6.5**
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 6**
k) any mitigation measures for inclusion in the EMPr;	**Section 8.7**
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 8.7**
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	**Section 10.1**
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	**N/A** - No feedback has yet been received from the public participation process regarding the visual environment
p) 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
q) any other information requested by the competent authority.	N/A - No information regarding the visual study has been requested from the competent authority to date.
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	**N/A**

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Appendix A: Specialist Expertise
Appendix B: Specialist Declaration
Appendix C: Site Sensitivity Verification (in terms of Part A of the Assessment Protocols published in GN 320 on 20 March 2020
Appendix D: Impact Rating Methodology
Appendix E: Maps

Glossary of Terms

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.

ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
BA	Basic Assessment
DBAR	Draft Basic Assessment Report
DEDECT	Department of Economic Development, Environment, Conservation and Tourism
DEFF	Department of Environment, Forestry and Fisheries
DM	District Municipality
DoE	Department of Mineral Resources and Energy
DTM	Digital Terrain Model
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EMP	Environmental Management Plan
FBAR	Final Basic Assessment Report
GIS	Geographic Information System
HA	Hectares
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
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
SPEF	Solar Photovoltaic Energy Facility
VIA	Visual Impact Assessment
VR	Visual Receptor
WEF	Wind Energy Facility

Visual Impact Assessment for Leeuwbosch 3 PV Energy Facility

1. INTRODUCTION

The original BA process for the proposed Leeuwbosch Solar Photovoltaic (PV) plant was initiated in August 2016. All specialist studies were undertaken and subsequently all site sensitivities were identified. The BA was however put out on hold prior to submitting the final basic assessment report (FBAR) to the competent authority. Subsequently, the proponent, Leeuwbosch PV Generation (Pty) Ltd (hereafter referred to as Leeuwbosch PV Generation) revised their development proposals to accommodate two (2) separate Solar Photovoltaic (PV) Energy facilities (SPEFs), each with a capacity of up to 9.9MW, on Portion 37 of the Farm Leeuwbosch No. 44, near Leeudoringstad, North West Province. Environmental Authorisation for both of these facilities was granted on 14 December 2021 by way of reference numbers NWP/EIA/41/2021 (Leewbosch 1 Solar PV) and NWP/EIA/45/2021 (Leewbosch 2 Solar).

Leeuwbosch PV generation is now proposing to construct a third solar photovoltaic (PV) plant and associated infrastructure on Portion 37 of the Farm Leeuwbosch No 44. The proposed development will have a maximum export capacity of up to 15 megawatt (MW) and will be known as the Leeuwbosch 3 Solar PV Plant. The proposed PV Facility will require Environmental Authorisation (EA) and as such, the project is the subject of a separate Basic Assessment (BA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended. The competent authority for this BA is the Department of Economic Development, Environment, Conservation and Tourism (DEDECT) – North West Provincial Government.

Accordingly, specialist studies have been commissioned to assess and verify the proposed development under the Gazetted specialist protocols[1].

1.1 SCOPE AND OBJECTIVES

This visual impact assessment (VIA) is being undertaken as part of the required BA process. The proposed solar PV plant is located on Portion 37 of the Farm Leeuwbosch No 44 which was assessed in the original VIA undertaken by SiVEST in 2016, and re-assessed in the combined VIA undertaken for Leeuwbosch 1 and 2 Solar PV Plants in 2020. The aim of this VIA is to revise and update the VIA report previously compiled and to assess the new Leeuwbosch 3 Solar PV development proposals.

As per the previous VIAs, this VIA will determine the potential visual issues associated with the development of the proposed Solar PV energy facility (SPEF), as well as to determine the potential extent of visual impacts. This involves 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 potentially sensitive visual receptor locations and provides an assessment of the magnitude and significance of the visual impacts associated with the proposed development.

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

1.2 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. Kerry's GIS skills have been extensively utilised in projects throughout South Africa and in other Southern African countries. In recent years, Kerry has become increasingly involved in the compilation of VIA reports. Kerry's relevant VIA project experience is listed in the table below.

Environmental Practitioner	SLR Consulting (South Africa) (Pty) Ltd – Kerry Schwartz
Contact Details	**klschwartz@slrconsulting.com**
Qualifications	BA (Geography), University of Leeds 1982
Expertise to carry out the Visual Impact Assessment.	**<u>Visual Impact Assessments</u>:** VIA (BA) for the proposed Oya Solar Photovoltaic (PV) Facility, near Matjiesfontein in the Western 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 (BA) for the proposed Gromis WEF, near Kleinzee in the Northern Cape Province. VIA (BA) for the proposed Komas WEF, near Kleinzee 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 A** and a signed specialist declaration of independence is included in **Appendix B** of this specialist assessment**.**

1.3 ASSESSMENT METHODOLOGY

This VIA has been based on a desktop-level assessment supported by field-based observation.

1.3.1 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 initially sourced from spatial databases provided by NGI, the South African National Biodiversity Institute (SANBI) and the South African National Land Cover Dataset (Geoterraimage – 2020). The characteristics identified via desktop analysis were later verified during the site visits.

1.3.2 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 identified and assessed (by desktop means) in order to determine the impact of the proposed development on each of the identified receptor locations.

1.3.3 Fieldwork and photographic review

Fieldwork was originally undertaken in October 2016 (early summer) as part of a visual assessment undertaken for preliminary solar PV development proposals on the Leeuwbosch application site. Given the time that has elapsed since the original fieldwork was undertaken, a second site visit was undertaken, involving a two (2) day site visit between the 12th and 13th of August 2020 (late winter). As most rainfall occurs in this area during the summer months, visual impacts resulting from the proposed development will be greater during winter when the vegetation cover provides less potential screening.

The purpose of the site visits was to:

- verify the landscape characteristics identified via desktop means;
- conduct a photographic survey of the study area;
- identify any additional visually sensitive receptor locations within the study area; and
- inform the impact rating assessment of visually sensitive receptor locations (where possible).

1.3.4 Visual Sensitivity

The application site was assessed to identify any areas of significant visual sensitivity, these being areas where the establishment of PV panels or other associated infrastructure would result in the greatest probability of visual impacts on potentially sensitive visual receptors.

In addition, the Landscape Theme of the National Environmental Screening Tool was used to determine the relative landscape sensitivity for the proposed development.

1.3.5 Impact Assessment

A rating matrix was used to evaluate objectively 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.

1.3.6 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.

2. ASSUMPTIONS AND LIMITATIONS

- Given the nature of the receiving environment and the height of the proposed PV panels and associated infrastructure elements, the study area or visual assessment zone is assumed to encompass an area of 5km from the boundary of the application site. This limit on the visual assessment zone relates to the fact that visual impacts decrease exponentially over distance. Thus, although the proposed development may still be visible beyond 5km, the degree of visual impact would diminish considerably. As such, the need to assess the impact on potential receptors beyond this distance would not be warranted.

- Due to the extent of the study area and the potentially large number of receptor locations, the identification of visual receptors was undertaken via desktop means only, using Google Earth imagery. 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.

- Site visits were undertaken during the initial phase of the project in October 2016 and again in August 2020 with the aim of verifying the visual character and level of transformation in the area and conducting a photographic survey of the area.

- For the purposes of the VIA, all analysis is based on a worst-case scenario where PV panel heights are assumed to be 4m.

- 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, minor topographical features or small undulations in the landscape may not be depicted on the DEM.

- No viewsheds were generated during 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 factored into the viewsheds.

- The impact rating assessment of the proposed development on some of the potentially sensitive visual receptor locations was undertaken via desktop means. Although the use of the farmsteads / residential dwellings could not be established during the field investigation, they were still regarded as being potentially sensitive to the visual impacts associated with the proposed development and were assessed as part of the VIA.

- The potential visual impact at each visual receptor location was assessed, via desktop means, 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.

- The assessment of receptor-based impacts has been based on the solar PV power plant layout provided by the proponent. It is recognised however that this layout is a preliminary one and is subject to changes based on a number of potential factors, including the findings of the BA studies. The PV panel area and associated infrastructure may thus move, which may result in greater or lesser visual impacts on receptor locations.

- 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.

- At the time of undertaking the visual study no information was available regarding the type and intensity of lighting that will be required for the proposed development and therefore the potential impact of lighting at night has not been assessed at a detailed level. However, lighting requirements are relatively similar for all Solar PV Energy Facilities (SPEFs) and as such, general measures to mitigate the impact of additional light sources on the ambiance of the nightscape have been provided.

- 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.

- Every effort has been made 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 photomontages (visualisation models) were undertaken for the proposed development. This can however be provided should the Public Participation process identify the need for this exercise.

- Most rainfall within the area occurs from October to March, during the summer months. During winter months, the visual impact of the proposed development may be greater, particularly from farmhouses surrounded by tall deciduous trees. The surrounding vegetation is however expected to provide only minimal potential screening. Hence the site visit (in August 2020), was undertaken at a time when the local vegetation cover would provide little screening of the proposed development.

- Clear weather conditions tend to prevail throughout most of the year in this area, and in these clear conditions, PV panels would present a greater contrast with the surrounding landscape than they would on an overcast day. Weather conditions were clear during the site visit and this was taken into consideration when undertaking this VIA.

3. TECHNICAL DESCRIPTION

3.1 PROJECT LOCATION

The proposed Leeuwbosch 3 SPEF is located approximately 6km north-east of the town of Leeudoringstad in the Maquassi Hills Local Municipality in the North West Province (**Figure 1)**.

The application site for Leeuwbosch PV 3 SPEF, namely Portion 37 of the Farm Leeuwbosch No. 44 is approximately 124.691 hectares (ha) in extent and is situated directly adjacent to the R502 Main Road (**Figure 2**).

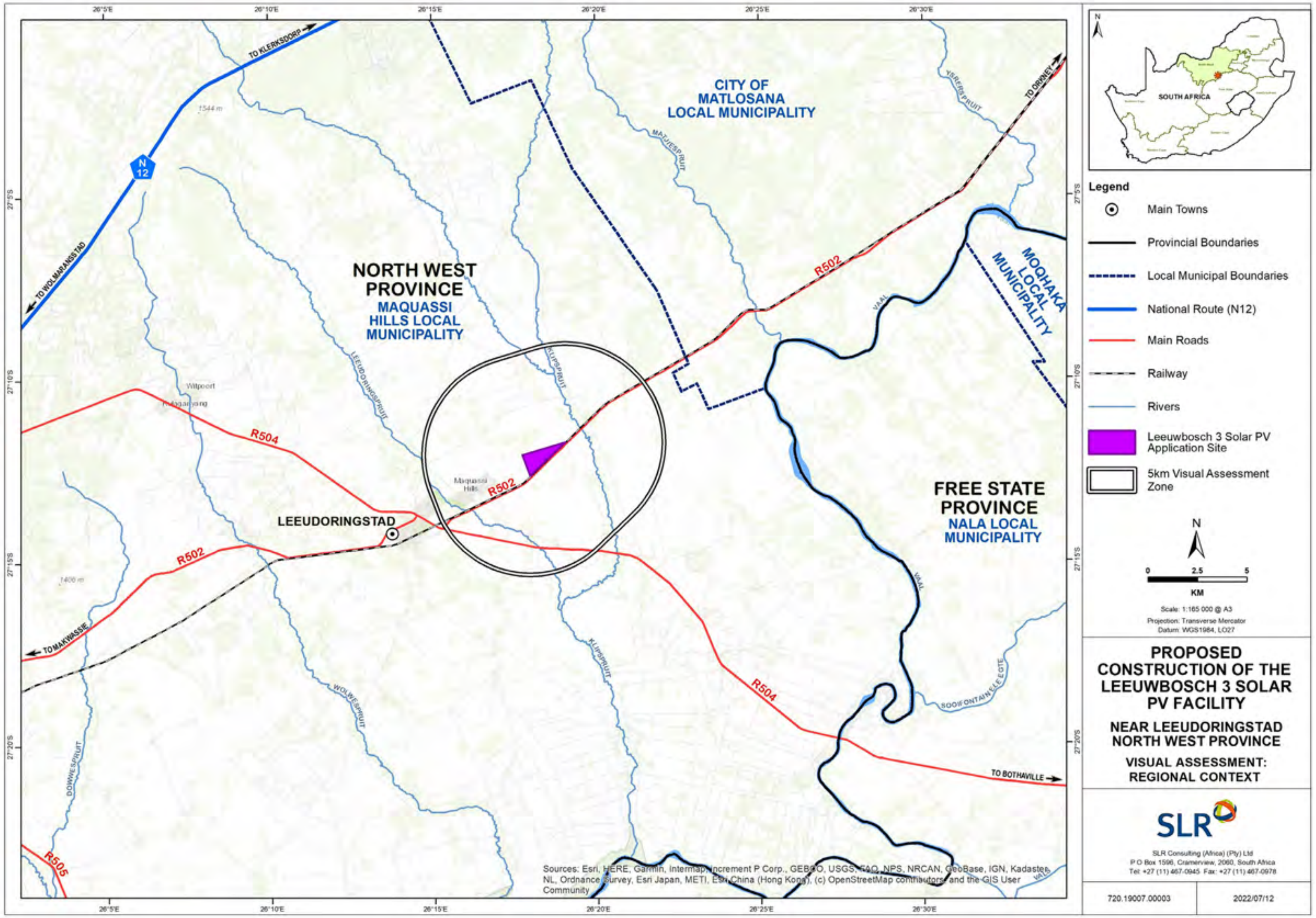

Figure 1: Regional Context

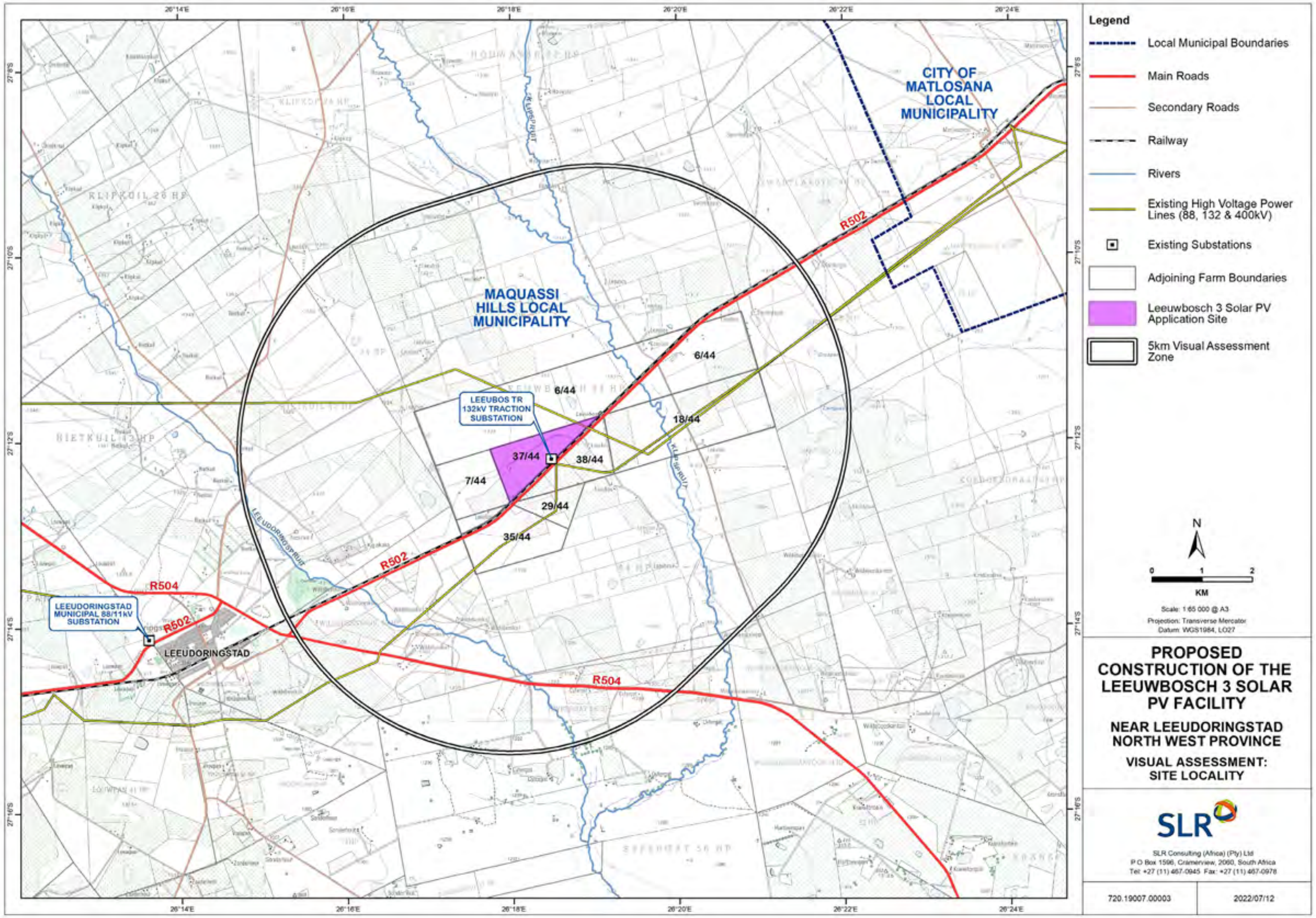

Figure 2: Site Locality

3.2 PROJECT DESCRIPTION

A BA process will be undertaken in respect of Leeuwbosch PV 3 SPEF and associated on-site infrastructure, including:

- Solar PV field, including panels and mountings;
- DL-AC current inverters and transformers [10 × 500 Kva (2.5m × 1m) within the PV field];
- Mini substations (3m × 2m within the PV field);
- Coupling station (≈10m × 10m); and
- Underground cabling (≈0.8m × 0.6 wide).

It is understood that Leeuwbosch PV 3 SPEF will make use of the existing infrastructure serving the Leeuwbsoch PV 1 and PV 2 SPEFs, including switching substation, maintenance buildings and access routes.

Once fully developed, the intention is to generate electricity (by capturing solar energy) to feed into the national electricity grid and "wheel" the power to customers based on a power purchase agreement. Additionally, an agreement is in place to sell the energy to PowerX, who hold a NERSA-issued electricity trading license which allows them to purchase energy generated from clean and renewable resources and sell it on to its customers.

The construction phase will be between 12 and 24 months and the operational lifespan will be approximately 20 years, depending on the length of the power purchase agreement with the relevant off taker.

3.2.1 Layout Alternatives

Design and layout alternatives were considered and assessed as part of the original BA process that was never completed, and as such the PV development area has been placed to avoid site sensitivities previously identified. The proposed PV development area for Leeuwbosch 3 SPEF is shown in **Figure 3** below.

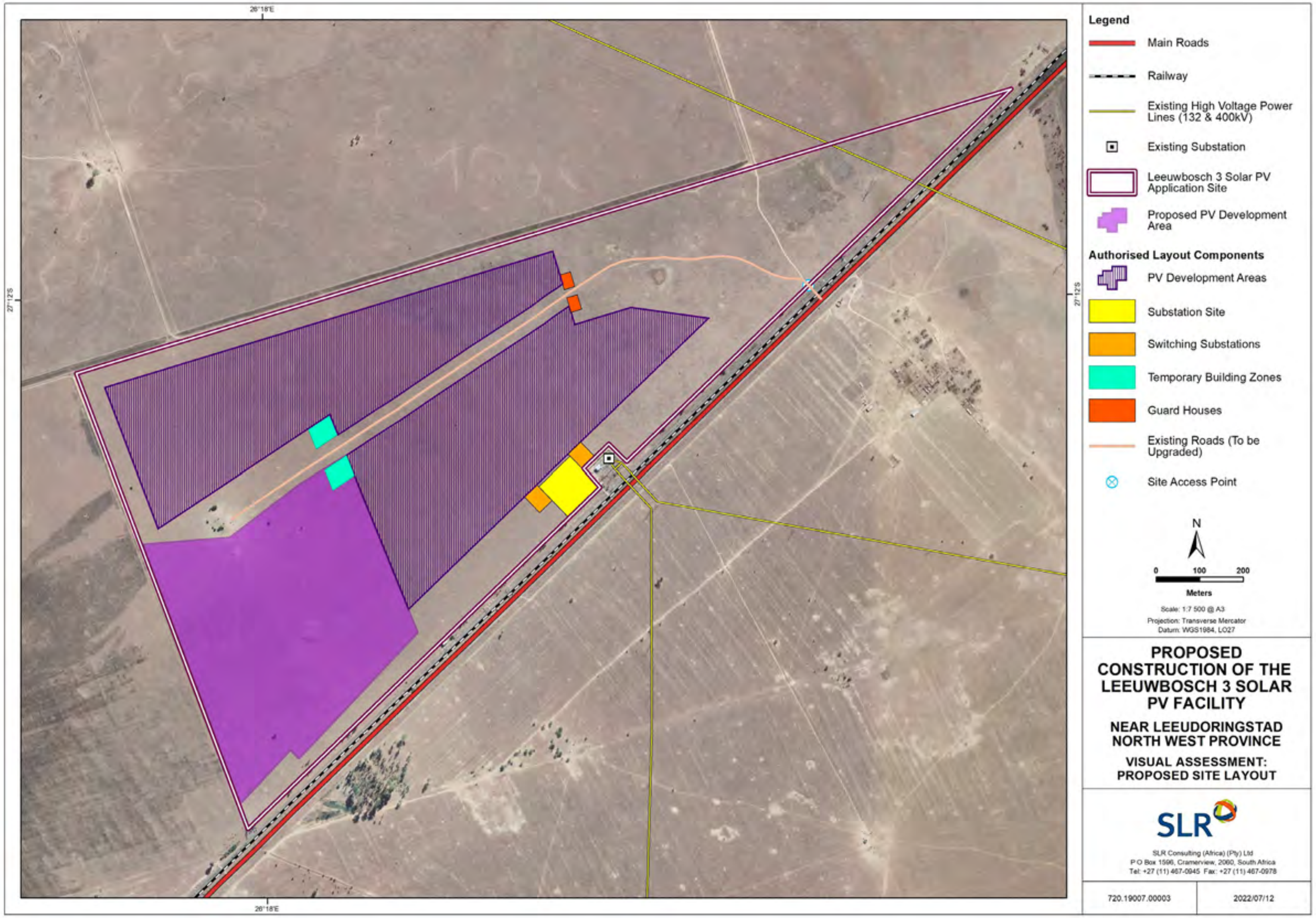

Figure 3: Proposed Site Layout

4. LEGAL REQUIREMENT AND GUIDELINES

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

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended, the each of the proposed SPEF projects include listed activities which require a BA to be undertaken. As part of this BA process, the need for a specialist VIA to be undertaken has been identified in order to assess the visual impact of the proposed development.

There is currently no legislation within South Africa that explicitly pertains to the assessment of visual impacts, however visual specialist studies are subject to the requirements of Appendix 6 of the Environmental Impact Assessment Regulations, as amended, (EIA Regulations), promulgated under sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

In addition to NEMA the following legislation has relevance to the protection of scenic resources:

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

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. DESCRIPTION OF THE RECEIVING ENVIRONMENT

5.1 PHYSICAL AND LAND USE CHARACTERISTICS

5.1.1 Topography

The topography within and in the immediate vicinity of the proposed application site is characterised by a mainly flat to gently undulating landscape, sloping down in a south-easterly direction.

In addition, the topography in the wider visual assessment zone is largely characterised by level plains with little noticeable relief and very gradual slopes (**Figure 4**).

Figure 4: Level plains with little noticeable relief resulting in wide-ranging vistas

Maps showing the topography and slopes within and in the immediate vicinity of the assessment area are provided in **Figure 5** and **Figure 6** below.

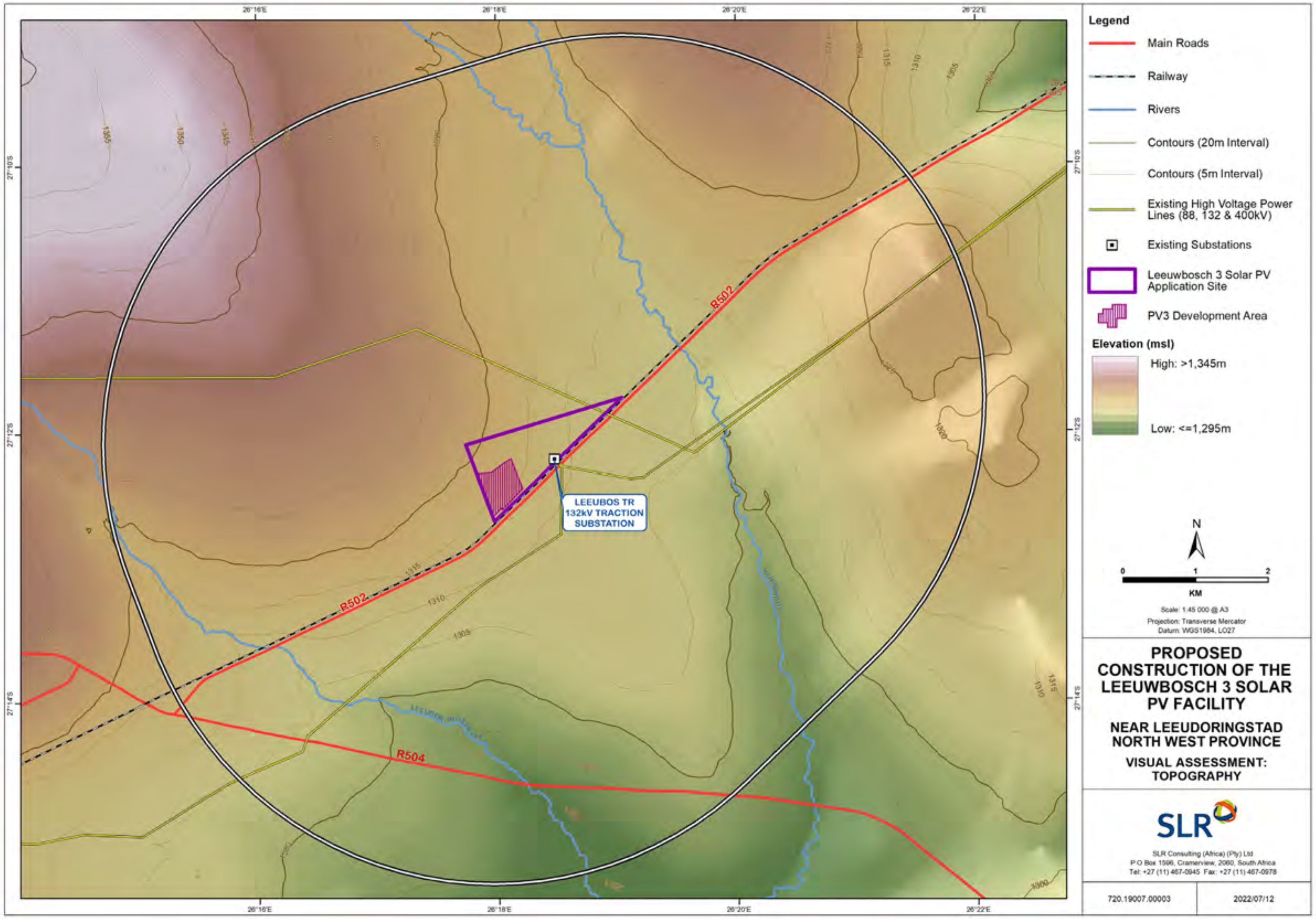

Figure 5: Topography in the Study Area

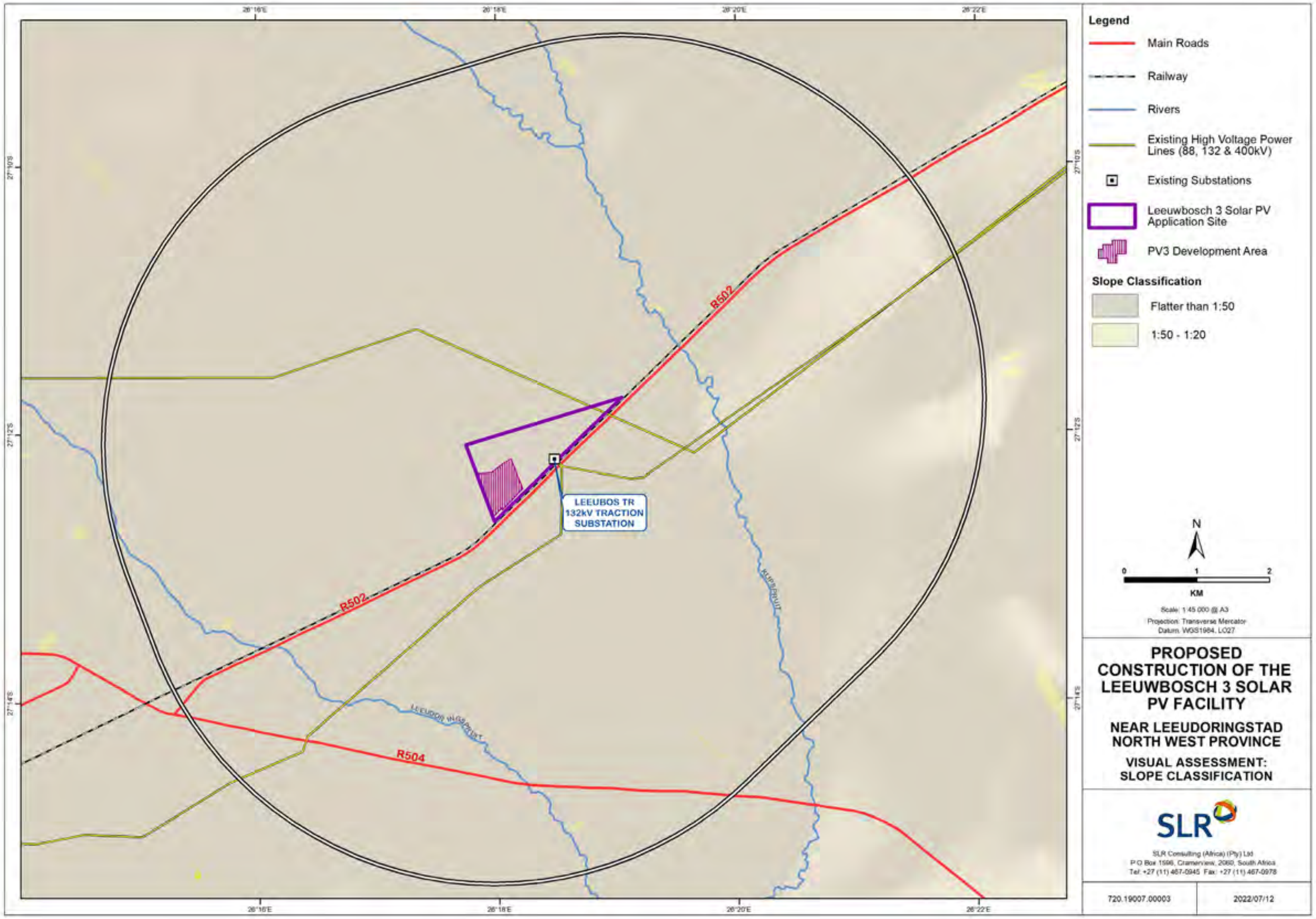

Figure 6: Slope Classification in the Study Area

Visual Implications

The largely flat terrain in the immediate vicinity of the application site results in generally wide-ranging vistas throughout the study area.

5.1.2 Vegetation

According to Mucina and Rutherford (2006), the entire study area is lies in the Vaal-Vet Sandy Grassland vegetation unit (**Figure 9**). The vegetation and landscape features of the Vaal-Vet Sandy Grassland vegetation unit are associated with plains-dominated landscapes with some scattered, slightly irregular and undulating plains and hills. Mainly low-tussock grasslands are prevalent with an abundant karroid element. The dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally, low cover of *T. triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall. Much of the study area is therefore characterised by low grassland, however with a scattering of low acacia trees (Vachellia Karoo) in evidence (**Figure 7**).

Figure 7: Typical grassland vegetation with acacia trees in evidence

In some parts of the study area, anthropogenic activities such as cultivation and livestock rearing have had an impact on the natural vegetation. Cultivated and fallow or burned fields are evident and in some instances, tall trees (sometimes exotic) and other typical garden vegetation have been established over many years around farmsteads (**Figure 8).**

Figure 8: Tall exotic tree species typically found in the study area

Visual Implications

The predominant open grassland results in wide-open vistas across most of the study area and as such the existing vegetation cover will provide little visual screening. In some instances however tall trees (sometimes exotic) established around farmhouses would provide some degree of visual screening.

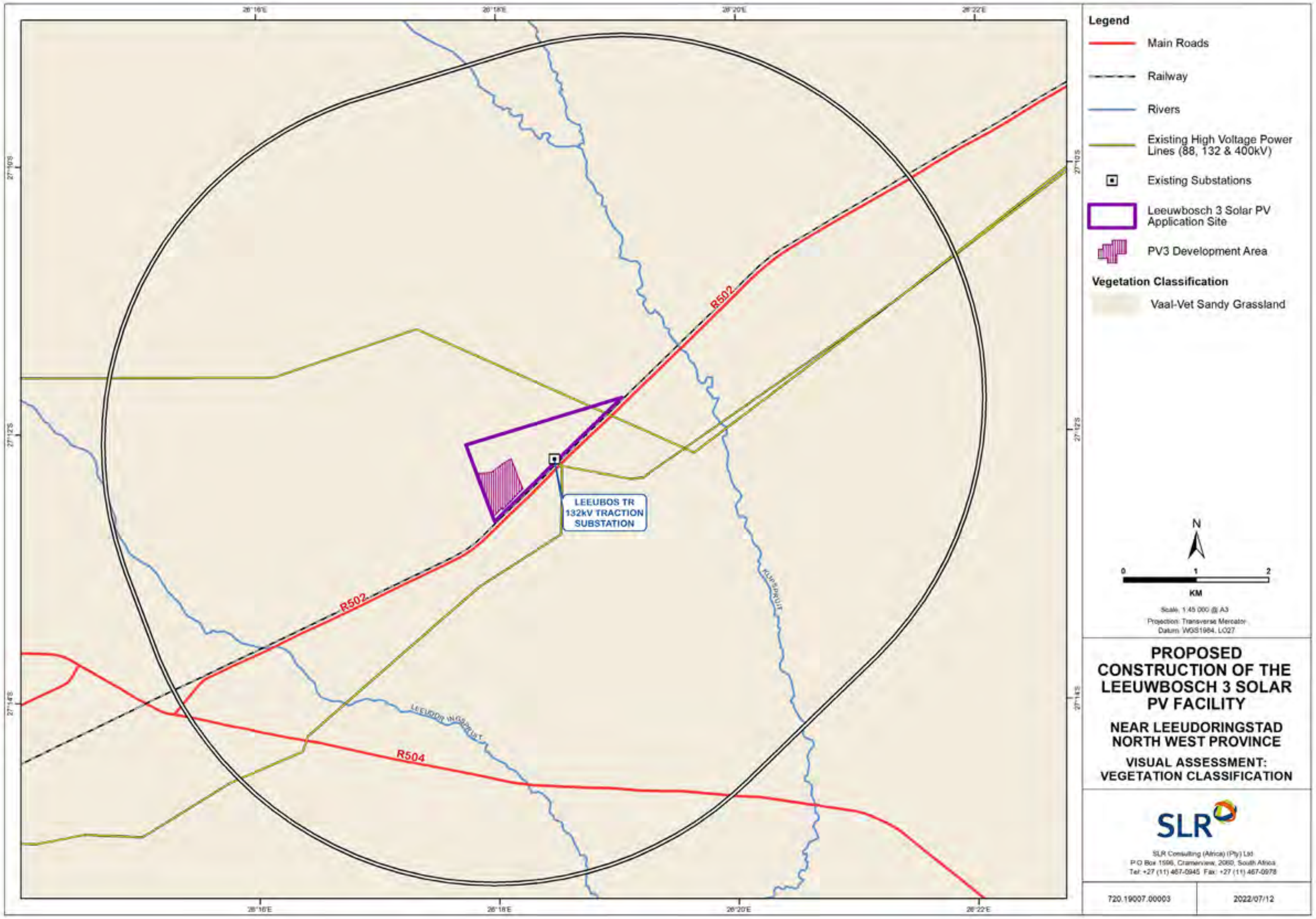

Figure 9: Vegetation Classification in the Study Area

5.1.3 Land Use

According to the South African National Land Cover dataset (GeoTerra Image 2018), much of the visual assessment area is characterised by natural vegetation which is dominated by natural grassland (**Figure 16**). There are however significant patches of land classified as “cultivated land” throughout the study area, although much of this land appears to be fallow grasslands. Hence livestock farming is the dominant agricultural activity in the study area, although livestock densities appear to be relatively low.

Farm properties in the study area tend to be relatively large resulting in a low density of rural settlement. Built form is largely characterised by scattered farmsteads and ancillary farm buildings (**Figure 10**), gravel access roads, telephone lines, fences and the remnants of disused workers’ dwellings. Other human influence is visible in the area in the form of road, rail and electricity infrastructure. This includes the R502 regional road which traverses the visual assessment zone in a north-east to south-west direction (along the southern boundary of the application site) and the R504 regional road which traverses the south-western section of the visual assessment zone. In addition, an operational railway line runs directly adjacent to the R502 (**Figure 11**) and several high voltage power lines (**Figure 12**) feed into the Leeubos TR 132kV Traction Substation situated on the boundary of the application site. The tall steel structures of the Traction Substation, as well as the tall steel towers of the power lines are expected to be visible from various parts of the study area (**Figure 13**).

Figure 10: Isolated Farmhouse visible from R504 Main Road

Figure 11: Railway infrastructure adjacent to the R502 Main Road

Figure 12: High voltage power lines in the study area

Figure 13: Power lines feeding into the Leeubos TR 132kV Traction Substation

The closest built-up areas include the town of Leeudoringstad, to the south-west, although only a small section of the town encroaches into the western sector of the study area and Kgakala Township, located approximately 1.7km to the south-west of the application site. Kgakala, is well inside the visual assessment zone for the Leeuwbosch PV project and has significantly altered the visual character of this sector of the study area. Within close proximity to this township, human influence is visible in the form of urban development and electricity infrastructure (**Figure 14**). General degradation of the visual character of the area has been exacerbated by significant amounts of litter in the township and the surrounding area, and the presence of an informal refuse dumping site located on the outskirts of the township (**Figure 15**) contributes to the overall disturbed nature of the Kgakala area.

Figure 14: Urban and infrastructural built form in Kgakala Township

Figure 15: Informal refuse dumping site on the outskirts of Kgakala Township

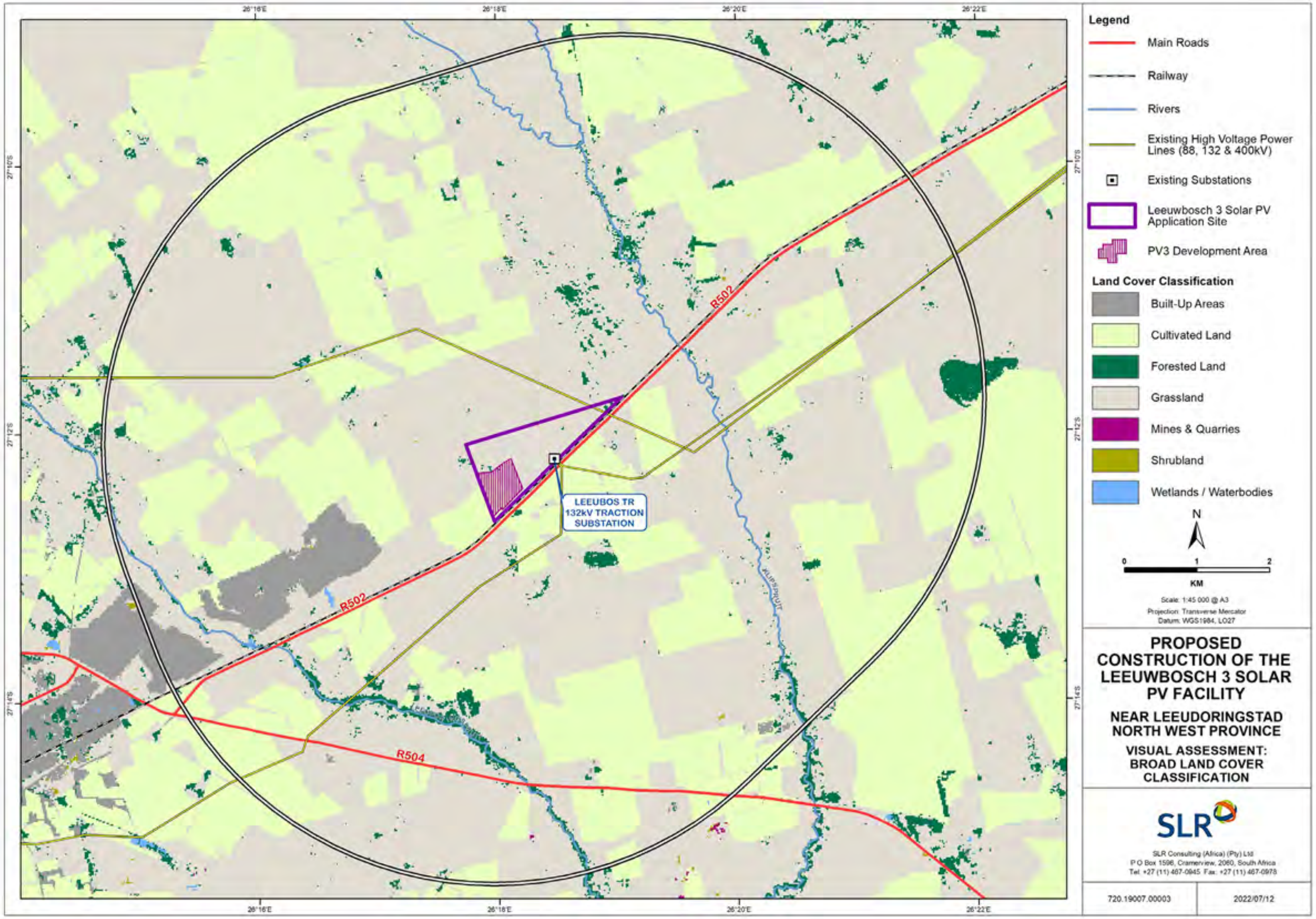

Figure 16: Broad Land Cover Classification in the Study Area

Visual Implications

The relatively low density of human habitation and presence of natural vegetation cover across large portions of the study area would give the viewer the general impression of a largely natural setting with some pastoral elements resulting from cultivation and livestock rearing activities. Although the town of Leeudoringstad is not expected to influence the visual character within the study area, high levels of human transformation and visual degradation become evident in the vicinity of the Kgakala Township. Urban development and electricity infrastructure significantly alter the visual character and the significant amounts of litter and a dumping site on the periphery of the township all contribute to the overall disturbed and degraded visual character of the surrounding area.

It should also be noted that the presence of road, rail and electricity infrastructure result in a more urban or industrial landscape character. Hence, the visual impacts associated with the proposed development are expected to be relatively insignificant in these areas as they have been relatively transformed and / or degraded.

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

6. SPECIALIST FINDINGS

6.1 VISUAL CHARACTER AND CULTURAL VALUE

The above physical and land use-related characteristics of the study area contribute to its overall visual character. Visual character 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, rail 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.

As mentioned above, much of the study area is characterised by rural areas with natural unimproved vegetation. Agriculture in the form of cultivation and livestock rearing is the dominant land use, which has transformed the natural vegetation in some areas. However, a large portion of the study area has retained a natural appearance due to the presence of the low shrubs and grasslands and the introduction of a solar PV power plant into this environment could be considered to be a degrading factor.

The most prominent anthropogenic elements in these areas include the R502 and R504 regional roads, rail infrastructure, high voltage power lines, the Leeubos TR 132kV Traction Substation, and other linear elements such as telephone poles, communication poles and farm boundary fences. However, the Kgakala Township and its environs appear more urban or disturbed, thus altering the overall visual character of the study area. In addition, litter in and around the township and the presence of a refuse dumping site on the outskirts of the township contribute to the overall disturbed nature of the area and will ultimately further degrade the visual character of the surrounding area.

The presence of the anthropogenic elements in the landscape is an important factor in this context, as the introduction of the proposed development would result in less visual contrast where other anthropogenic elements are already present. As such, the proposed development is not expected to result in significant visual impacts within these transformed areas.

The greater area surrounding the development site is an important component when assessing visual character. The area can be considered to be typical of a rural farming landscape that consists of largely flat areas of natural low shrubland and grassland interspersed with farmsteads, windmills, livestock holding pens and agricultural land. Livestock farming and other forms of agriculture are evident within the area. In addition, cultivation is considered to be an important land use within the study area. This can be attributed to the fact that the headquarters of “Suidwes Landbou”, one of the largest agricultural companies in South Africa, is located in the town of Leeudoringstad.

The small farming town of Leeudoringstad was established in 1920 and named after the Lion-thorn tree that was once characteristic of the farm Rietkuil, upon which the village was laid out. With the passing of time hunters gradually reduced the numbers of game in the area and the natural vegetation, including the “lion thorn" also gradually disappeared. The town made newspaper headlines on 17 July 1932 when a train carrying 320 to 330 tons of dynamite from the De Beers factory at Somerset West to the Witwatersrand exploded in the town centre, killing five people and numerous livestock, as well as damaging almost every building in the town. "The Star" newspaper of July 18th, 1932 carried extensive articles regarding this incident. This above-mentioned incident is described in the Leeudoringstad Museum (**http://www.stayza.com/leeudoringstad/**).

Considering the historical significance of the area, the broader area could potentially be seen to have some significance as a "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 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".

Based on the above, the study area can be regarded as a type 'ii', an organically evolving cultural landscape. It can be considered both a relict landscape, due to the relatively rich history dating back to the 1930's, and a continuing landscape as the typical rural farming landscape represents how the environment has been shaped by 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 farming towns, such as Leeudoringstad, engulfed by an otherwise rural environment, form an integral part of the wider landscape.

In light of this, it is important to assess whether the introduction of a solar PV facility with associated infrastructure into the study area would be a degrading factor in the context of the rural farming character of the landscape. In this instance however, visual impacts on the cultural landscape would be reduced by the fact that the visual character has been significantly transformed and degraded by urban and infrastructural development and also the fact there are relatively few tourism or nature-based leisure facilities in the study area.

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

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

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

i) **High** - The introduction of a new development such as a solar PV facility 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 1: 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 pastoral elements.										
Presence of potentially sensitive visual receptors	Relatively few potentially sensitive receptors have been identified in the study area.										
Aesthetic sense of place / visual character	Visual character is typical of a peri-urban / pastoral cultural landscape.										
Irreplaceability / uniqueness / scarcity value	Few areas of scenic value within the study area and these are not rated as highly unique.										
Cultural or symbolic meaning	Much of the area is typical of a peri-urban / pastoral 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 peri-urban / pastoral cultural landscapes.										
**Scenic quality under threat / at risk of change	Introduction of a Solar PV facility 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 29, which according to the scale above, would result in the area being rated as having a **LOW** visual sensitivity. This is mainly due to significant landscape transformation and degradation resulting from urban and infrastructural development (such as the Kgakala Township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line) which would have reduced the scenic quality of the area.

It should be stressed however 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 were identified in the study area and although a significant number of potentially sensitive receptors were identified in the study area, most of these appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors because they are located within a 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.

6.3 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 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 7.4** below), 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 depends on the viewer's perception and will vary from one inhabitant to another. 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 rural / pastoral character of the surrounding area.

6.3.1 Receptor Identification

During the VIA, a significant number potentially sensitive visual receptor locations were identified within the study area by desktop means, most of which appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the residents' sentiments toward the proposed development are unknown.

None of these receptor locations were identified as being sensitive. This is mainly due to the relative scarcity of leisure-based or nature based tourism activities in the assessment area. In addition, the only significant concentration of human habitation in the study area is the Kgakala Township which is largely characterised by urban land uses and a high degree of transformation. Although there is a relatively high concentration of receptors in this area, these receptors are not expected to be sensitive to the visual impact of the proposed development due to the existing visual degradation within these areas. Although a small section the town of Leeudoringstad encroaches into the visual assessment zone for the Leeuwbosch 3 SPEF, receptors on the periphery of the town are not expected to experience any adverse visual impacts from the proposed projects.

In many cases, roads, along which people travel, are considered to be sensitive receptors. The primary thoroughfares in the broader area the R502 and R504 Main Roads. The R502 regional road traverses the visual assessment zone in a north-east to south-west direction, connecting Leeudoringstad in the west with Orkney to the north-east. A section of this road abuts the Leeuwbosch 3 SPEF application site. The R504 regional road traverses the south-western section of the visual assessment zone, linking Leeudoringstad with Bothaville to the south-east. The roads are single carriageway tar roads, primarily used as access routes by local residents.

These roads do not form part of any formal scenic tourist routes, and are not specifically valued or utilised for their scenic or tourism potential. As such, the roads are not considered to be visually sensitive.

Other thoroughfares in the study area include gravel access / secondary roads which are primarily used by local farmers to gain access to surrounding farms / properties. These roads are therefore not regarded as visually sensitive as they do not form part of any scenic tourist routes and they are not specifically valued or utilised for their scenic or tourism potential.

There are therefore no visually sensitive roads within the visual assessment zone.

The potentially sensitive visual receptor locations in relation to the zones of visual impact are indicated in **Figure 17** below.

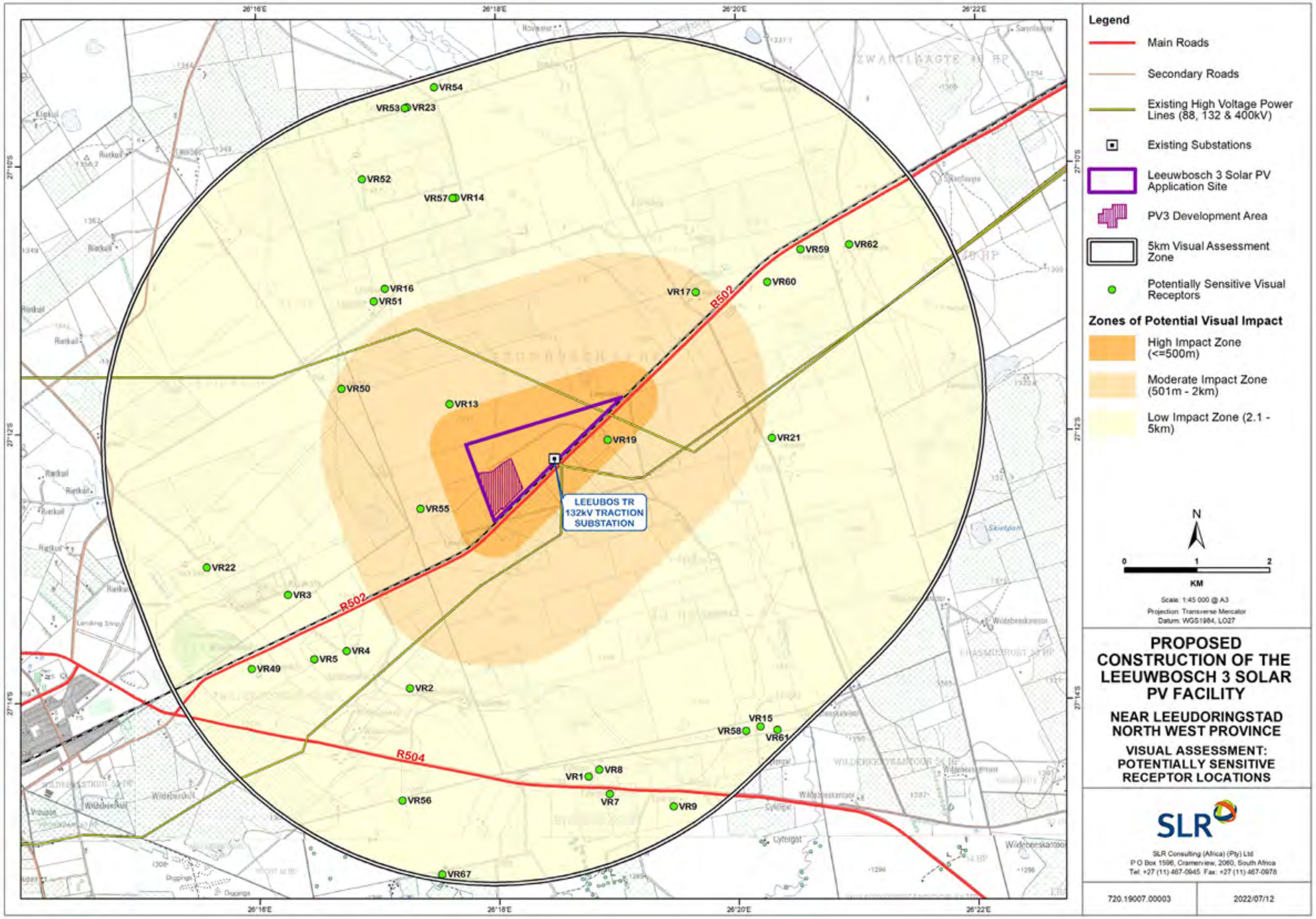

Figure 17: Visual Receptors in the Study Area

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 relatively flat topography in the study area and the relative lack of screening vegetation would reduce the visual absorption capacity, this would be offset to some degree by the presence of urban, peri-urban and infrastructural development in the vicinity of the proposed SPEFs.

Visual absorption capacity in the study area is therefore rated as **MODERATE**.

6.5 SITE SENSITIVITY VERIFICATION

Prior to commencing with the specialist assessment in accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

Visual sensitivity of the broader area surrounding the proposed Leeubosch 3 SPEF development site was found to be low largely due to the to the presence of degraded land and anthropogenic elements such as the Kgakala Township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line, which would likely reduce the scenic quality of the area.

As a result of the relatively flat terrain and the lack of screening vegetation, PV arrays placed on the site are expected to be at least partially visible from most of the potentially sensitive receptors and as such, no areas on the site were significantly more sensitive than the remainder of the site.

In assessing the visual sensitivity of the proposed Leeuwbosch 3 SPEF application site, consideration was given to the Landscape Theme of the National Environmental Screening Tool. Under this theme, the tool identifies areas of “**Medium”** sensitivity in respect of solar PV development on the application site. The identification of areas of “Medium” landscape sensitivity in this instance is related to the proximity of the site to Kgakala Township. **Figure 18** below is an extract from the Screening Tool Report generated for the Leeuwbosch 3 SPEF application site.

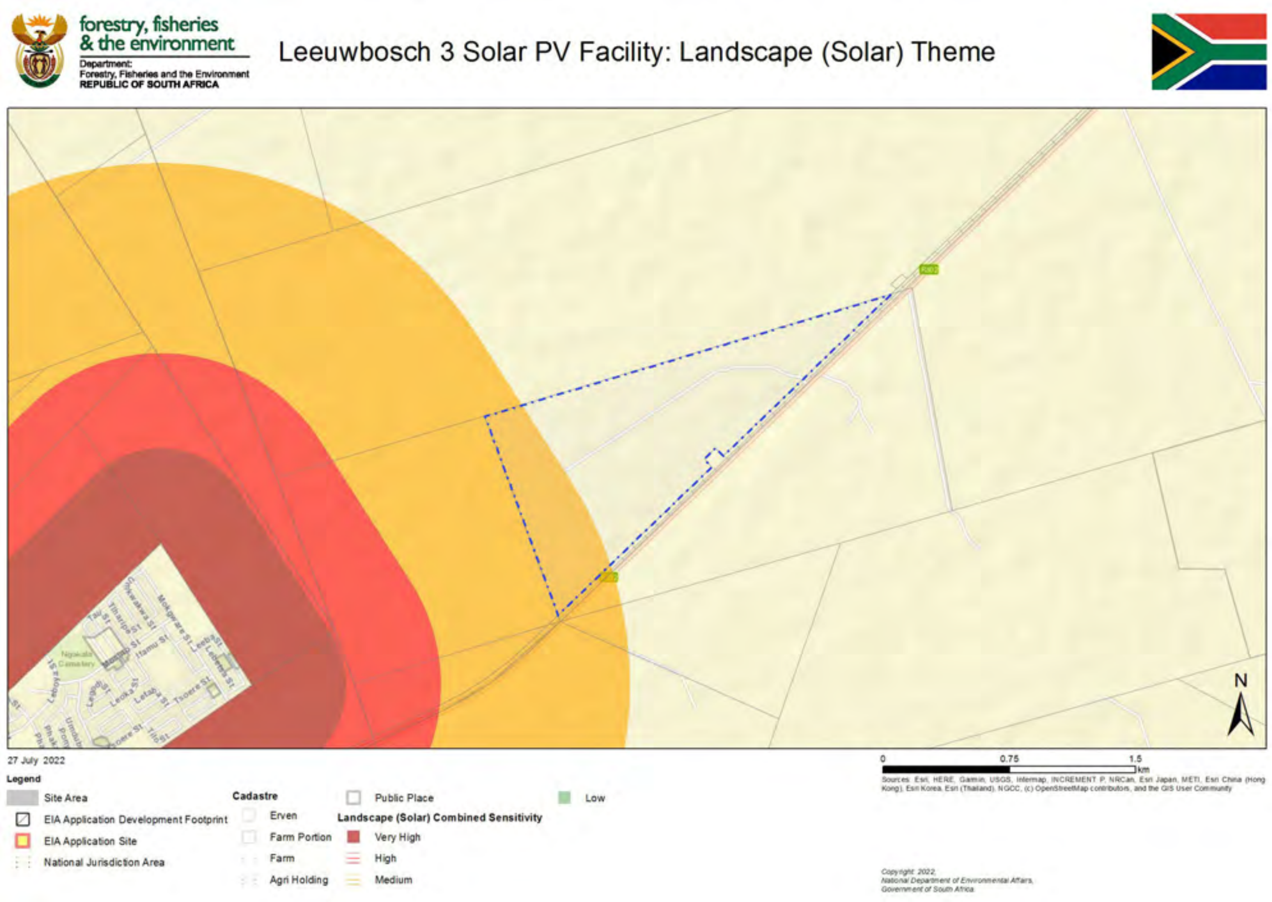

Figure 18: Relative Landscape Sensitivity for the Leeuwbosch 3 SPEF application site

This VIA has however found that, although there is a relatively high concentration of receptors in the Kgakala, Township, these receptors are not expected to be sensitive to the visual impact of the proposed development due to the existing visual degradation within these areas.

It should be noted that the Screening Tool is a very high level, desktop study and as such the results of the study must be viewed against the findings of the field investigation as well as factors affecting visual impact, such as:

- the presence of visual receptors;
- the distance of those receptors from the proposed development; and
- the likely visibility of the development from the receptor locations.

This issue is further examined in the Site Sensitivity Verification Report in Appendix D.

7. FACTORS INFLUENCING VISUAL IMPACT

7.1 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 a Solar PV Facility to be a negative visual impact as it is often associated with employment creation, social upliftment and the general growth and progression of an area, and thus the development could even have positive connotations.

7.2 VISUAL ENVIRONMENT

SPEFs are not features of the natural environment but are rather a representation of human (anthropogenic) alteration. As such, these developments are 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 PV panels and associated infrastructure 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 PV panels as a visual intrusion.

The presence of other anthropogenic features associated within 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 a Solar PV facility into this setting may be considered to be less visually intrusive than if there was no existing built infrastructure visible.

7.3 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.

7.4 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 19**).

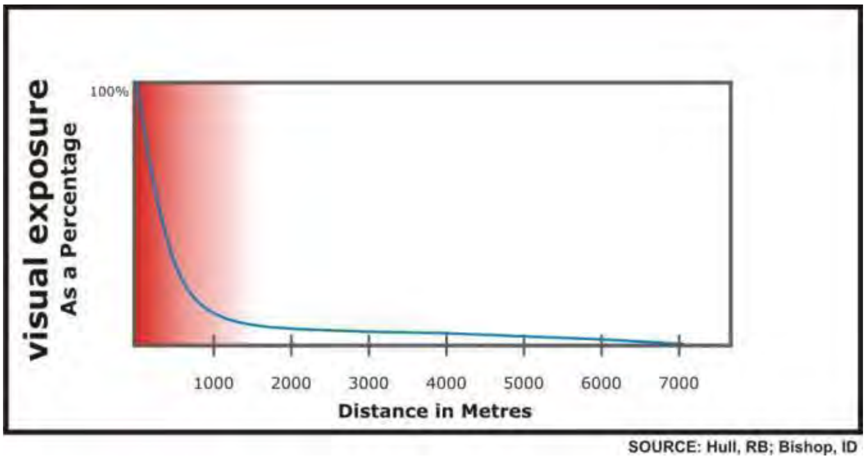

Figure 19: Conceptual representation of diminishing visual exposure over distance

8. ASSESSMENT OF IMPACTS

8.1 GENERIC VISUAL IMPACTS ASSOCIATED WITH SOLAR PV FACILITIES

In this section, the typical visual issues related to the establishment of solar PV facilities and associated infrastructure as proposed are discussed. It is important to note that the renewable energy industry is still relatively new in South Africa and as such this report draws on international literature and web material (of which there is significant material available) to describe the generic impacts associated with solar energy facilities.

8.1.1 Solar PV Fields

The solar PV component of the proposed SPEF consists of PV panels, which grouped together form a 'solar field'. As mentioned above, each PV panel is a large structure that is typically between 1 and 4m high (**Figure 20**). The height of these objects will make them visible, especially in the context of a relatively flat landscape.

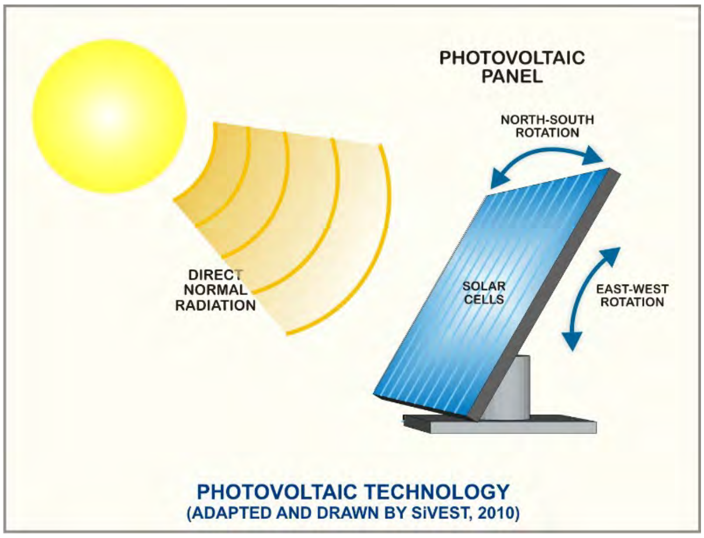

Figure 20: Typical components of a solar PV Panel

More importantly, the concentration of these panels will increase their visibility, depending on the number of panels in each solar field. Solar fields with a large spatial extent (footprint) will become distinctly visible features that contrast with the landscape, especially where the landscape is natural in character or undeveloped. In this context the solar field could be considered a visual intrusion, potentially altering the visual environment towards a more industrial character.

The establishment of PV facilities generally requires some levelling of the terrain and the clearance of taller shrubs and vegetation. This will intensify the visual prominence of the solar energy facility, particularly in natural locations where little transformation has taken place as shown in the example provided in **Figure 21**.

Figure 21: Kathu Solar Power Plant (photo courtesy of "visits to the park"), near Kathu, Northern Cape Province.

8.1.2 Associated On-Site Infrastructure

The infrastructure associated with the proposed Leeuwbosch 3 SPEF will include the following (in addition to the PV arrays):

- DL-AC current inverters and transformers [10 × 500 Kva (2.5m × 1m) within the PV field];
- Mini substations (3m × 2m within the PV field);
- Coupling station (≈10m × 10m); and
- Underground cabling (≈0.8m × 0.6 wide).

Surface clearance for cable trenches may result in the increased visual prominence of these features, thus increasing the level of contrast with the surrounding landscape. In addition, security lighting on the site may impact on the nightscape (Section 8.3).

However, the visual impact of infrastructure associated with the proposed development is generally not regarded as a significant factor when compared to the visual impact associated with large PV arrays. The infrastructure would, however, increase the visual "clutter" of the proposed development and magnify the visual prominence of the development if located on ridge tops or flat sites in natural settings where there is limited tall wooded vegetation to conceal the impact.

8.2 RECEPTOR IMPACT RATING

In order to assess the impact of the proposed facilities 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 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.

8.2.1 Distance

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 Leeuwbosch 3 SPEF application site. Beyond 5km, the visual impact of a solar PV facility and the associated infrastructure diminishes considerably, as the development would appear to merge with the elements on the horizon. Hence, receptor locations beyond this distance have not been included in the receptor impact rating.

Zones of visual impact were delineated according to distance from the boundary of the application site. Based on the height and scale of the solar PV 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)

8.2.2 Screening Elements

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.

8.2.3 Visual Contrast

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.

8.2.4 Receptor Impact Rating Matrix

The matrix returns a score which in turn determines the visual impact rating assigned to each receptor location (**Table 2**) below.

Table 2: 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 3** below.

Table 3: Visual assessment matrix used to rate the impact of the proposed development on potentially sensitive receptors

VISUAL FACTOR	VISUAL IMPACT RATING			
	HIGH	**MODERATE**	**LOW**	**OVERRIDING FACTOR: 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**	

Table 4. below presents a summary of the overall visual impact of the proposed development on each of the potentially sensitive visual receptor locations which were identified within 5kms of the proposed Leeuwbosch 3SPEF application site.

Table 4: Summary Receptor Impact Rating

Receptor Location	Distance	Screening	Contrast	OVERALL IMPACT RATING
VR 1 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 2 - Farmstead	Low (1)	Moderate (2)	Moderate (2)	MODERATE (5)
VR 3 – Kgakala Township	Low (1)	Low (1)	Low (1)	LOW (3)
VR 4 - Farmstead	Low (1)	Moderate (2)	Moderate (2)	MODERATE (5)
VR 5- Farmstead	Low (1)	Moderate (2)	Moderate (2)	MODERATE (5)
VR 7 - Farmstead	Low (1)	Moderate (2)	Moderate (2)	MODERATE (5)
VR 8 - Farmstead	Low (1)	Moderate (2)	Moderate (2)	MODERATE (5)
VR 9 - Farmstead	Low (1)	Moderate (2)	Moderate (2)	MODERATE (5)
VR 13 - Farmstead	Moderate (2)	Moderate (2)	Moderate (2)	MODERATE (6)
VR 14 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 15 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 16 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 17 - Farmstead	Moderate (2)	Low (1)	Moderate (2)	MODERATE (5)
VR 19 - Farmstead	High (3)	Moderate (2)	Moderate (2)	MODERATE (7)
VR 21 - Farmstead	Low (1)	Low (1)	High (3)	MODERATE (5)
VR 22 - Farmstead	Low (1)	Low (1)	Low (1)	LOW (3)
VR 23 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 49 - Farmstead	Low (1)	Low (1)	Moderate (2)	LOW (4)
VR 50 - Farmstead	Moderate (2)	Moderate (2)	Moderate (2)	MODERATE (6)
VR 51 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 52 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 53 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 54 - Farmstead	Low (1)	Low (1)	High (3)	MODERATE (5)
VR 55 - Farmstead	Moderate (2)	Moderate (2)	Moderate (2)	MODERATE (6)
VR 56 - Farmstead	Low (1)	Low (1)	High (3)	MODERATE (5)
VR 57 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 58 - Farmstead	Low (1)	Moderate (2)	High (3)	MODERATE (6)
VR 59 - Farmstead	Low (1)	Low (1)	Moderate (2)	LOW (4)
VR 60 - Farmstead	Low (1)	Low (1)	Moderate (2)	LOW (4)
VR 61 - Farmstead	Low (1)	Low (1)	High (3)	MODERATE (5)
VR 62 - Farmstead	Low (1)	Low (1)	Moderate (2)	LOW (4)
VR 67 - Farmstead	Low (1)	Low (1)	High (3)	MODERATE (5)

Although the proposed development would theoretically be visible (to a degree) from all of the potentially sensitive visual receptor locations, none of these potentially sensitive receptor locations are expected to experience high levels of visual impact as a result of the proposed development. As indicated above, the proposed development would result in a moderate visual impact on almost all of the potentially sensitive visual receptor locations identified within the study area (26 in total). None of these receptors are tourism-related facilities however, and as such they are not considered to be Sensitive Receptors. Thus the moderate impact rating assigned will not affect the overall impact ratings determined in Section **8.7**.

The remaining six (6) potentially sensitive visual receptors will be subjected to low levels of visual impact as a result of the proposed development.

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.

The Kgakala Township, located approximately 1.7km to the south-west of the application site, is the main source of light within the surrounding area. This township is therefore expected to have a significant impact on the night scene. The small town of Leeudoringstad is also another significant source of light within the surrounding area, although the town is located approximately 4.8km to the south-west of the application site and is therefore only expected to have a limited impact on the night scene within the study area. Another prominent light source within the study area at night is the security lighting at the existing Leeubos TR 132kV Traction Substation. It is expected that the lights from this substation will be seen at night from relatively far away. Other sources of light are limited to localised lighting from the surrounding farmsteads and residential dwellings. These farmsteads are located within largely undisturbed / untransformed parts of the study area and are therefore characterised by limited amounts of lighting at night. Due to the fact that the VIA was undertaken via desktop methods, feedback could not be obtained from the local farmers and residents regarding the night time scene and light sources. Accordingly, the visual character of the night environment within the study area is considered to be slightly 'polluted' and will therefore not be regarded as pristine.

Due to the fact that a significant amount of light is already present within the surrounding area, the nightscape is not expected to be sensitive to the impact of additional lighting at night. The relatively natural dark character of the nightscape experienced from many of the identified farmsteads is however expected to be moderately sensitive to the impact of additional lighting at night as these areas are characterised by limited disturbance / transformation. Existing night time views from these areas are characteristic of a relatively dark night scene with some light sources visible in the distance as well as those from the Kgakala Township, Leeudoringstad and the existing Leeubos TR 132kV Traction substation.

The security lighting required for the proposed solar PV power plant and associated infrastructure is expected to intrude slightly on the nightscape and create additional glare, which would increase the existing light pollution in the surrounding area.

8.4 CUMULATIVE IMPACTS

Although it is important to assess the visual impacts of the proposed solar PV facility specifically, it is equally important to assess the 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.

Renewable energy facilities 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 and also exacerbate the visual impacts on surrounding visual receptors, once constructed. Although power lines and substations are relatively small developments when compared to renewable energy facilities, they may still introduce a more industrial character into the landscape, thus altering the sense of place.

Five renewable energy projects were identified within a 30 km radius of the proposed development as shown in **Figure 22** below. The projects, as listed in Table 5: Renewable energy developments proposed within a 30km radius of the Leeuwbosch **Table 5**, were identified using the DEFF's Renewable Energy EIA Application Database for SA. It is assumed that all of these renewable energy developments include grid connection infrastructure.

Table 5: Renewable energy developments proposed within a 30km radius of the Leeuwbosch 3 SPEF

Applicant	Project	Technology	Capacity	Status of Application / Development
Bokomoso Energy (Pty) Ltd	Bokomoso PV Solar Energy Facility	Solar PV	75MW	Under Construction
Upgrade Energy (Pty) Ltd	Leeuwbosch 1 Solar PV	Solar PV	9.9MW	Approved
Upgrade Energy (Pty) Ltd	Leeuwbosch 2 Solar PV	Solar PV	9.9MW	Approved
Upgrade Energy (Pty) Ltd	Wildebeestkuil 1 Solar PV	Solar PV	9.9MW	Approved
Upgrade Energy (Pty) Ltd	Wildebeestkuil 2 Solar PV	Solar PV	9.9MW	Approved

All 5 of these projects are Solar PV facilties and are located within 10kms of the application site and in close proximity to the R502 Main Road. The proposed Leeuwbosch 1 Solar PV and Leeuwbosch 2 Solar PV projects (authorised under DEDECT reference numbers NWP/EIA/41/2021 and NWP/EIA/45/2021) are located on the same farm portion as Leeuwbosch 3 SPEF while the Wildebeestkuil 1 and 2 SPEFs (DEDECT reference numbers NWP/EIA/44/2021 and NWP/EIA/46/2021) are located less than 5km away. It should also be noted that, related to these renewable energy developments is a significant electrical infrastructure project in the form of the proposed Leeudoringstad Solar Plant Substation. This proposed substation is located on the Leeuwbosch 1 and 2 Solar PV application site and is intended to serve the Leeuwbosch PV projects as well as the Wildebeestkuil PV projects. The proposed substation was approved on 14th December 2021 (DEDECT reference number NWP/EIA/43/2021).

Considering the proximity of the approved Wildebeestkuil and Leeuwbosch Solar PV projects to the proposed Leeuwbosch 3 SPEF, it is anticipated that the identified potentially sensitive visual receptors will experience significant cumulative visual impacts should all of these SPEF Projects be constructed. Bokamoso SEF is however some 1.5km outside the visual assessment zone for the Leeuwbosch PV projects and is only expected to affect the few receptors located in the eastern sector of the assessment zone. It is however important to note that the sensitivity of these farmsteads is largely subjective.

Areas in close proximity to the R503 have already undergone noticeable change as a result of road, rail and electricity infrastructure and this will be exacerbated with the development of additional SPEFs and associated infrastructure in these areas as proposed. Impacts of this transformation will however be reduced by the fact that the landscape in the vicinity of the proposed Leeuwbosch 3 SPEF has already been disturbed by anthropogenic elements such as the Kgakala Township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line. In addition, it is possible that the Leeuwbosch and Wildebeestkuil SPEF projects and associated grid connection infrastructure, located in close proximity to each other, could be seen as one large SPEF 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.

An examination of the literature available for the environmental assessments undertaken for some 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 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.

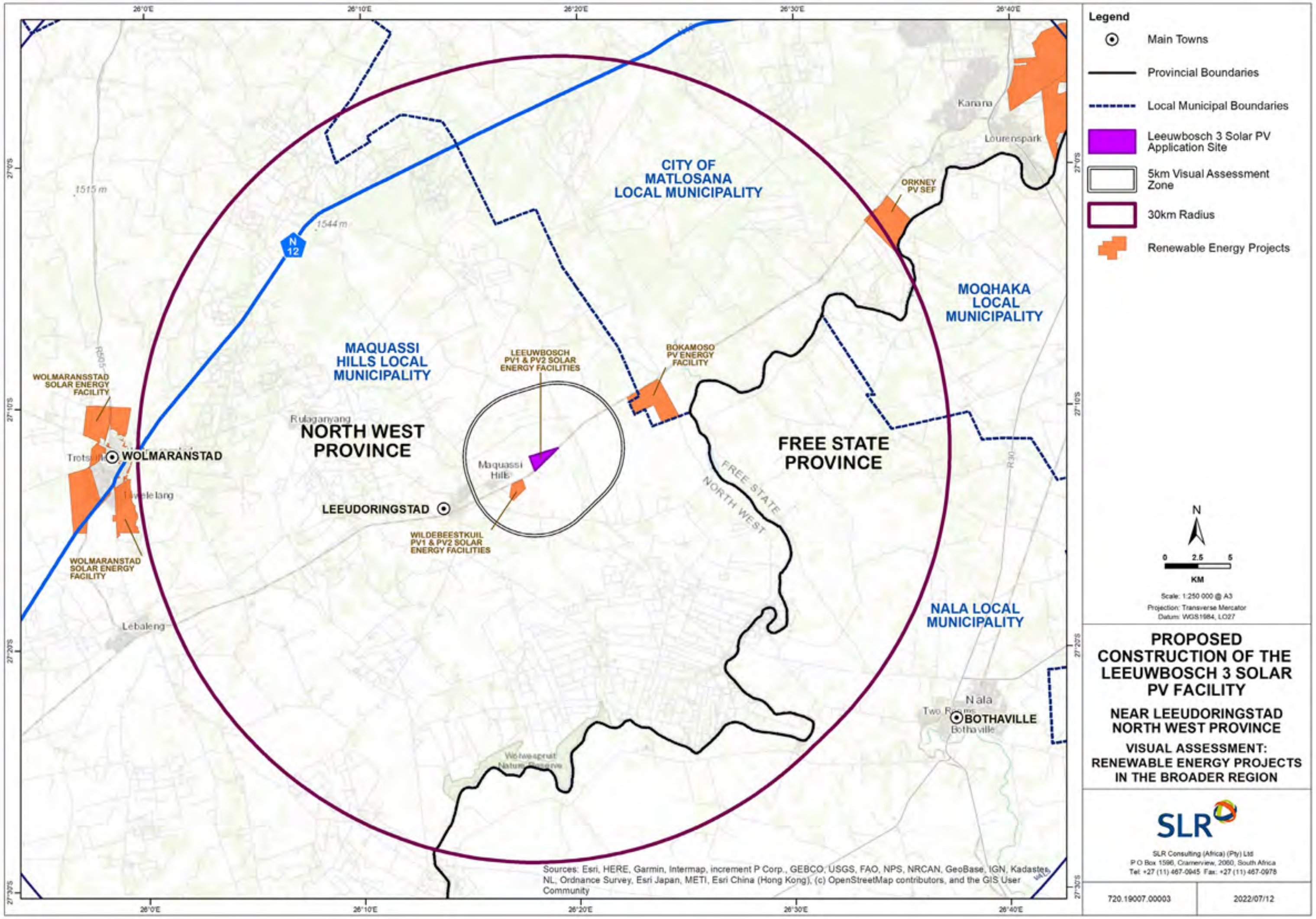

Figure 22: Renewable energy facilities proposed within a 30km radius of the Leeuwbosch 3 SPEF

8.5 SUMMARY OF KEY ISSUES IDENTIFIED

The potential visual issues / impacts identified during the VIA for the proposed Leeuwbosch 3 SPEF project include:

- Potential alteration of the visual character of the area during both construction and operation;
- Potential visual impact on receptors in the study area;
- Potential visual intrusion resulting from vehicles and equipment during construction and decommissioning phases;
- Potential impacts of increased dust emissions from construction / decommissioning activities and related traffic during construction and decommissioning phases;
- Potential visual scarring of the landscape as a result of site clearance and earthworks during construction;
- Potential visual intrusion resulting from PV arrays during operation;
- Potential visual clutter in the landscape resulting from the PV arrays and associated on-site infrastructure;
- Potential alteration of the night time visual environment as a result operational and security lighting at the proposed PV facilities;
- Potential visual intrusion of any remaining infrastructure on the site during decommissioning; and
- Combined visual impacts (i.e. cumulative visual impacts) from other renewable energy facilities in the broader area could potentially alter the sense of place and visual character of the area.

No comments or feedback pertaining to the visual environment have been received from the public participation process to date. Accordingly, any issues raised of a visual nature during the public participation process will be incorporated into this report.

8.6 POTENTIAL IMPACTS

The potential visual issues / impacts resulting from the proposed Leeuwbosch 3 SPEF project are outlined below.

8.6.1 Construction Phase

- 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.
- The night time visual environment will be altered as a result of construction-related lighting at the proposed PV facility.

8.6.2 Operational Phase

- The PV arrays and on-site infrastructure may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.
- The proposed solar PV facility will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts.
- 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 as a result of operational and security lighting at the proposed PV facility.

8.6.3 Decommissioning Phase

- 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 site 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 areas could result in dust which would have a visual impact.

8.6.4 Cumulative Impacts

- Additional renewable energy 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 in the broader area.

8.6.5 No Go Alternative

The ‘No Go’ alternative is essentially the option of not developing a Solar PV Facility 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.

8.7 OVERALL 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. **Leeuwbosch 3** Solar PV Facility Table 6 and **Leeuwbosch 3** Solar PV Associated Infrastructure

Table 7 below presents the impact matrix for visual impacts associated with the proposed construction and operation of the Leeuwbosch 3 SPEF and the associated on-site infrastructure. 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.

8.7.1 Leeuwbosch 3 Solar PV Facility

Table 6: Impact Rating for Leeuwbosch 3 SPEF

LEEUWBOSCH 3 SOLAR PV FACILITY																					
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	2	3	1	2	1	2	18	-	Low	• Carefully plan to mimimise the construction period and avoid construction delays. • Inform receptors within 500m of the site of the construction programme and schedules. • Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. • Vegetation clearing should take place in a phased manner.	2	2	1	2	1	2	16	-	Low	

LEEUWBOSCH 3 SOLAR PV FACILITY																				
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**
	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.										• Where possible, re-vegetate all reinstated cable trenches with the same vegetation that existed prior to the cable being laid. • Establish erosion control measures on areas which will be exposed for long periods of time. This is to reduce the potential impact heavy rains may have on the bare soil. • Suitable buffers of intact natural vegetation should be provided along the perimeter of the development area. • Maintain a neat construction site by removing rubble and waste materials regularly.									

LEEUWBOSCH 3 SOLAR PV FACILITY																				
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
											• 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: ▪ on all access roads; ▪ in all areas where vegetation clearing has taken place; ▪ on all soil stockpiles. • Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.									

LEEUWBOSCH 3 SOLAR PV FACILITY																				
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
Operational Phase (Direct Impacts)																				
• 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 PV arrays may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. • The proposed solar PV facility will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. • Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers.	2	3	3	3	3	2	28	-	Medium	• Restrict vegetation clearance on the site to that which is required for the correct operation of the facility. • Ensure that the PV arrays are not located within 500m of any farmhouses in order to minimise visual impacts on these dwellings. • As far as possible, limit the number of maintenance vehicles which are allowed to access the site. • Ensure that dust suppression techniques are implemented on all gravel access roads.	2	3	3	2	2	2	24	-	Medium

LEEUWBOSCH 3 SOLAR PV FACILITY																				
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
	• The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility.										• Only clear vegetation on site and adjacent to the site which is required to be cleared for the correct operation of the facility. • As far as possible, limit the amount of security and operational lighting present on site. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • If possible, light sources should be shielded by physical barriers (walls, vegetation, or the structure itself); • Lighting fixtures should make use of minimum lumen or wattage.									

LEEUWBOSCH 3 SOLAR PV FACILITY																				
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**
											• Mounting heights of lighting fixtures should be limited, or alternatively, foot-light or bollard level lights should be used. • If economically and technically feasible, make use of motion detectors on security lighting. • Care should be taken with the layout of the security lights to prevent motorists on the R502 from being blinded by lights.									
Decommissioning Phase (Direct Impacts)																				
• Potential visual intrusion resulting from vehicles and equipment involved in the de-	• Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose	2	3	1	2	1	2	18	-	Low	• All infrastructure that is not required for post-decommissioning use should be removed.	2	2	1	2	1	2	16	-	Low

LEEUWBOSCH 3 SOLAR PV FACILITY																				
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
commissioning process; • Potential visual impacts of increased dust emissions from de-commissioning activities and related traffic; and • Potential visual intrusion of any remaining infrastructure on the site.	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 site may evoke negative sentiments from surrounding viewers. • Surface disturbance during decommissioning would expose bare soil (scarring) which could visually surrounding environment. • Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind										• 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. • All cleared areas should be rehabilitated as soon as possible • Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required.									

LEEUWBOSCH 3 SOLAR PV FACILITY																					
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
	blowing over these disturbed areas could result in dust which would have a visual impact.																			
Cumulative Impacts																				
• 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 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.	3	3	3	3	3	2	30	-	Medium	• Restrict vegetation clearance on development sites to that which is required for the correct operation of the facility. • Ensure that the PV arrays are not located within 500m of any farmhouses in order to minimise visual impacts on these dwellings. • As far as possible, limit the number of maintenance vehicles which are allowed to access the facility.	3	3	3	2	2	2	26	-	Medium

LEEUWBOSCH 3 SOLAR PV FACILITY																				
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
	• 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 in the broader area.										• Ensure that dust suppression techniques are implemented on all gravel access roads. • As far as possible, limit the amount of security and operational lighting present on site. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • If possible, light sources should be shielded by physical barriers (walls, vegetation, or the structure itself); • Lighting fixtures should make use of minimum lumen or wattage.									

LEEUWBOSCH 3 SOLAR PV FACILITY																				
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
											• Mounting heights of lighting fixtures should be limited, or alternatively foot-light or bollard level lights should be used. • If possible, make use of motion detectors on security lighting. • Non-reflective surfaces should be utilised where possible.									

8.7.2 Leeuwbosch 3 Solar PV Associated Infrastructure

Table 7: Impact Rating for On-Site Infrastructure associated with Leeuwbosch 3 SPEF

LEEUWBOSCH 3 SOLAR PV ASSOCIATED INFRASTRUCTURE (Switching substation, temporary building zone and guard hut)																					
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	2	3	1	2	1	2	18	-	Low	• Carefully plan to mimimise the construction period and avoid construction delays. • Inform receptors within 500m of the site of the construction programme and schedules. • Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. • Vegetation clearing should take place in a phased manner.	2	2	1	1	1	2	14	-	Low	

LEEUWBOSCH 3 SOLAR PV ASSOCIATED INFRASTRUCTURE (Switching substation, temporary building zone and guard hut)																				
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
	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.										• Maintain a neat construction site by removing rubble and waste materials regularly. • Where possible, underground cabling should be utilised. • Make use of existing gravel access roads where possible. • Limit the number of vehicles and trucks travelling to and from the 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.									

LEEUWBOSCH 3 SOLAR PV ASSOCIATED INFRASTRUCTURE (Switching substation, temporary building zone and guard hut)																				
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
											• Ensure that dust suppression techniques are implemented: ▪ on all access roads; ▪ in all areas where vegetation clearing has taken place; ▪ on all soil stockpiles. • Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.									
Operational Phase (Direct Impacts)																				
• Potential alteration of the visual character and sense of place. • Potential visual impact on	• The on-site infrastructure may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.	2	3	2	2	3	1	12	-	Low	• Restrict vegetation clearance on the site to that which is required for the correct operation of the facility.	2	3	2	2	3	1	12	-	Low

LEEUWBOSCH 3 SOLAR PV ASSOCIATED INFRASTRUCTURE (Switching substation, temporary building zone and guard hut)																				
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
receptors in the study area. • Potential visual impact on the night time visual environment.	• The on-site infrastructure will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. • 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 as a result of operational and security lighting at the proposed PV facility.										• As far as possible, limit the number of maintenance vehicles which are allowed to access the site. • Ensure that dust suppression techniques are implemented on all gravel access roads. • As far as possible, limit the amount of security and operational lighting present on site. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • If possible, light sources should be shielded by physical barriers (walls, vegetation, or the structure itself);									

LEEUWBOSCH 3 SOLAR PV ASSOCIATED INFRASTRUCTURE (Switching substation, temporary building zone and guard hut)																				
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
											• Lighting fixtures should make use of minimum lumen or wattage. • Mounting heights of lighting fixtures should be limited, or alternatively, foot-light or bollard level lights should be used. • If economically and technically feasible, make use of motion detectors on security lighting. • Care should be taken with the layout of the security lights to prevent motorists on the R502 from being blinded by lights.									
Decommissioning Phase (Direct Impacts)																				
• Potential visual intrusion resulting	• Vehicles and equipment required for	2	3	1	2	1	2	18	-	Low	• All infrastructure that is not required for post-	2	2	1	1	1	2	14	-	Low

LEEUWBOSCH 3 SOLAR PV ASSOCIATED INFRASTRUCTURE (Switching substation, temporary building zone and guard hut)																				
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
from vehicles and equipment involved in the de-commissioning process; • Potential visual impacts of increased dust emissions from de-commissioning activities and related traffic; and • Potential visual intrusion of any remaining infrastructure on the site.	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 site may evoke negative sentiments from surrounding viewers. • Surface disturbance during decommissioning would expose bare soil (scarring) which could visually surrounding environment.										decommissioning use should be removed. • Carefully plan to minimise 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. • All cleared areas should be rehabilitated as soon as possible • Rehabilitated areas should be monitored post-decommissioning and									

LEEUWBOSCH 3 SOLAR PV ASSOCIATED INFRASTRUCTURE (Switching substation, temporary building zone and guard hut)																				
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
	• Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.										remedial actions implemented as required.									

8.7.3 No-Go Alternative

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 Solar PV Facility 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	0	-	NIL	• N / A	NIL	NIL	NIL	NIL	NIL	NIL	0	-	NIL

9. COMPARATIVE ASSESSMENT OF ALTERNATIVES

As previously stated, design and layout alternatives were considered and assessed as part of the original BA process, and as such the PV development area has been placed to avoid site sensitivities previously identified. Accordingly, no further comparative assessment is required

10. CONCLUSION

A visual study was conducted to assess the magnitude and significance of the visual impacts associated with the development of the proposed Leeuwbosch 3 SPEF near Leeudoringstad in the North West Province. The VIA has demonstrated that overall, much of the study area has a partly natural visual character, with certain areas displaying a rural or pastoral component where cultivation and farmsteads occur. As such, a solar PV development would alter the visual character and contrast significantly with this typical land use and/or pattern and form of human elements present across the broader study area. However, areas in close proximity to the Leeuwbosch 3 SPEF application site exhibit high levels of human transformation resulting from urban and infrastructural development (such as the Kgakala Township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line). These elements have resulted in a significant degree of landscape degradation, and thus the introduction of a Solar PV facility into this setting would be considered to be less visually intrusive than if there was no existing built infrastructure visible.

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. However, 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 visually sensitive receptors were identified within the study area. This is most likely due to the fact that the study area is not typically valued or utilised for its tourism significance. Additionally, the R502 and R504 regional roads, which traverse the visual assessment zone, are used almost exclusively as local access roads, do not form part of any scenic tourist routes and are not specifically valued or utilised for their scenic or tourism potential.

A total of 32 potentially sensitive receptors were however identified, all of which appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the residents' sentiments toward the proposed development are unknown. The receptor impact rating conducted in respect of these potentially sensitive receptors found that none of these potentially sensitive receptors are expected to experience high levels of visual impact from the proposed SPEF. Twenty-six receptors are however expected to experience moderate levels of visual impact, while the remaining 6 receptors are only expected to experience low levels of impact from the proposed SPEF.

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

Leeuwbosch 3 SPEF and associated infrastructure will be of (negative) low significance during both construction and decommissioning phases.

During operation, visual impacts from the solar PV facility arrays would be of (negative) medium significance with relatively few mitigation measures available to reduce the visual impact. Impacts from the associated infrastructure would however be of low significance during operation.

Five other renewable energy developments and infrastructure projects, either proposed or in operation, were identified within a 30km radius of the proposed Leeuwbosch 3 SPEF, namely Leeuwbosch 1 and Leeuwbosch 2 SPEFs, Wildebeestkuil 1 and Wildebeestkuil 2 SPEFs and Bokamoso Solar. It was determined that all of these would impact on the landscape within the visual assessment zone. These projects, in conjunction with the proposed Leeudoringstad Solar Plant Substation, located on the Leeuwbosch 3 SPEF application site, 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. 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 light of this and the significant degree of human transformation and landscape degradation evident in close proximity to the proposed developments, cumulative impacts have been rated as medium.

No design and layout alternatives were considered and assessed as part of this VIA as these were considered as part of a previous BA process. As such the PV development area and associated infrastructure have been placed to avoid site sensitivities previously identified.

10.1 IMPACT STATEMENT

It is SLR's opinion that the visual impacts associated with the proposed Leeuwbosch 3 SPEF and associated infrastructure are of moderate significance. Given the relative absence of sensitive receptors and the significant degree of human transformation and landscape degradation in areas close to the Leeuwbosch 3 SPEF application site, the project is deemed acceptable from a visual impact perspective and the EA should be granted for the BA application. SLR is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases of the project can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

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Appendix A

SEPCIALIST EXPERTISE

CURRICULUM VITAE

KERRY LIANNE SCHWARTZ

SENIOR GIS CONSULTANT

EMPA, South Africa

QUALIFICATIONS

BA	1982	Geography, Leeds Trinity University, UK

EXPERTISE

- GIS, spatial modelling and 3D analysis
- Visual Impact Assessment
- Fatal Flaw Assessments
- Glint and Glare Assessments

Kerry is a highly focused and dedicated Spatial Professional with strong technical skills and some 27 years' experience in the application and use of geographic analysis and geospatial technologies in support of a range of environmental and development planning projects. While Kerry's expertise is largely centred on the management and presentation of geospatial data for environmental impact assessments, her GIS skills are frequently utilised in support of a range of other projects, including:

- Strategic environmental assessments and management plans;
- Visual and landscape assessments;
- Glint and glare assessments;
- Wetland / surface water assessments;
- Catchment delineation for floodline analysis;
- Urban and Rural Development Planning;
- Transport Assessments; and
- Infrastructure Development Planning.

Kerry has extended her skills base to include the undertaking of specialist Visual Impact Assessments (VIAs) for a range of projects, including renewable energy, power line and residential / mixed-use developments.

PROJECTS

A selection of Kerry's key project's are presented below.

	Built Infrastructure
EIA and EMP for a 9km railway line and water pipeline for manganese mine – Kalagadi Manganese	Kerry was responsible for GIS analysis and mapping in support of the EIA project in the Northern Cape, South Africa.
EIA and EMP for 5x 440kV Transmission Lines between Thyspunt (proposed nuclear power station site) and several substations	Kerry was responsible for GIS analysis and mapping in support of the EIA project in the Port Elizabeth area in the Eastern Cape, South Africa.

EIA for multi petroleum products pipeline from Kendall Waltloo, and from Jameson Park to Langlaagte Tanks farms Pipelines	Kerry was responsible for GIS analysis and mapping in support of the EIA project.
Environmental Management Plan for copper and cobalt mine	Kerry was responsible for GIS analysis and mapping in support of the EMP project in the Democratic Republic of Congo.
EIA and Agricultural Feasibility study for Miwani Sugar Mill	Kerry was responsible for GIS analysis and mapping in support of the EIA project in Kenya.
EIAs for several Solar Photovoltaic Energy Facilities and associated infrastructure	Kerry was responsible for GIS analysis and mapping in support of several EIAs for Solar PV facilities, the most recent projects being: • Oya Energy Facility (Western Cape Province); • Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV Facilities (Northern Cape Province); and • Sendawo 1, 2 and 3 Solar Energy Facilities (North West Province).
EIAs / BAs for several WEFs and associated infrastructure	Kerry was responsible for GIS analysis and mapping in support of several EIAs for Wind Energy Farms, the most recent projects being: • Tooverberg WEF (Western Cape Province); • Rondekop WEF (Western Cape Province); and • Graskoppies, Hartebeest Leegte, Ithuba and !Xha Boom (Leeuwberg Cluster) WEFs (Northern Cape Province).
Basic Assessments for various 400kV and 132kV Distribution Lines for the Transnet Coal Link Upgrade Project	Kerry was responsible for GIS analysis and mapping in support of the powerline BA project in KwaZulu-Natal and Mpumalanga, South Africa.
Environmental Assessment for the proposed Moloto Development Corridor	Kerry was responsible for GIS analysis and mapping in support of the EIA project in the Limpopo Province.
Environmental Advisory Services for the Gauteng Rapid Rail Extensions Feasibility Project	Kerry was responsible for GIS analysis and mapping in support of a feasibility study for a rail extension in Gauteng, South Africa.
Environmental Screening for the Strategic Logistics and Industrial Corridor Plan for Strategic Infrastructure Project 2	Kerry was responsible for GIS analysis and mapping in support of the environmental screening for strategic infrastructure in KwaZulu-Natal, the Free State and Gauteng.

Fatal Flaw Assessments for various proposed Renewable Energy Facilities	Kerry was responsible for GIS analysis and mapping in support of fatal flaw assessment for renewable energy projects in the Northern Cape and Western Cape Provinces.
	Strategic Planning
Lesotho Highlands Development Association – Lesotho	GIS database development for socio-economic and health indicators arising from Social Impact Assessments
Development Plans for the adjacent towns of Kasane and Kazungula and for the rural village of Hukuntsi	Kerry was responsible for GIS database management, spatial data analysis and mapping for the development plans for towns in Botswana.
Integrated Development Plans for various District and Local Municipalities	Kerry was responsible for GIS database management, spatial data analysis and mapping for various IDPs for District Municipalities in KwaZulu-Natal.
Rural Development Initiative and Rural Roads Identification for uMhlathuze Local Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for rural road identification in the uMhlathuze Local Municipality in KwaZulu-Natal.
Tourism Initiatives and Master Plans for areas such as the Mapungubwe Cultural Landscape	Kerry was responsible for GIS database management, spatial data analysis and mapping for various Master Plans in the Limpopo and Northern Cape Provinces.
Spatial Development Frameworks for various Local and District Municipalities	Kerry was responsible for GIS database management, spatial data analysis and mapping for Spatial Development Frameworks for various Municipalities in KwaZulu-Natal, Mpumalanga and the Free State.
Land Use Management Plans/Systems (LUMS) for various Local Municipalities	Kerry was responsible for GIS database management, spatial data analysis and mapping for the development of Land Use Management Systems for various Local Municipalities in KwaZulu-Natal.
Land use study for the Johannesburg Inner City Summit and Charter	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Johannesburg Inner City land use study.
Due Diligence Investigation for the Port of Richards Bay	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Port of Richards Bay Due Diligence Investigation.
	State of the Environment Reporting
2008 State of the Environment Report for City of Johannesburg	Kerry was responsible for GIS database management, spatial data analysis and mapping for the 2008 Johannesburg State of the Environment Report.

	Strategic Environmental Assessments and Environmental Management Frameworks
SEA for Greater Clarens	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Greater Clarens SEA in the Free State Province.
SEA for the Marula Region of the Kruger National Park	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Marula Region SEA on behalf of SANParks.
SEA for Thanda Private Game Reserve	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Thanda Private Game Reserve SEA in KwaZulu-Natal.
SEA for KwaDukuza Local Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the KwaDukuza Local Municipality SEA in KwaZulu-Natal.
SEA for Molemole Local Municipality, Capricorn District Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Molemole Local Municipality SEA in Limpopo Province.
SEA for Blouberg Local Municipality, Capricorn District Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Blouberg Local Municipality in Limpopo Province.
SEA for the Bishopstowe study area in the Msunduzi Local Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Bishopstowee SEA in KwaZulu-Natal.
EMF for proposed Renishaw Estate	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Reinshaw Estate EMF in KwaZulu-Natal.
EMF for Mogale City Local Municipality, Mogale City Local Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Mogale City Local Municipality EMF in Gauteng.
	Visual Impact Assessments
VIAs for various Solar Power Plants and associated grid connection infrastructure	Kerry was responsible for the GIS mapping and visual impact assessments for various Solar Power Plants and associated grid connection infrastructure (Northern Cape, Free State, Limpopo and North West Province) the most recent projects being: • Oya Energy Facility (Western Cape Province); • Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV facilities (Northern Cape Province); and • Nokukhanya Solar PV Facility (Limpopo Province.

VIAs for various WEFs and associated grid connection infrastructure	Kerry was responsible for the GIS mapping and visual impact assessments for various Wind Energy Farms and associated grid connection infrastructure (Northern Cape and Western Cape), the most recent projects including: • Gromis and Komas WEFs (Northerrn Cape Province). • Paulputs WEF (Northern Cape Province); • Kudusberg WEF (Western Cape Province); • Tooverberg WEF (Western Cape Province); • Rondekop WEF (Northern Cape Province); and • San Kraal and Phezukomya WEFs (Northern Cape Province).
VIAs for various 400kV and 132kV Distribution Lines for the Transnet Coal Link Upgrade Project	Kerry was responsible for the GIS mapping and visual impact assessments for various powerlines in KwaZulu-Natal and Mpumalanga Provinces.
VIAs for the proposed Assagay Valley and Kassier Road North Mixed Use Development	Kerry was responsible for the GIS mapping and a visual impact assessment for the Assagay Valley and Kassier Road North Mixed Use Development in KwaZulu-Natal.
VIA for the proposed Tinley Manor South Banks Development	Kerry was responsible for the GIS mapping and a visual impact assessment for the Tinley Manor Southbanks Coastal Development in KwaZulu-Natal.
VIA for the proposed Tinley Manor South Banks Beach Enhancement Solution	Kerry was responsible for the GIS mapping and a visual impact assessment for the Tinley Beach Enhancement EIA in KwaZulu-Natal.
VIA for the proposed Mlonzi Hotel and Golf Estate Development	Kerry was responsible for the GIS mapping and a visual impact assessment for the Mlonzi Hotel and Golf Estate in the Eastern Cape.
Landscape Assessment for the Mogale City Local Municipality	Kerry was responsible for the GIS mapping and a visual impact assessment for the Mogale City Local Municipality landscape assessment.

MEMBERSHIPS

GISSA	Member of Geo-Information Society of South Africa
SAGC	Registered as GISc Technician with the South African Geomatics Council, Membership No. GTc GISc 1187

KSchwartz

04 February 2022

Appendix C

Site Sensitivity Verification

PROPOSED CONSTRUCTION OF THE LEEUWBOSCH 3 SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY NEAR LEEUDORINGSTAD, NORTH WEST PROVINCE

Site Sensitivity Verification Report

DEDECT Reference:	***(To be provided)***
Report Prepared by:	**SLR Consulting (South Africa) (Pty) Ltd**
Issue Date:	**28 July 2022**
Version No.:	**1**

SITE SENSITIVITY VERIFICATION
(IN TERMS OF PART A OF THE ASSESSMENT PROTOCOLS PUBLISHED IN GN 320 ON 20 MARCH 2020

Contents

List of Figures

SITE SENSITIVITY VERIFICATION
(IN TERMS OF PART A OF THE ASSESSMENT PROTOCOLS PUBLISHED IN GN 320 ON 20 MARCH 2020

1. INTRODUCTION

The original BA process for the proposed Leeuwbosch Solar Photovoltaic (PV) plant was initiated in August 2016. All specialist studies were undertaken and subsequently all site sensitivities were identified. The BA was however put out on hold prior to submitting the final basic assessment report (FBAR) to the competent authority. Subsequently, the proponent, Leeuwbosch PV Generation (Pty) Ltd (hereafter referred to as Leeuwbosch PV Generation) revised their development proposals to accommodate two separate Solar Photovoltaic (PV) Energy facilities (SPEFs), each with a capacity of up to 9.9MW, on Portion 37 of the Farm Leeuwbosch No. 44, near Leeudoringstad, North West Province. Environmental Authorisation for both of these facilities was granted on 14 December 2021 by way of reference numbers NWP/EIA/41/2021 (Leewbosch 1 Solar PV) and NWP/EIA/45/2021 (Leewbosch 2 Solar).

Leeuwbosch PV generation is now proposing to construct a third solar photovoltaic (PV) plant and associated infrastructure on Portion 37 of the Farm Leeuwbosch No 44. The proposed development will have a maximum export capacity of up to 15 megawatt (MW) and will be known as the Leeuwbosch 3 Solar PV Plant. The proposed PV Facility will require Environmental Authorisation (EA) and as such, the project is the subject of a separate Basic Assessment (BA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended. A visual impact assessment (VIA) is being undertaken by SLR Consulting South Africa (Pty) Ltd (SLR) as part of the required BA process.

In accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a site sensitivity verification has been undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

2. SITE SENSITIVITY VERIFICATION

The site sensitivity verification exercise conducted in support of the Visual Impact Assessment (VIA) for the proposed Leeuwbosch 3 SPEF has been based on a desktop-level assessment supported by field-based observation. This verification involved an assessment of factors as outlined below.

2.1 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 initially sourced from spatial databases provided by NGI, the

South African National Biodiversity Institute (SANBI) and the South African National Land Cover Dataset (Geoterraimage – 2020). The characteristics identified via desktop means were later verified during the site visit.

2.2 IDENTIFICATION OF SENSITIVE RECEPTORS

Due to the extent of the study area and the potentially large number of receptor locations, the identification of visual receptors was undertaken via desktop means only, using Google Earth imagery.

2.3 FIELDWORK AND PHOTOGRAPHIC REVIEW

Fieldwork was originally undertaken in October 2016 (early summer) as part of a visual assessment undertaken for preliminary solar PV development proposals on the Leeuwbosch application site. Given the time that has elapsed since the original fieldwork was undertaken, a second site visit was undertaken, involving a two (2) day site visit between the 12th and 13th of August 2020 (late winter).

The purpose of the site visits was to:

- verify the landscape characteristics identified via desktop means;
- conduct a photographic survey of the study area;
- identify any additional visually sensitive receptor locations within the study area; and
- inform the impact rating assessment of visually sensitive receptor locations (where possible).

3. OUTCOME OF SITE SENSITIVITY VERIFICATION

Visual sensitivity of the broader area surrounding the proposed Leeuwbosch 3 SPEF application site was found to be low, largely due to the to the presence of degraded land and anthropogenic elements such as the Kgakala Township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line, which would likely reduce the scenic quality of the area.

In addition, no formal protected areas were identified in the study area and although a significant number of potentially sensitive receptors were identified, most of these appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors because they are located within a 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.

As a result of the relatively flat terrain and the lack of screening vegetation, PV arrays placed on the site are expected to be at least partially visible from most of the potentially sensitive receptors and as such, no areas on the site were deemed to be significantly more sensitive than the remainder of the site.

4. NATIONAL ENVIRONMENTAL SCREENING TOOL

In assessing the visual sensitivity of the proposed Leeuwbosch 3 SPEF application site, consideration was given to the Landscape Theme of the National Environmental Screening Tool. Under this theme, the tool identifies areas of "**Medium"** sensitivity in respect of solar PV development on the application site. The identification of areas of "Medium" landscape sensitivity in this instance is related to the proximity of the site to Kgakala Township. **Figure 1** below is an extract from the Screening Tool Report generated for the Leeuwbosch 3 SPEF application site.

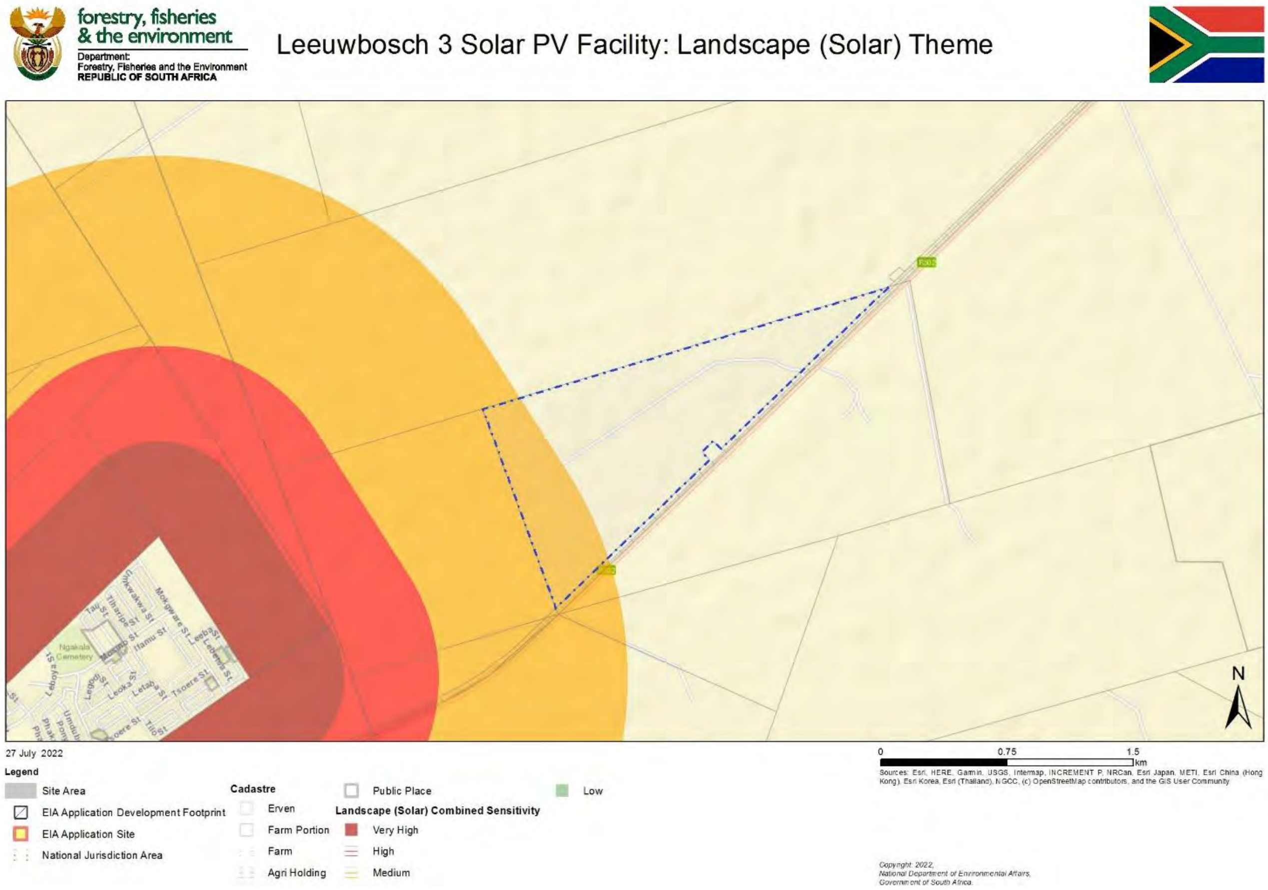


Figure 1: Relative Landscape Sensitivity for the Leeuwbosch 3 SPEF application site

It should be noted that the Screening Tool is a very high level, desktop study and as such the results of the study in respect of landscape sensitivity must be viewed against the findings of the field investigation as well as factors affecting visual impact, such as:

- the presence of visual receptors;
- the distance of those receptors from the proposed development; and
- the likely visibility of the development from the receptor locations.

This VIA has found that, although there is a relatively high concentration of receptors in the Kgakala, Township, these receptors are not expected to be sensitive to the visual impact of the proposed development due to the existing visual degradation within these areas. Urban development and electricity infrastructure have significantly altered the visual character in this sector of the study area and general degradation of the landscape has been exacerbated by significant amounts of litter in the township and the surrounding area (**Figure 2**). Accordingly, the verification did not suggest any significant level of landscape sensitivity in this area.

Figure 2: Typical landscape in Kgakala Township

5. CONCLUSION

The site sensitivity verification exercise conducted in support of the Visual Impact Assessment (VIA) for the proposed Leeuwbosch 3 SPEF has been based on a desktop-level assessment supported by field-based observation. In assessing the visual sensitivity of the proposed Leeuwbosch 3 SPEF application site, consideration was given to the Landscape Theme of the National Environmental Screening Tool, and as outlined above, the findings of the sensitivity assessment undertaken in the VIA have been verified.

Appendix D

Impact Rating Methodology

1 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).

1.2.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 1: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.**		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

The table below is to be represented in the Impact Assessment section of the report. The excel spreadsheet template can be used to complete the Impact Assessment.

Table 2: Rating of impacts template and example

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																				
Vegetation and protected plant species	Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species.	2	4	2	2	3	3	39	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	4	2	1	3	2	24	-	Low

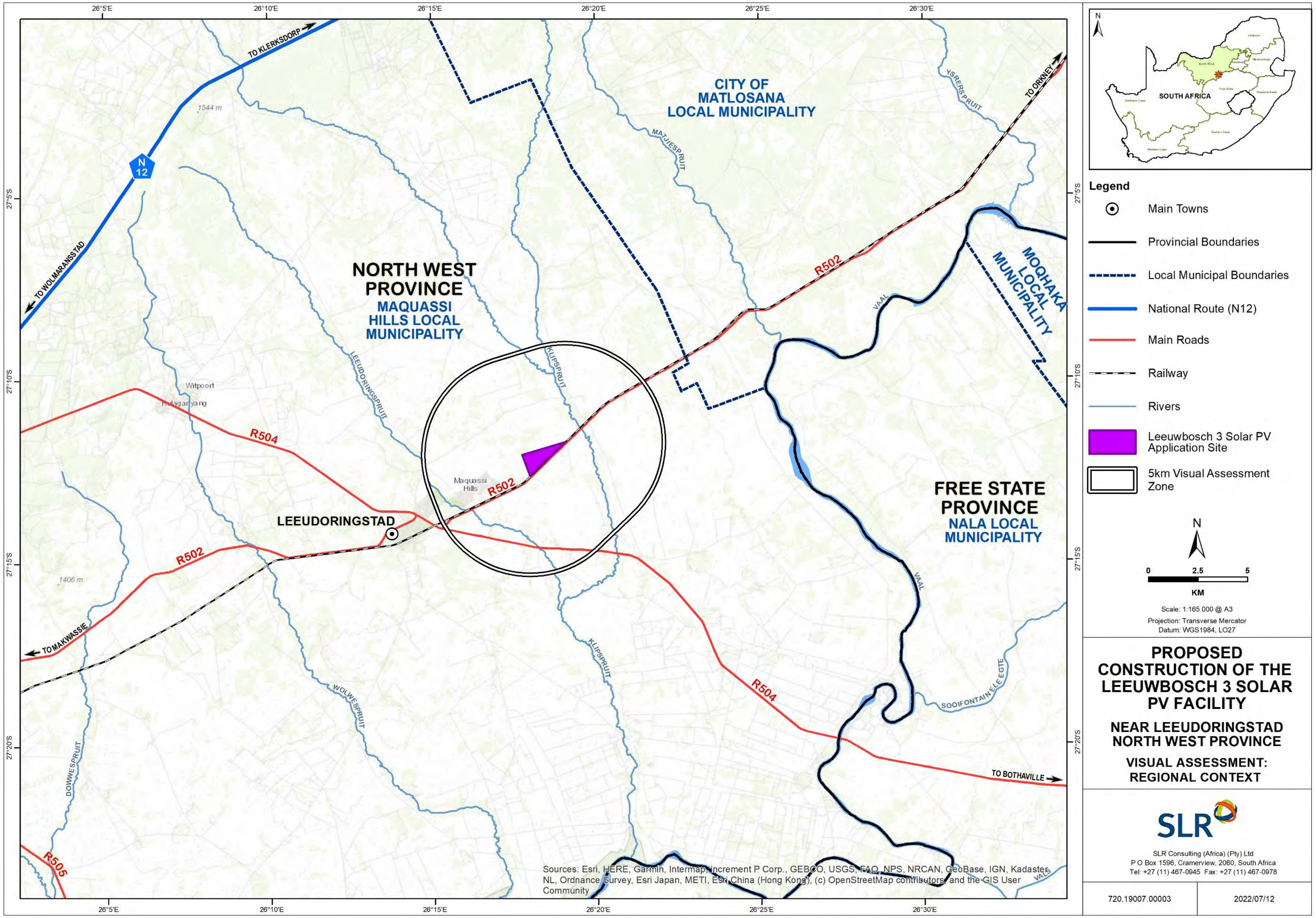
Operational Phase																		
Fauna	Fauna will be negatively affected by the operation of the wind farm due to the human disturbance, the presence of vehicles on the site and possibly by noise generated by the wind turbines as well.	2	3	2	1	4	3	36	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	2	2	1	4	2	22	-	Low
Decommissioning Phase																		
Fauna	Fauna will be negatively affected by the decommissioning of the wind farm due to the human disturbance, the presence and operation of vehicles and heavy machinery on the site and the noise generated.	2	3	2	1	2	3	30	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	2	2	1	2	2	18	-	Low

Cumulative																			
Broad-scale ecological processes	Transformation and presence of the facility will contribute to cumulative habitat loss and impacts on broad-scale ecological processes such as fragmentation.	2	4	2	2	3	2	26	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	3	2	1	3	2	22	-	Low

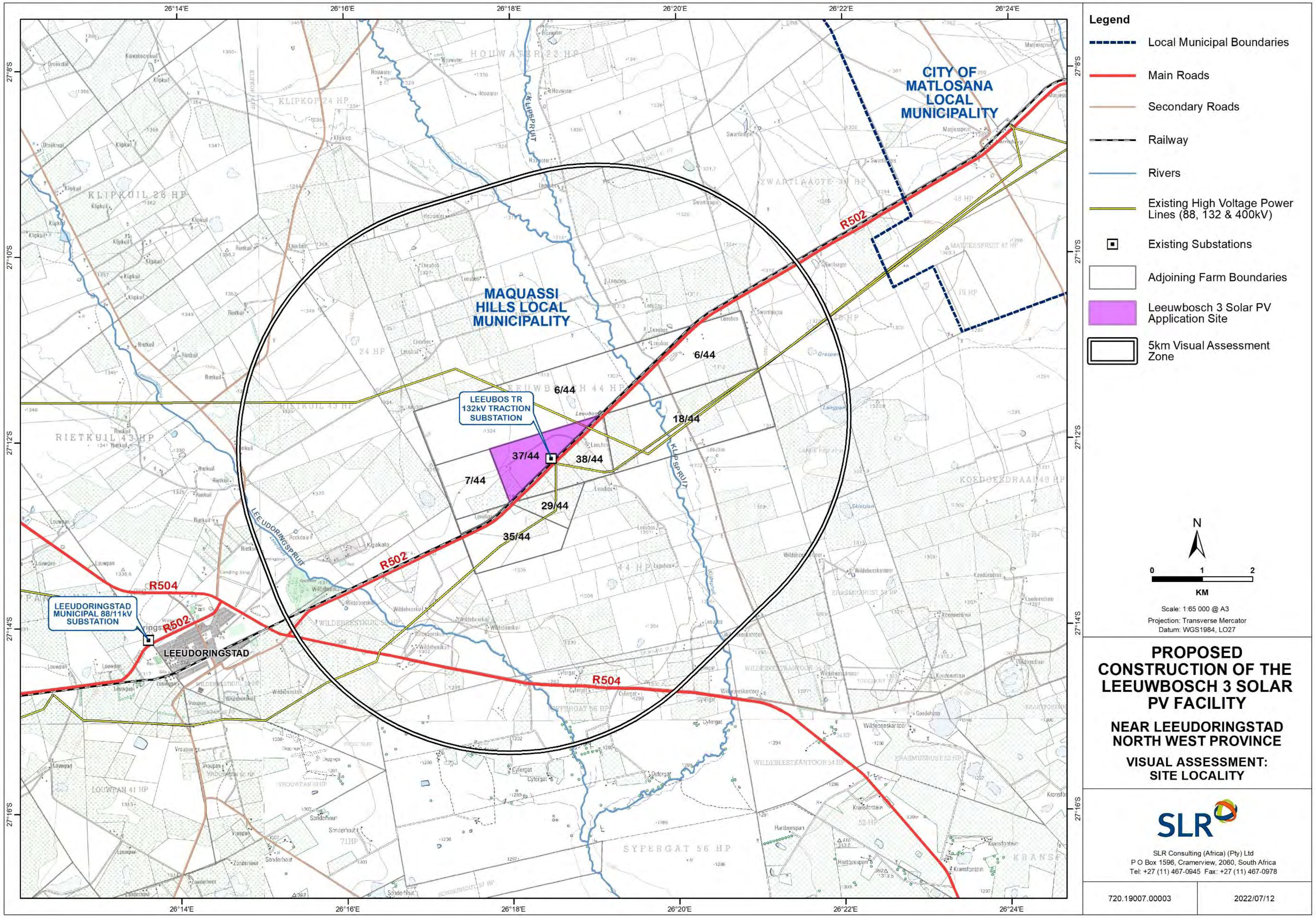
Appendix E

Maps

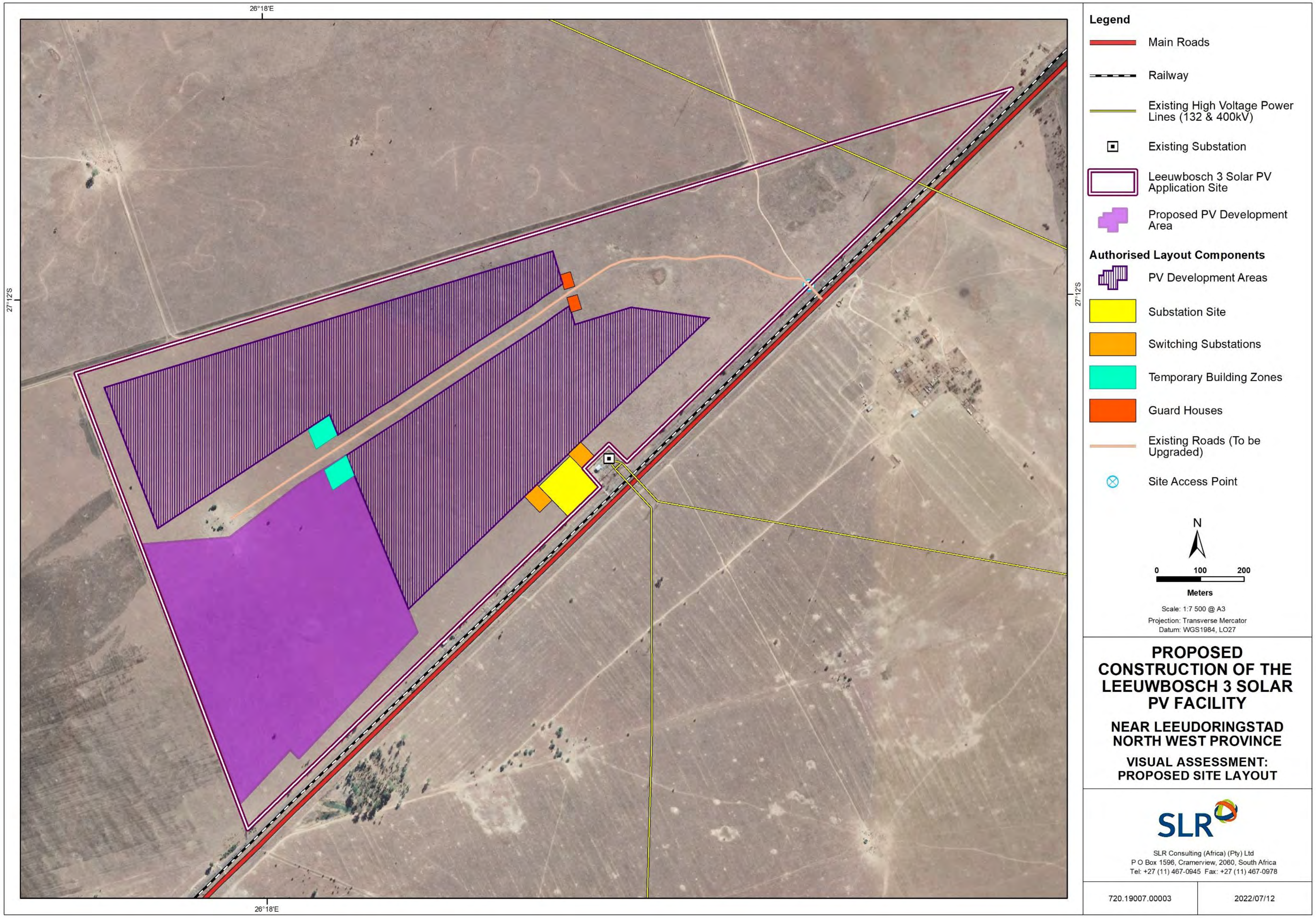
MAP 1: Regional Context



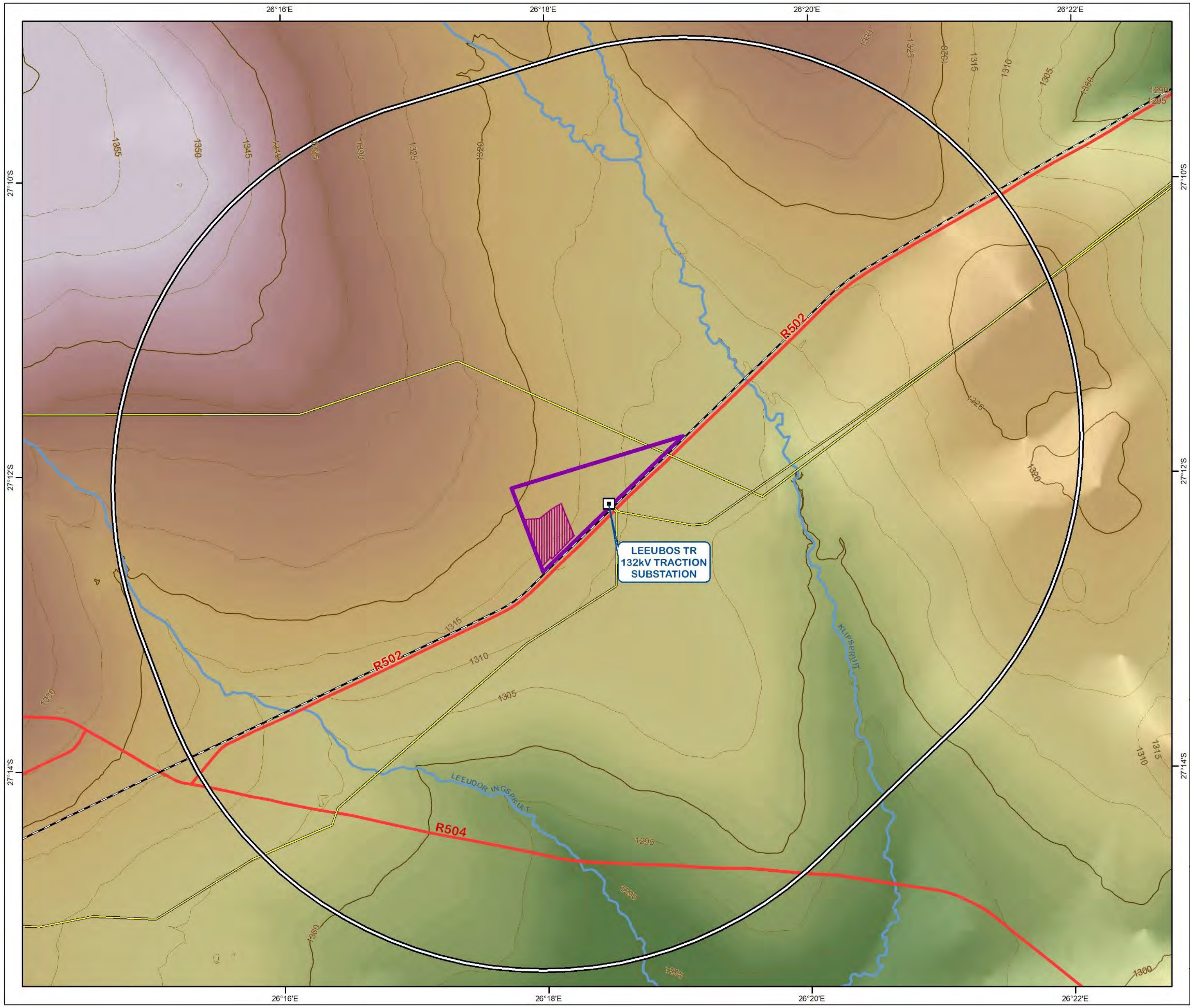
MAP 2: Site Locality



MAP 3: Proposed Site Layout



MAP 4: Topography



PROPOSED CONSTRUCTION OF THE LEEUWBOSCH 3 SOLAR PV FACILITY

NEAR LEEUDORINGSTAD NORTH WEST PROVINCE

VISUAL ASSESSMENT: TOPOGRAPHY

SLR

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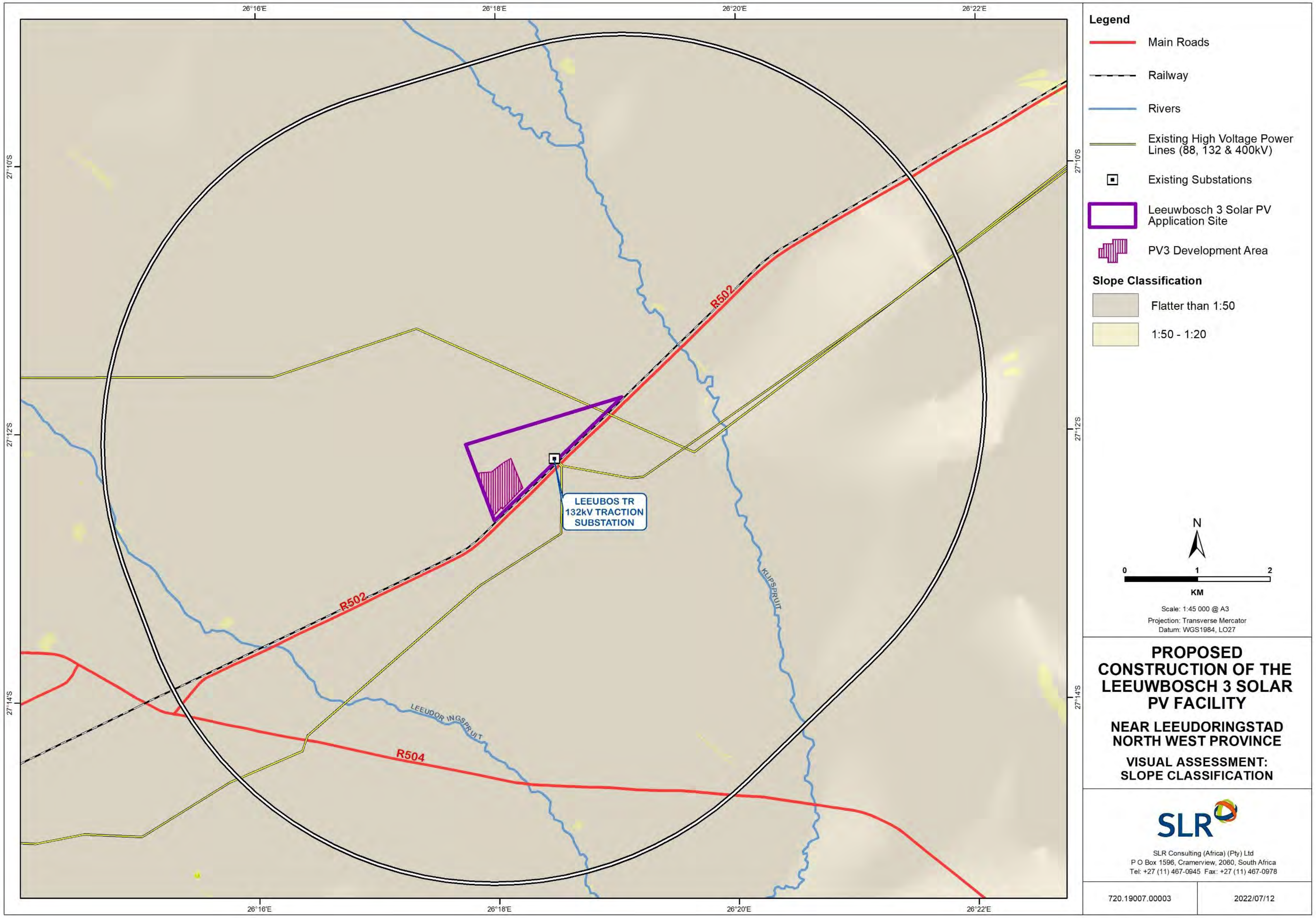
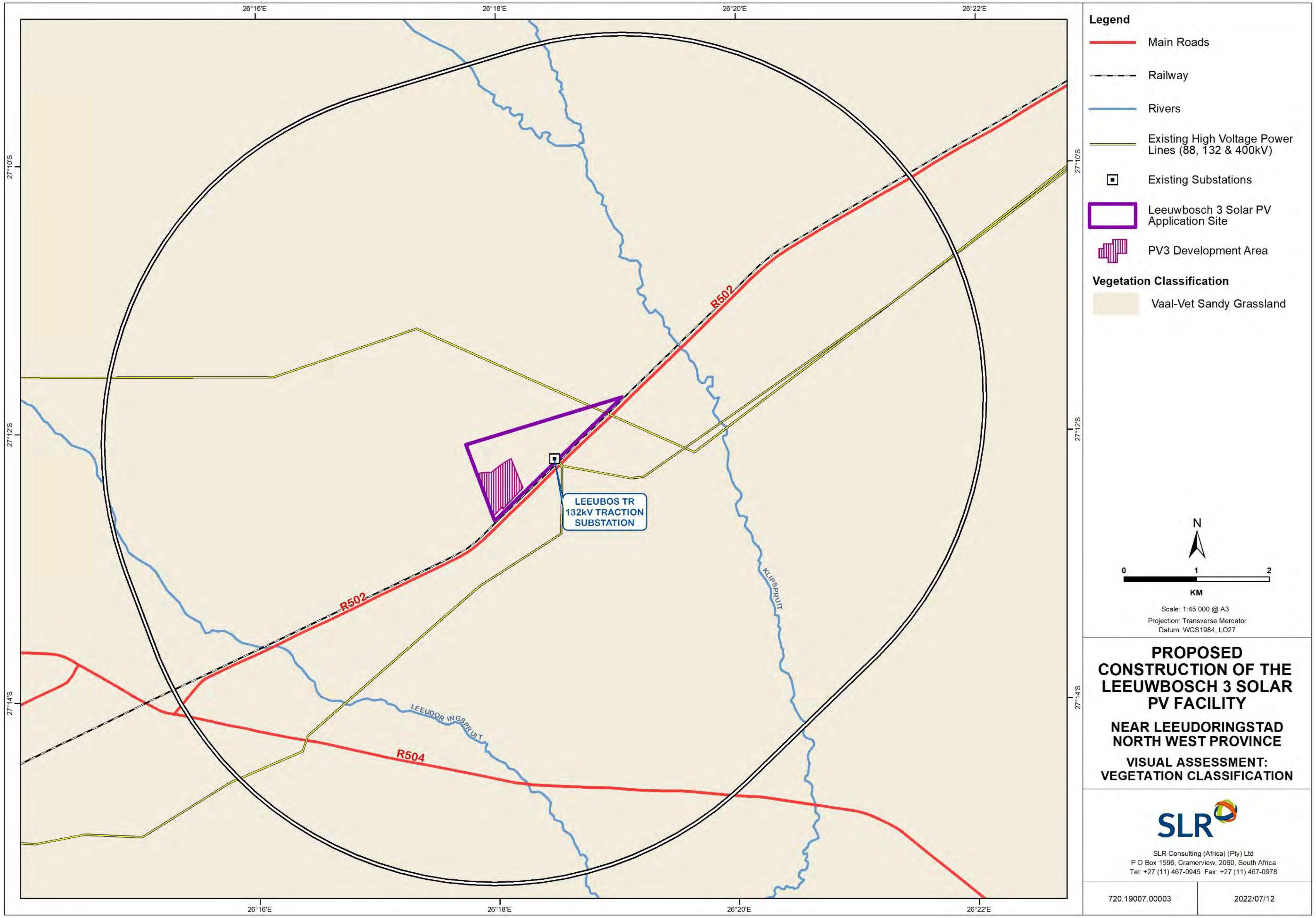
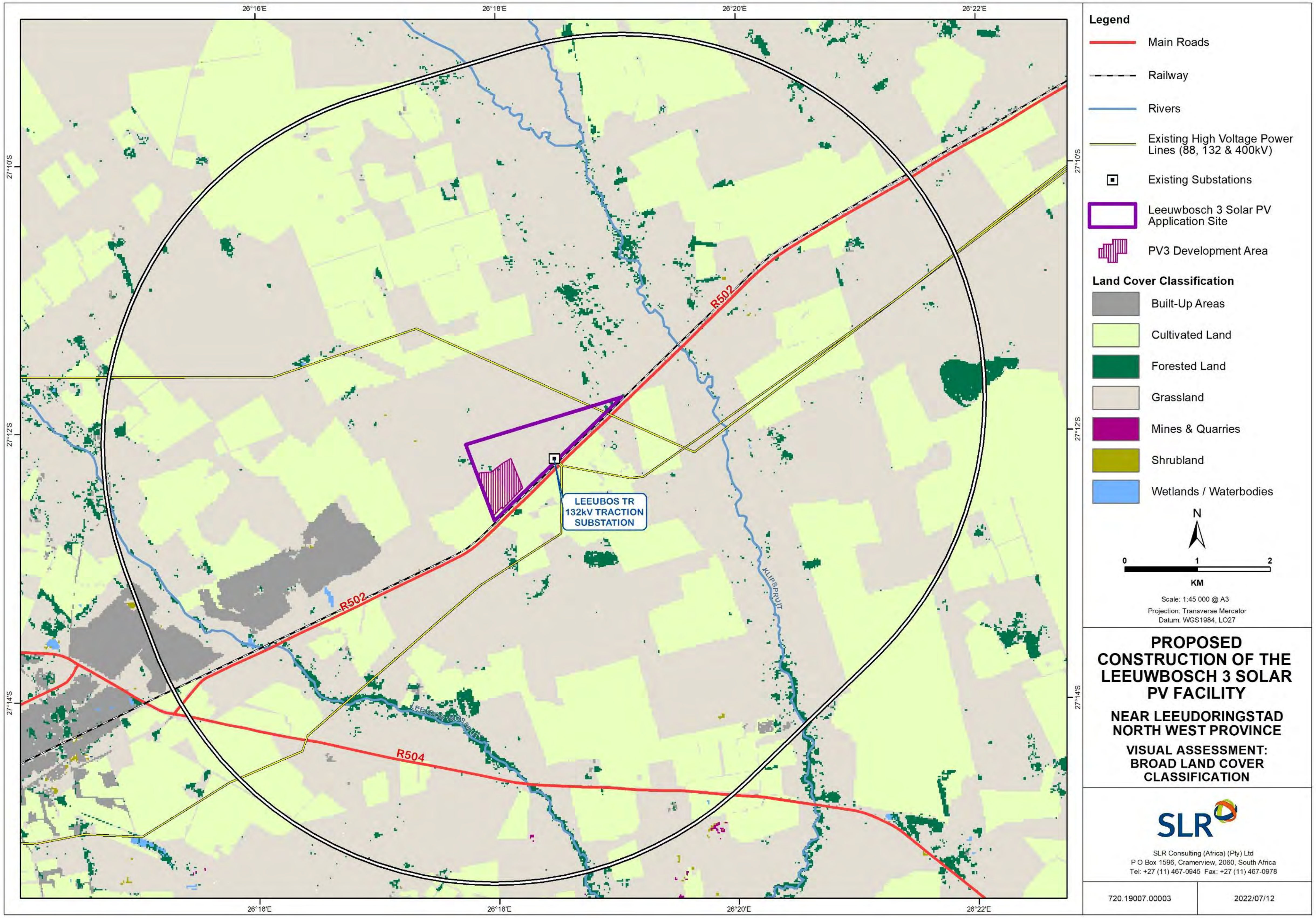
MAP 5: Slope Classification



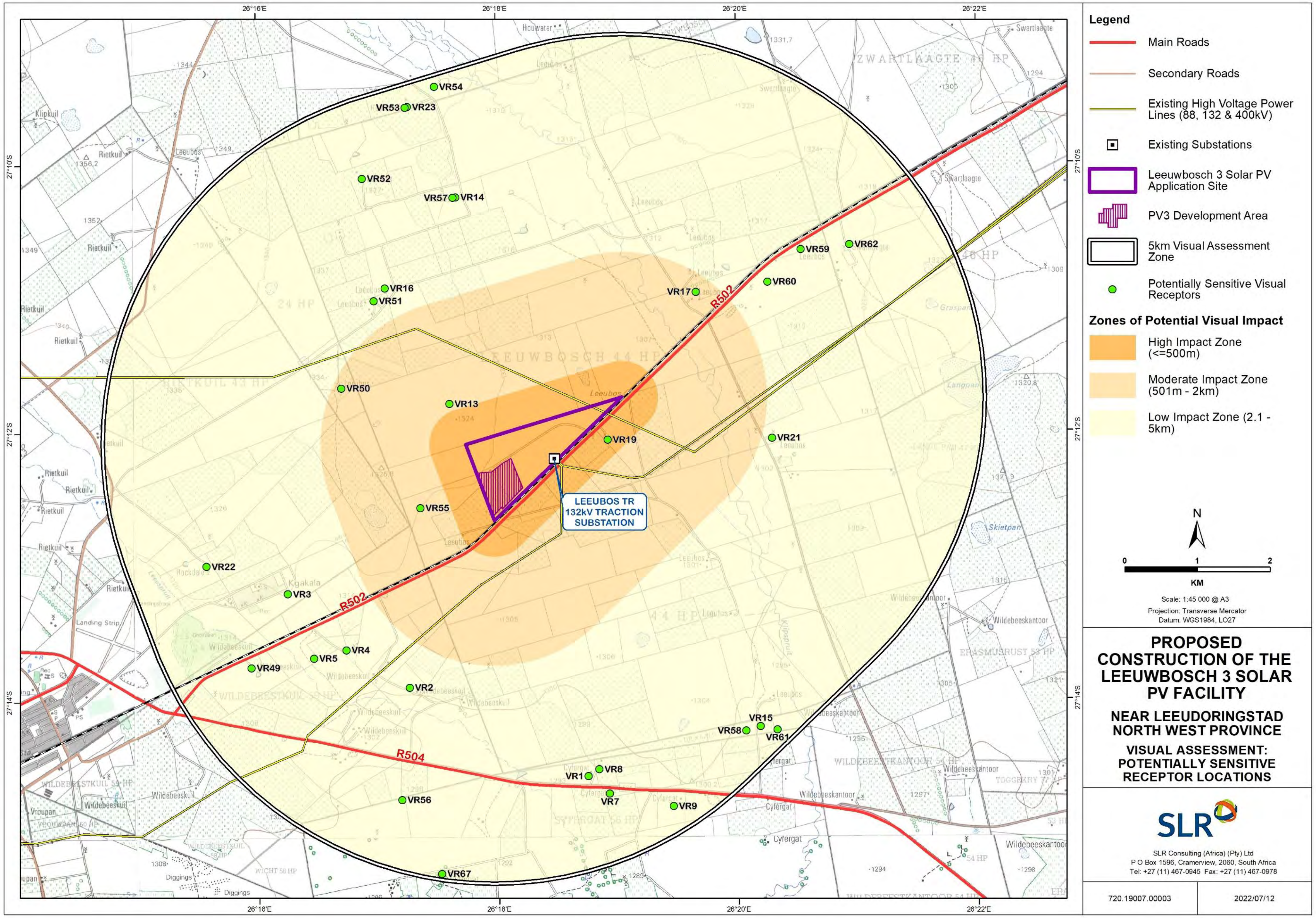
MAP 6: Vegetation Classification



MAP 7: Broad Land Cover Classification



MAP 8: Potentially Sensitive Receptor Locations



MAP 9: Renewable Energy Projects within 30km of the Proposed Powerline