ARCUS CONSULTANCY SERVICES SOUTH AFRICA (PTY) LTD

Proposed Construction of a 132kV Power Line and Associated Infrastructure to serve Wind Energy Facilities near Noupoort, Northern Cape Province

Visual Impact Assessment Report – Basic Assessment

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Document Title:	Proposed Construction of a 132kV Power Line and Associated Infrastructure to serve Wind Energy Facilities near Noupoort, Northern Cape Province
Version Number:	1
Author:	Kerry Schwartz
Checked by:	Andrea Gibb
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Signature:	
Client:	Arcus Consultancy Services South Africa (Pty) Ltd

Confidentiality Statement

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
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Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Construction of a 132kV Power Line and Associated Infrastructure to serve proposed Wind Energy Facilities near Noupoort, Northern Cape Province.

Kindly note the following:

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Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	SiVEST SA (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	3	Percentage Procurement recognition	110
Specialist name:	Kerry Schwartz			
Specialist Qualifications:	BA			
Professional affiliation/registration:	SAGC (GISc Technician)			
Physical address:	51 Wessels Road, Rivonia			
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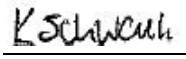
2. DECLARATION BY THE SPECIALIST

I, **Kerry Schwartz**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

SiVEST SA (Pty) Ltd

Name of Company:

7th August 2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Kerry Schwartz**, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

K Schwartz

Signature of the Specialist

SiVEST SA (Pty) Ltd

Name of Company

7th August 2019

Date

Signature of the Commissioner of Oaths

07/08/2019

Date

Jacqueline Chantel Jackson
COMMISSIONER OF OATHS

Signature:

Divisional Controller
Ref. 9/1/8/2 (R/O) KZN PMB - 08/02/2019

Date: 07/08/2019 Place: PMB

Business Address: VCC Estate, 170 Peter Brown Drive, PMB

National Environmental Management Act, 1998 (Act No. 107 of 1998) and Environmental Impact Regulations (2017) Requirements for Specialist Reports (Appendix 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	**Section 1.4.** Specialist CV's are included in **Appendix B**
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	**Page iii - v**
(c) an indication of the scope of, and the purpose for which, the report was prepared;	**Section 1.**
(cA) an indication of the quality and age of base data used for the specialist report;	**Section 1.5.** **Section 0.**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	**Section 0.** **Section 4.** **Section 5.** **Section 0.**
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**Section 1.3.** **Section 1.5.3.**
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	**Section 1.5.**
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	**Section 0.** **Section 5.** **Section 0.**
(g) an identification of any areas to be avoided, including buffers;	**Section 3.3.** **Section 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 5.**
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Section 1.3.**
(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 0.**
(k) any mitigation measures for inclusion in the EMPr;	**6.4.**
(l) any conditions for inclusion in the environmental authorisation;	N/A
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	**Section 6.4.**
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised;	**Section 7.1.**

iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	**No feedback has yet been received from the public participation process regarding the visual environment.**
(p) any other information requested by the competent authority	**No information regarding the visual study has been requested from the competent authority.**
(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**

ARCUS CONSULTANCY SERVICES SA (PTY) LTD

PROPOSED CONSTRUCTION OF A 132kV POWER AND ASSOCIATED INFRASTRUCTURE TO SERVE WIND ENERGY FACILITIES NEAR NOUPOORT, NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT REPORT – BASIC ASSESSMENT

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GLOSSARY OF TERMS

ABBREVIATIONS

BA	Basic Assessment
DBAR	Draft Basic Assessment Report
DM	District Municipality
DoE	Department of Energy
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
FBAR	Final Basic Assessment Report
GIS	Geographic Information System
I&AP	Interested and/or Affected Party
IPP	Independent Power Producer
LM	Local Municipality
kV	Kilovolt
MW	Megawatt
NGI	National Geo-Spatial Information
REIPPP	Renewable Energy Independent Power Producer Programme
SANBI	South African National Biodiversity Institute
VIA	Visual Impact Assessment
VR	Visual Receptor
WEF	Wind Energy Facility

DEFINITIONS

Anthropogenic feature: An unnatural feature resulting from human activity.

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

Power line route: The alignment followed by the proposed power line or power line alternatives.

Power line corridor: A predetermined assessment area which allows for flexibility when determining the final power line route. Ultimately the 31m wide power line servitude would be routed within the corridor.

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: The study area or visual assessment zone is assumed to encompass a zone of 5 km from the outer boundary of the power line corridor. This is also referred to as the **Visual Assessment Zone**.

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), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards the new development, which are usually based on the perceived aesthetic appeal of the area.

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PROPOSED CONSTRUCTION OF A 132kV POWER AND ASSOCIATED INFRASTRUCTURE TO SERVE WIND ENERGY FACILITIES NEAR NOUPOORT, NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT REPORT – BASIC ASSESSMENT

1 INTRODUCTION

The DEA granted environmental authorisations (EA) on 28th June 2018 for the proposed construction of the 390MW San Kraal Wind Energy Facility (WEF) and the 275MW Phezukomoya Wind Energy Facility (WEF) with associated grid connection infrastructure near Noupoort in the Northern Cape Province. The developer, EDF Renewables (Pty) Ltd (hereafter referred to as EDF) is now proposing to split each of the proposed WEFs into two separate WEFs, namely San Kraal Split 1 WEF, Hartebeesthoek East WEF, Phezukomoya Split 1 and Hartebeesthoek West WEF. A Part 2 Amendment application is in this regard presently underway. Revisions and additions to the approved grid connection infrastructure to accommodate the proposed split facilities will however require a Basic Assessment process.

In light of this, SiVEST has been appointed to undertake a visual impact assessment (VIA) as part of the BA process. The VIA aims to identify potential visual issues associated with the proposed development, as well as to determine the potential extent of visual impacts by characterising the visual environment of the area and identifying areas of potential visual sensitivity that may be subject to visual impacts. This visual assessment focuses on the potentially sensitive receptor locations and provides an assessment of the magnitude and significance of the visual impacts associated with the proposed development.

1.1 Project Description

As previously stated, this assessment relates to revisions and additions to the approved grid connection infrastructure serving the approved San Kraal and Phezukomoya WEFs as well as the proposed amendments and splits (Error! Reference source not found.).

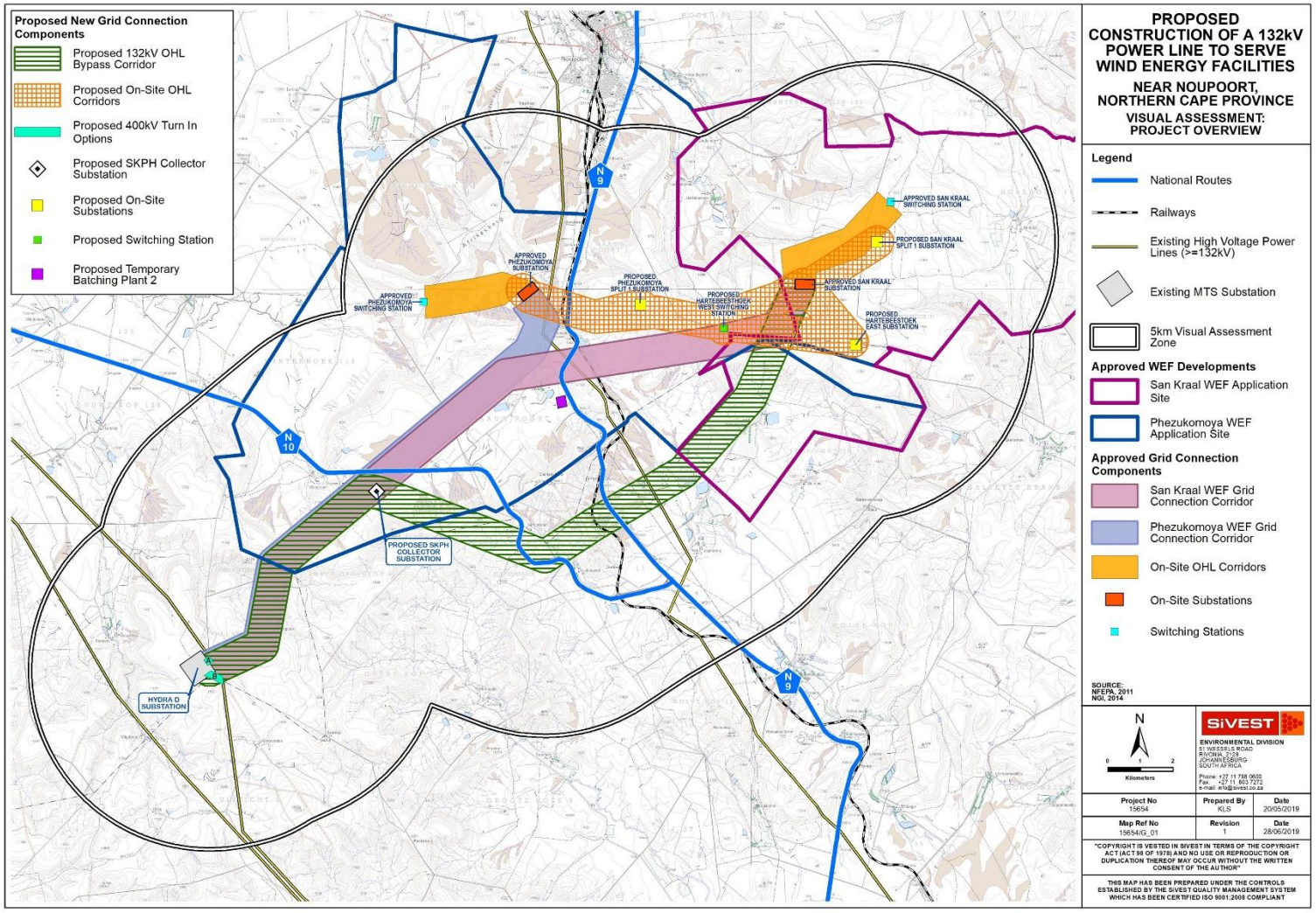

Figure 1: Project Overview

These additions essentially comprise the following elements:

- Construction of a new collector substation to be located within the approved San Kraal WEF grid corridor on a site of approximately 9 000m^2.
- A new 132kV power line route, approximately 25kms in length, connecting the approved San Kraal on-site substation with Hydra D substation. Although 8kms of this route lies within the approved San Kraal grid connection corridor, the remaining 17kms traverses an area not previously assessed.
- 400kV turn-in options required for the 132/400kV step up at Hydra D substation.
- Infrastructure associated with additional access points to the WEFs.

Additional grid infrastructure is proposed for each of the proposed split WEFs as outlined below.

1.1.1 San Kraal Split 1 WEF includes:

- An on-site 33/132 kV substation to serve the San Kraal Split 1 WEF. The new site will be approximately 9ha in extent and lies approximately 2kms north-east of the approved San Kraal substation.
- A 132 kV overhead power line (OHL), approximately 2.6kms in length (located within the approved San Kraal WEF site) which will transfer electricity from the proposed San Kraal Split 1 substation to the approved San Kraal substation.
- A 132 kV OHL, approximately 8.8kms in length (located within the approved San Kraal and Phezukomoya WEF sites) which will transfer electricity from the approved San Kraal substation to the approved Phezukomoya substation.

Three grid connection options being considered for the San Kraal Split 1 WEF as outlined below.

OPTION A:

- Electricity will be transferred from the approved San Kraal switching station to the San Kraal substation via an approved OHL **or** electricity will be transferred from the proposed 132 kV step-up substation to the approved San Kraal substation via a proposed OHL.
- From the San Kraal substation, the electricity will be transferred by the approved 132 kV OHL to the SK-PH collector substation **or** by the proposed southerly 132 kV OHL (HBH Corridor) to the SK-PH collector substation.
- From the SK-PH collector substation, electricity will be transferred to the Eskom Hydra D substation via a 132 kV OHL.

OPTION B:

- Electricity will be transferred from the proposed 132 kV San Kraal Split 1 substation to the approved San Kraal substation via a proposed OHL.
- From the San Kraal substation, the electricity is transferred via a proposed westerly 132 kV OHL to the approved Phezukomoya substation.
- From the approved Phezukomoya substation the electricity will be transferred by the approved 132 kV OHL to the Eskom Hydra D substation.

OPTION C:

- Electricity will be transferred from the proposed 132 kV San Kraal Split 1 substation to the San Kraal substation via a proposed OHL.
- From the San Kraal substation, the electricity will be transferred by the approved 132 kV OHL to the Eskom Hydra D substation **or** by the proposed southerly 132 kV OHL (HBH Corridor) to the Eskom Hydra D substation.

Grid connection proposals for the San Kraal Split 1 WEF are shown in **Figure 2**.

1.1.2 Hartebeesthoek East WEF includes:

- An on-site 33/132 kV substation to serve the Hartebeesthoek East WEF. The new site will be approximately 9ha in extent and lies approximately 2.3kms south-east of the approved San Kraal substation.
- A 132 kV OHL, approximately 2.1kms in length (located within the approved San Kraal WEF site) which will transfer electricity from the proposed Hartebeesthoek East on-site substation to the approved San Kraal substation.
- A 132 kV OHL, approximately 10kms in length (located within the approved San Kraal and Phezukomoya WEF sites) which will transfer electricity from the proposed Hartebeesthoek East substation to the approved Phezukomoya substation.

Three grid connection options are being considered for the Hartebeesthoek East WEF as outlined below.

OPTION A:

- Electricity will be transferred from the proposed Hartebeesthoek East substation to the San Kraal substation via a proposed OHL.
- From the San Kraal substation, the electricity will be transferred by the approved 132 kV OHL to the SK-PH collector substation **or** by the proposed southerly 132 kV OHL (HBH Corridor) to the SK-PH collector substation.
- From the SK-PH collector substation, electricity will be transferred to the Eskom Hydra D substation via a 132 kV OHL.

OPTION B:

- Electricity will be transferred from the proposed Hartebeesthoek East substation to the approved Phezukomoya substation via a proposed OHL.
- From the approved Phezukomoya substation the electricity will be transferred by the approved 132 kV OHL to the Eskom Hydra D substation.

OPTION C:

- Electricity will be transferred from the proposed Hartebeesthoek East substation to the approved San Kraal substation via a proposed OHL.
- From the approved San Kraal substation, the electricity will be transferred by the approved 132 kV OHL to the Eskom Hydra D substation **or** by the proposed southerly 132 kV OHL (HBH Corridor) to the Eskom Hydra D substation.

Grid connection proposals for the Hartebeesthoek East WEF are shown in **Figure 3**.

1.1.3 Phezukomoya Split 1 WEF includes:

- A temporary batching plant.
- An on-site 33/132 kV substation to serve the Phezukomoya Split 1 WEF. The new site will be approximately 9ha in extent and lies approximately 6.5kms east of the approved Phezukomoya substation.
- A 132 kV OHL, approximately 3.8kms in length (located within the approved Phezukomoya WEF site) which will transfer electricity from the proposed Phezukomoya Split 1 substation to the approved Phezukomoya substation.
- A 132 kV OHL, approximately 8.8kms in length (located within the approved Phezukomoya and San Kraal WEF sites) which will transfer electricity from the approved Phezukomoya substation to the approved San Kraal substation.

Three grid connection options being considered for the Phezukomoya Split 1 WEF as outlined below.

OPTION A:

- Electricity will be transferred from the approved Phezukomoya switching station **and** from the proposed Phezukomoya Split 1 substation to the approved Phezukomoya substation via an approved OHL and a proposed OHL respectively.
- From the approved Phezukomoya substation the electricity will be transferred by the approved 132 kV OHL to the SK-PH collector substation **or** via the proposed southerly 132 kV OHL (HBH Corridor) to the SK-PH collector substation.
- From the SK-PH collector substation, electricity will be transferred to the Eskom Hydra D substation via a 132 kV OHL.

OPTION B:

- Electricity will be transferred from the approved Phezukomoya switching station **and** from the proposed Phezukomoya Split 1 substation to the approved Phezukomoya substation by an approved OHL and a proposed OHL respectively.
- From the approved Phezukomoya substation the electricity is transferred by the approved 132 kV OHL to the Eskom Hydra D substation.

OPTION C:

- Electricity will be transferred from the approved Phezukomoya switching station **and** from the proposed Phezukomoya Split 1 substation to the approved Phezukomoya substation via an approved OHL and a proposed OHL respectively.
- From the approved Phezukomoya substation the electricity will be transferred by a proposed easterly 132 kV OHL to the approved San Kraal substation.
- From the approved San Kraal substation electricity will be transferred by the approved 132 kV OHL to the Eskom Hydra D substation **or** by the proposed southerly 132 kV OHL (HBH Corridor) to the Eskom Hydra D substation.

Grid connection proposals for the Phezukomoya Split 1 WEF are shown in **Figure 4**.

1.1.4 Hartebeesthoek West WEF includes:

- The relocation of the approved on-site switching station to serve the Hartebeesthoek West WEF. The site will be approximately 1ha in extent and lies approximately 2.5kms south-west of the approved San Kraal substation.
- A 132 kV OHL, approximately 2.7kms in length (located within the approved Phezukomoya and San Kraal WEF sites) which will transfer electricity from the proposed Hartebeesthoek West switching station to the approved San Kraal substation.
- A 132 kV OHL, approximately 10kms in length (located within the approved San Kraal and Phezukomoya WEF sites) which will transfer electricity from the approved San Kraal substation to the approved Phezukomoya substation.

Three grid connection options being considered for the Hartebeesthoek West WEF as outlined below.

OPTION A:

- Electricity will be transferred from the proposed Hartebeesthoek West switching station to the approved San Kraal substation via a proposed OHL.
- From the approved San Kraal substation, the electricity will be transferred by the approved 132 kV OHL to the SK-PH collector substation **or** by the proposed southerly 132 kV OHL (HBH Corridor) to the SK-PH collector substation.
- From the SK-PH collector substation, electricity will be transferred to the Eskom Hydra D substation via a 132 kV OHL.

OPTION B:

- Electricity will be transferred from the proposed Hartebeesthoek West switching station to the approved San Kraal substation via a proposed OHL.
- From the approved San Kraal substation, the electricity will be transferred via a proposed OHL to the approved Phezukomoya substation.
- From the approved Phezukomoya substation the electricity will be transferred by the approved 132 kV OHL to the Eskom Hydra D substation.

OPTION C:

- Electricity will be transferred from the proposed Hartebeesthoek West switching station to the approved San Kraal substation via a proposed OHL.
- From the approved San Kraal substation, the electricity will be transferred by the approved 132 kV OHL to the Eskom Hydra D substation **or** by the proposed southerly 132 kV OHL (HBH Corridor) to the Eskom Hydra D substation.

Grid connection proposals for the Hartebeesthoek West WEF are shown in **Figure 5**.

This additional infrastructure will connect into the approved grid connection infrastructure to feed electricity generated by the proposed San Kraal Split 1, Hartebeesthoek East, Phezukomoya Split 1 and Hartebeesthoek West WEFs into the national grid via the Hydra D Substation.

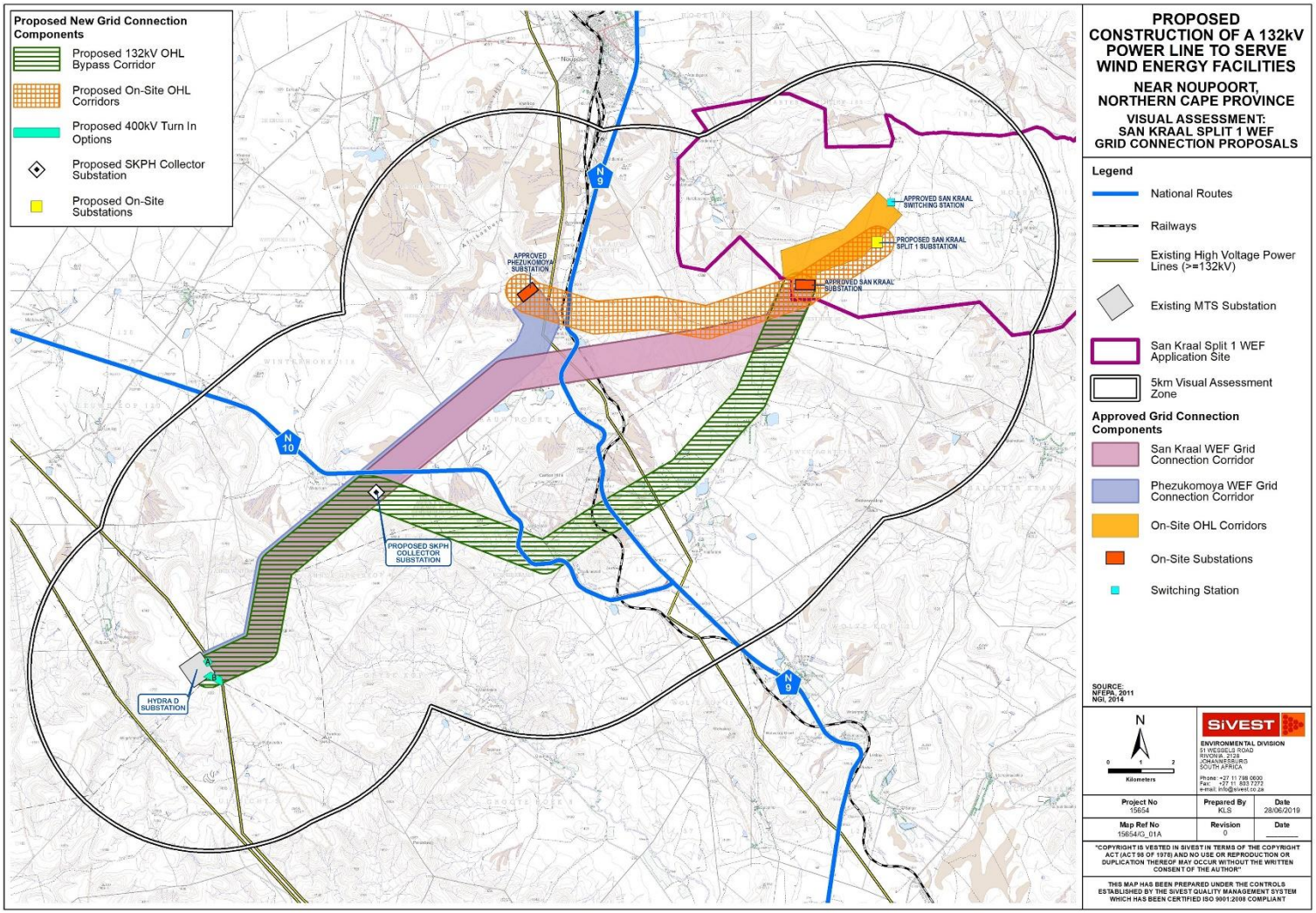

Figure 2: Grid connection proposals for San Kraal Split 1 WEF

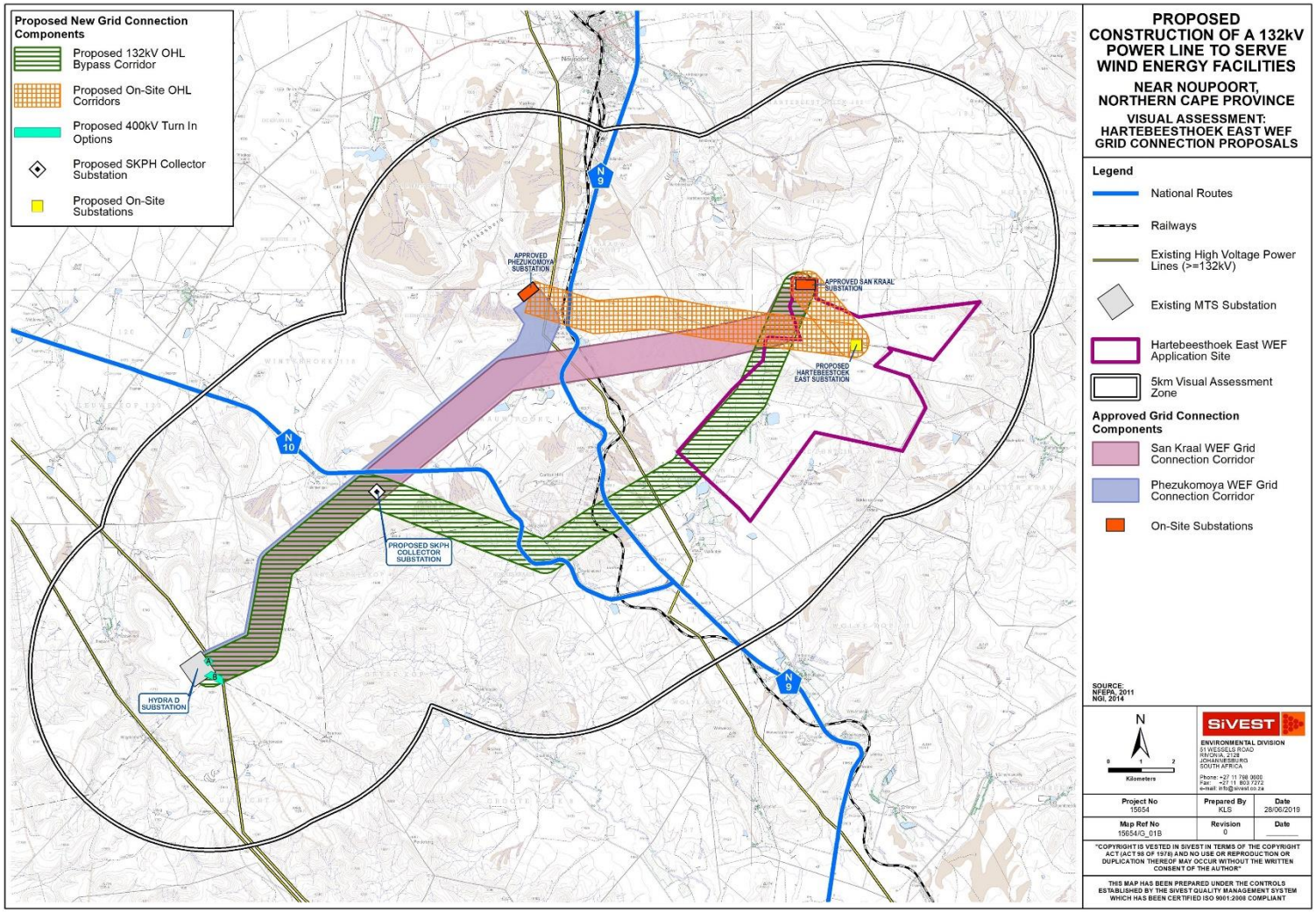

Figure 3: Grid connection proposals for Hartebeesthoek East WEF

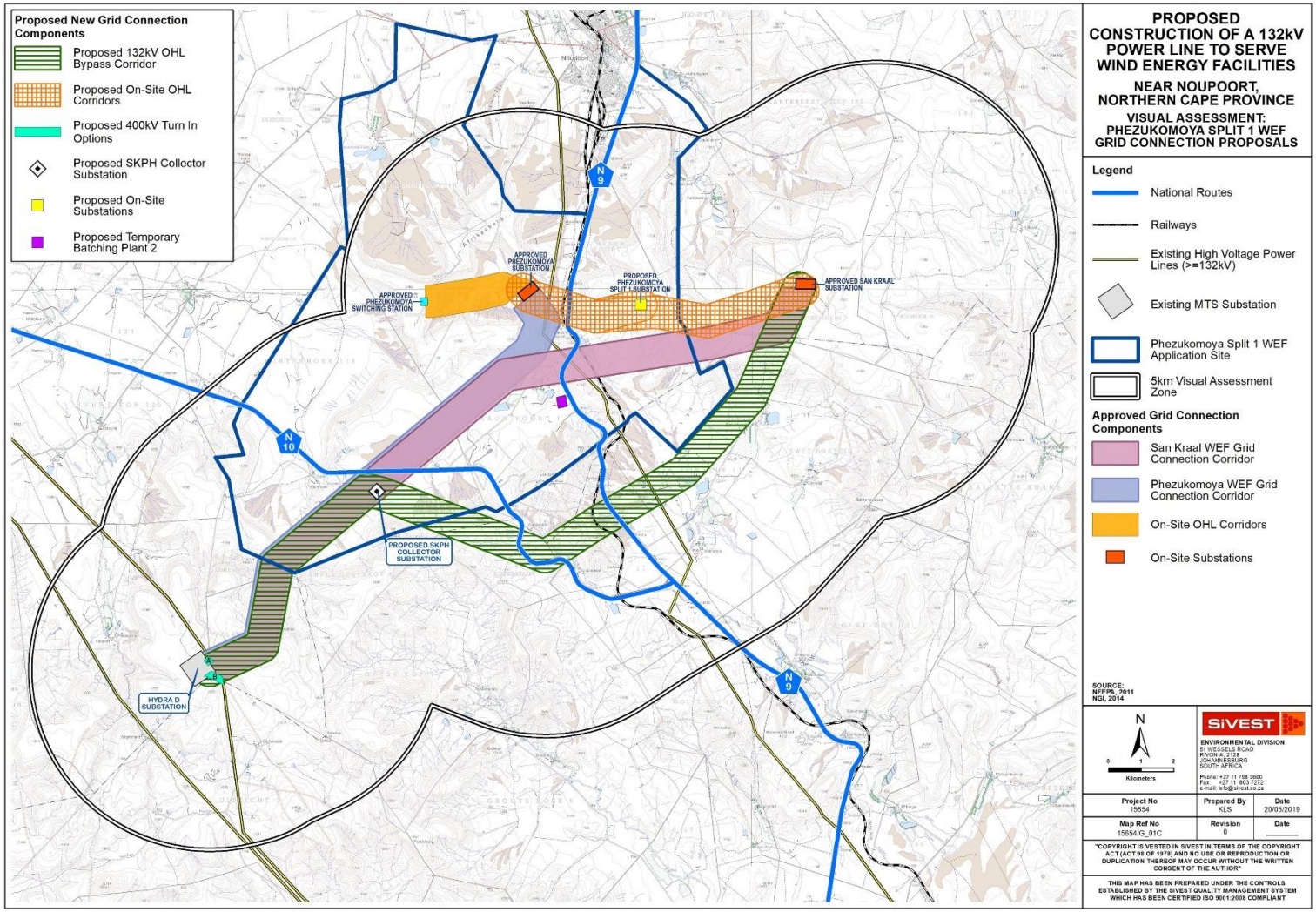

Figure 4: Grid connection proposals for Phezukomoya Split 1 WEF

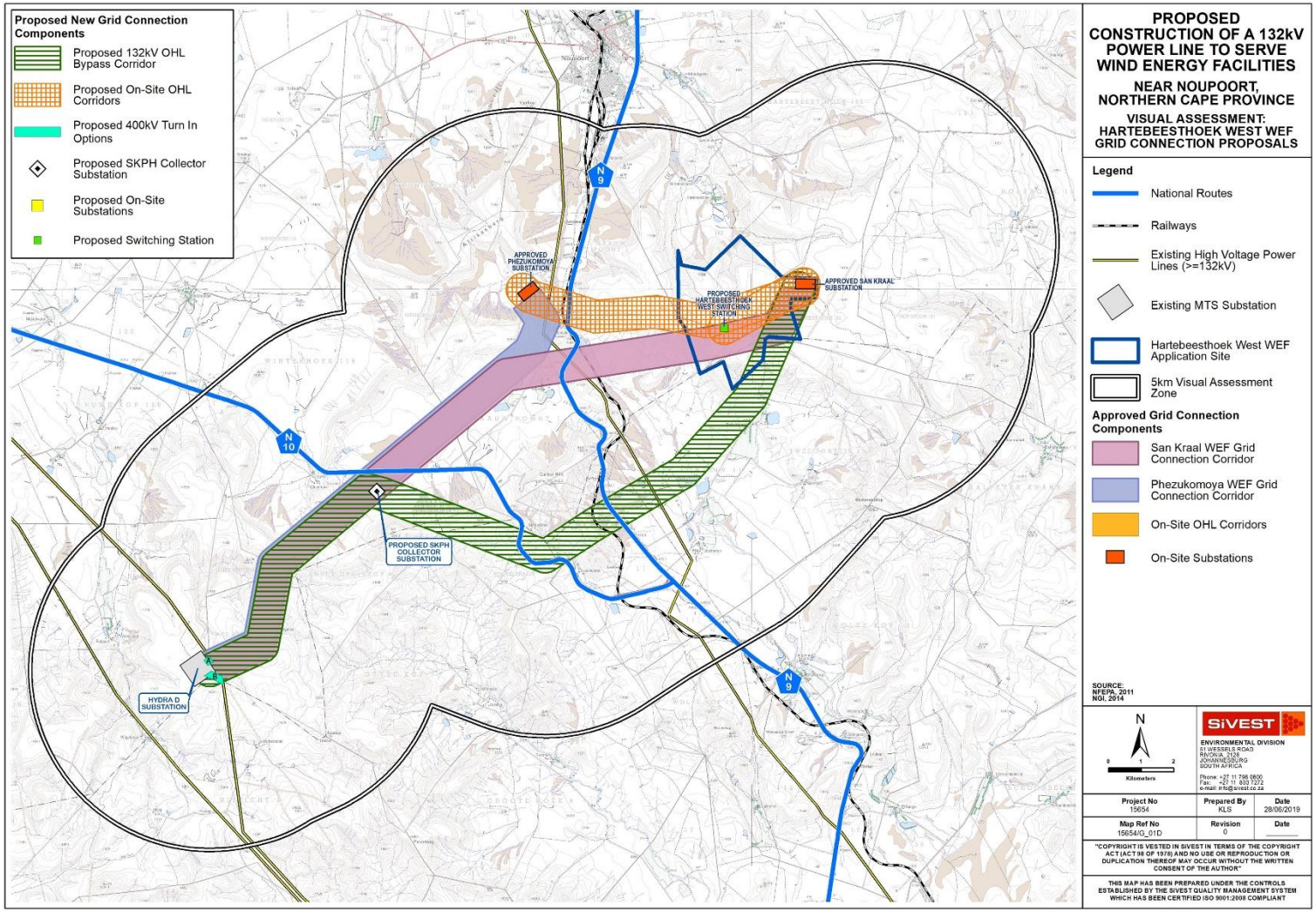

Figure 5: Grid connection proposals for Hartebeesthoek West WEF

Power line corridors of approximately 1km in width are being assessed to allow flexibility when determining the final route alignment. The proposed power lines, however, only require a 31m wide servitude, and as such, this servitude would be aligned within the corridor.

In the absence of any technical details, certain assumptions have been made based on similar projects in this area. It has been assumed that the type of power line towers being considered for this development includes both lattice and monopole towers and that these towers will be located approximately 200m to 250m apart. Tower heights have been assumed to be up to 25m in height, depending on the terrain, but will ensure minimum overhead line clearances from buildings and surrounding infrastructure. The exact location of the towers will only be determined during the final design stages of the power line.

The applicant is requesting that all options be approved in order to provide flexibility to Eskom. Accordingly, all options have been assessed in this VIA.

1.2 Site Location

The proposed development is located approximately 8km south-east of Noupoort, straddling the boundary between the Umsobomvu Local Municipality in the Northern Cape Province and the Inxuba Yethemba Local Municipality in the Eastern Cape Province (Figure 6).

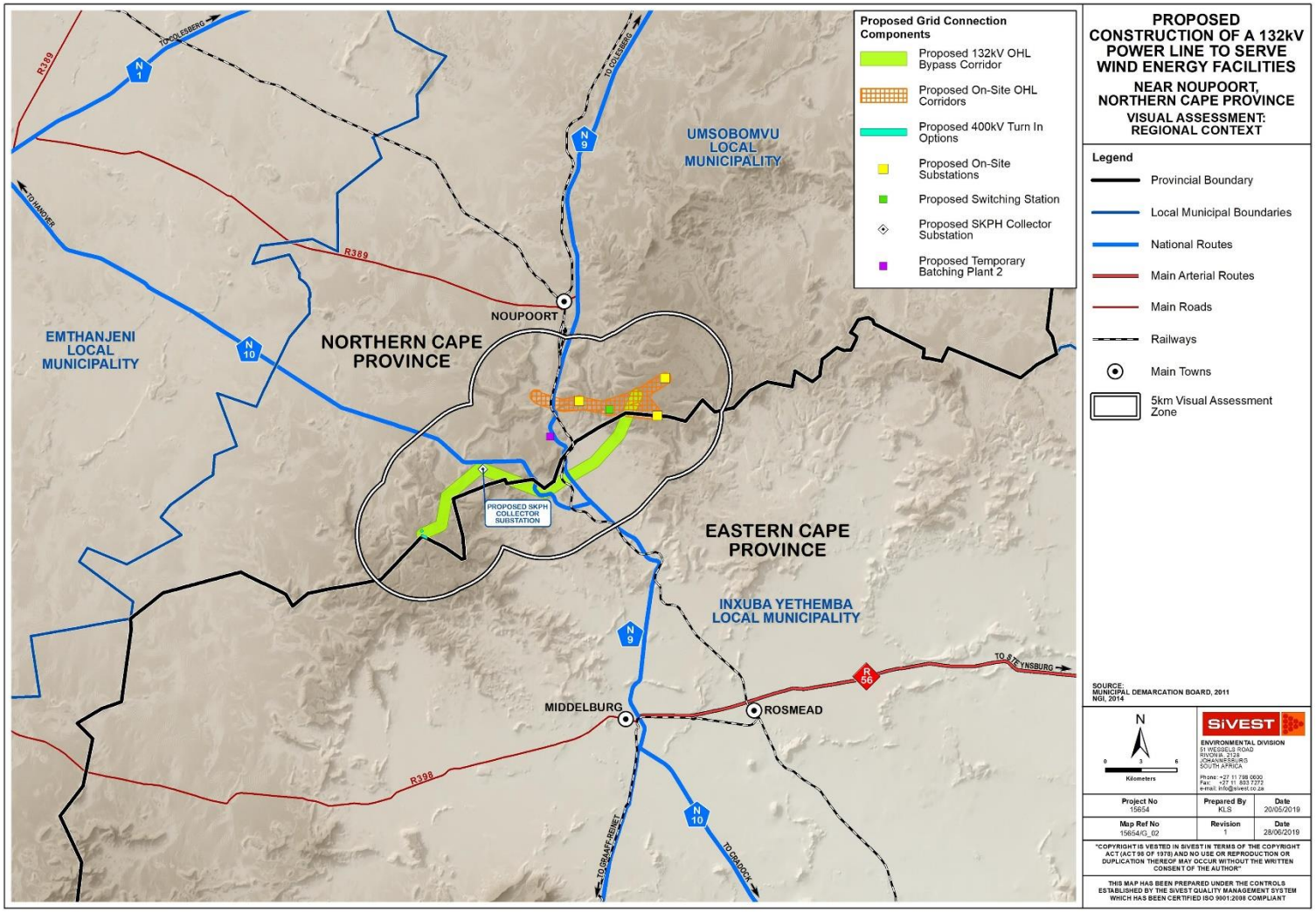

Figure 6: Regional Context

1.3 Assumptions and Limitations

- Given the fact that the proposed grid connection infrastructure is within the project area previously assessed for the San Kraal WEF and Phezukomoya WEF VIAs, it has been assumed that the baseline conditions in the area remain largely unchanged. As such, additional fieldwork was not considered necessary and baseline information used in this VIA is largely drawn from the previous WEF VIAs.

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

- Visual receptors identified for the original San Kraal and Phezukomoya WEF VIAs will be used to inform this assessment. The identification of visual receptors for the previous WEF VIAs involved a combination of desktop assessments as well as field-based observation. Initially, Google Earth imagery was used to identify potential receptors within the study area. Where possible, these receptor locations were verified and assessed during a site visit which was undertaken between the 11th and the 14th of September 2017. Due to the extent of the study area, however, it was not possible to visit or verify every potentially sensitive receptor location, and 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 and the economic dependency of the occupants on the scenic quality of views from the facility. Sensitive receptor locations typically include sites such as tourism facilities and scenic locations within natural settings that 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 a visual impact will be experienced.

- Due to access limitations during the site visit, the impact rating assessment of the proposed development on some of the potentially sensitive visual receptor locations has been undertaken via desktop means. Although the exact status of these receptors could not be established during the field investigation, it was assumed that most of these were farmsteads and as such, they are still regarded as being potentially

sensitive to the visual impacts associated with the proposed substations and power line and were assessed as part of the VIA.

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

- A viewshed analysis was undertaken for the proposed power lines based on the route alignments provided by Arcus. This analysis was based on points at 500m intervals along the centre lines of the corridors and an assumed tower height of 25m. Screening provided by any existing infrastructure and tall wooded vegetation was, however, not factored into the analysis. It should be noted that detailed topographic data was not available for the entire study area and as such, the viewshed analysis does not consider any localised topographic variations which may constrain views. The viewshed analysis should, therefore, be seen as a conceptual representation or a worst-case scenario which rates the geographical area from where the proposed wind turbines could be visible.

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

- The assessment of receptor-based impacts was based on the power line corridor alignments and substation sites provided by the proponent. It is recognised however that the exact route of the proposed power line has not yet been determined, and as such the final routing of the proposed power line 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. However, any feedback from the public during the review period of the Draft Basic Assessment Report (DBAR) will be incorporated into further drafts of this report.

- It is assumed that operational and security lighting will be required for the substations proposed. At the time of undertaking the visual study, no information was available regarding the type and intensity of lighting required, and therefore, the potential impact of lighting at night has not been assessed at a detailed level. Accordingly, only general measures to mitigate the impact of additional light sources on the ambience of the nightscape have been provided.

- Visualisation modelling has not been undertaken for the proposed development as the final power line route alignment and tower locations have not been established. In addition, although the grid connection infrastructure will introduce a new development in the area and result in some change to the visual character, the area is not regarded as a protected landscape. Visual models can, however, be provided should the Public Participation process identify the need for this exercise.

- This study includes an assessment of the potential cumulative impacts of multiple renewable energy developments and associated infrastructure 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.

- It should be noted that the site visit was undertaken in September 2017 (for the original San Kraal and Phezukomoya WEFs), during late winter/early spring. The study area is, however, typically characterised by low levels of rainfall all year round and therefore the time of the year is not expected to affect the significance of the visual impact of the proposed development. In addition, the vegetation cover within the study area largely comprises low shrubs, and thus, vegetation cover is not expected to have a significant effect on the visual impact of the proposed development.

- The weather conditions in the study area also affect the visual impact of the proposed development to some degree. The site visit was undertaken in clear weather conditions which tend to prevail for most of the year due to the low levels of rainfall. In these clear conditions, power lines and associated infrastructure would present a greater contrast with the surrounding landscape than they would on a cloudy day. The weather conditions during the time of the study were therefore taken into consideration when undertaking this VIA.

1.4 Specialist Credentials

This VIA has been undertaken by Andrea Gibb and Kerry Schwartz from SiVEST. Andrea Gibb has 11 years' work experience and specialises in undertaking visual impact and landscape assessments, by making use of ArcGIS technology and field surveys. Andrea's relevant VIA project experience is listed in the table below.

Environmental Practitioner	SiVEST (Pty) Ltd – Andrea Gibb
Contact Details	andreag@sivest.co.za
Qualifications	BSc Landscape Architecture and BSc (Hons) Environmental Management
Expertise to carry out the	**Visual Impact Assessments:** ▪ VIA for the proposed Rondekop WEF near Sutherland, Northern Cape Province.

Visual Impact Assessment.	▪ VIA (Scoping Phase) for the proposed development of the Paulputs WEF near Pofadder, Northern Cape Province. ▪ VIA (BA) for the proposed development of the Tooverberg WEF near Touws River, Western 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 ▪ VIA (Scoping Phase) for the proposed 3000MW Wind Farm and associated infrastructure near Richmond, Northern Cape Province. ▪ VIA for the proposed construction of a power line and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces. ▪ VIA for the proposed construction of a power line and associated infrastructure for the proposed Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province. ▪ 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. ▪ VIAs (Scoping and Impact Phase) for the proposed construction of the Sendawo substation and associated 400kV power line near Vryburg, North West 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 for the proposed Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province. ▪ VIAs (Scoping and Impact Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province. ▪ VIA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province. ▪ VIA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.

Kerry Schwartz is a GIS specialist with more than 20 years' experience in the application of GIS technology in various environmental, regional planning and infrastructural projects undertaken by SiVEST. Kerry's GIS skills have been extensively utilised in projects throughout

South Africa in other Southern African Countries. Kerry has also been involved in the compilation of reports for specialist studies such as visual impact assessments. Kerry's relevant VIA project experience is listed in the table below.

Environmental Practitioner	SiVEST (Pty) Ltd – Kerry Schwartz
Contact Details	kerrys@sivest.co.za
Qualifications	BA (Geography), University of Leeds 1982
Expertise to carry out the Visual Impact Assessment.	**Visual Impact Assessments:** ▪ VIA for the proposed Rondekop WEF near Sutherland, Northern Cape Province. ▪ VIA (Scoping Phase) for the proposed development of the Paulputs WEF near Pofadder, Northern Cape Province. ▪ VIA (BA) for the proposed development of the Tooverberg WEF near Touws River, 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

Full CVs are attached as **Appendix B**.

1.5 Assessment Methodology

As mentioned above, the proposed grid connection infrastructure is within the area previously assessed for the San Kraal and Phezukomoya WEF VIAs and as such baseline information for this VIA is largely drawn from the previous VIAs which were based on a desktop-level assessment supported by field-based observation.

1.5.1 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 – 2014). The characteristics identified via desktop means were later verified during the site visit.

1.5.2 Identification of sensitive receptors

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

1.5.3 Fieldwork and photographic review

Given that the proposed grid connection infrastructure is located within the project areas already assessed for the original San Kraal and Phezukomoya WEF VIAs, it was not considered necessary to undertake any additional fieldwork. Fieldwork undertaken for the previous WEF VIAs has therefore been used to inform this assessment. The fieldwork involved a four (4) day site visit in September 2017 which served to:

- verify the landscape characteristics identified via desktop means;
- conduct a photographic survey of the study area;
- verify, where possible, the sensitivity of visual receptor locations identified via desktop means;
- eliminate receptor locations that are unlikely to be influenced by the proposed development;
- identify any additional visually sensitive receptor locations within the study area; and
- inform the impact rating assessment of visually sensitive receptor locations (where possible).

1.5.4 Impact Assessment

A rating matrix, as provided by the Environmental Assessment Practitioner (EAP), was used to objectively evaluate the significance of the visual impacts associated with the proposed development, both before and after implementing mitigation measures. Mitigation measures were identified (where possible) in an attempt to minimise the visual impact of the proposed development. The rating matrix made use of several different factors including geographical extent, probability, reversibility, irreplaceable loss of resources, duration, cumulative effect 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 identified. This matrix is based on three 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.

1.5.5 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, this report will be updated to include relevant information as and when it becomes available.

2 FACTORS INFLUENCING VISUAL IMPACT

2.1 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. The viewer’s perception is usually dependent on age, gender, activity preferences, time spent within the landscape and the traditions of the viewer (Barthwal, 2002). Thus, certain receptors may not consider power lines and associated infrastructure to be a negative visual impact as they are often associated with the general growth and progression of an area and could even have positive connotations.

2.2 Visual environment

Power lines and substations 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 practised. Residents and visitors to these areas could perceive power lines and substations 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 power lines to be visually intrusive.

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

2.3 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 place 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.

2.4 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 7)**.

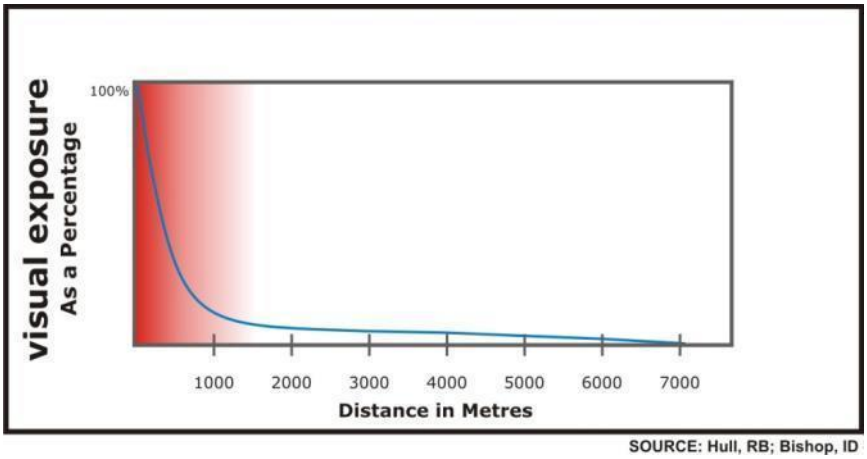

Figure 7: Conceptual representation of diminishing visual exposure over distance

3 VISUAL CHARACTER AND SENSITIVITY OF THE STUDY AREA

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

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

3.1 Physical and Land Use Characteristics

3.1.1 Topography

Much of the study area is relatively hilly in character, with a mix of incised valleys and flatter, higher-lying plateaus (**Figure 8**). The central sector of the study area is, however, characterised by relatively flat plains, typical of the Karoo (**Figure 9**).

Maps showing the topography and slopes within and in the immediate vicinity of the proposed development are provided in **Figure 10** and **Figure 11**.

Figure 8: Typical view of the hilly, incised topography within the wider study area.

Figure 9: View of relatively flat plains in the study area, typical of much of the Karoo.

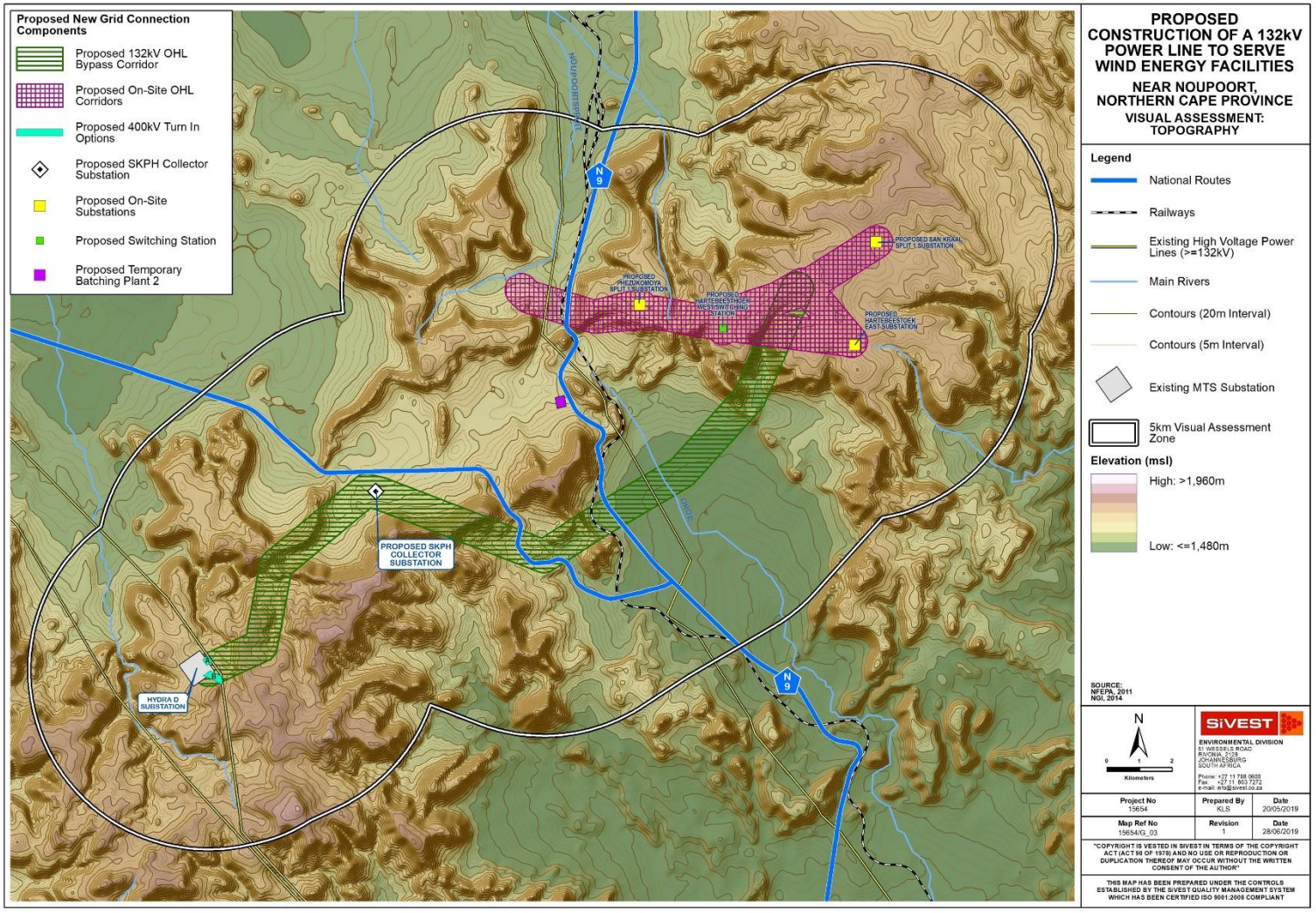

Figure 10: Topography of the study area

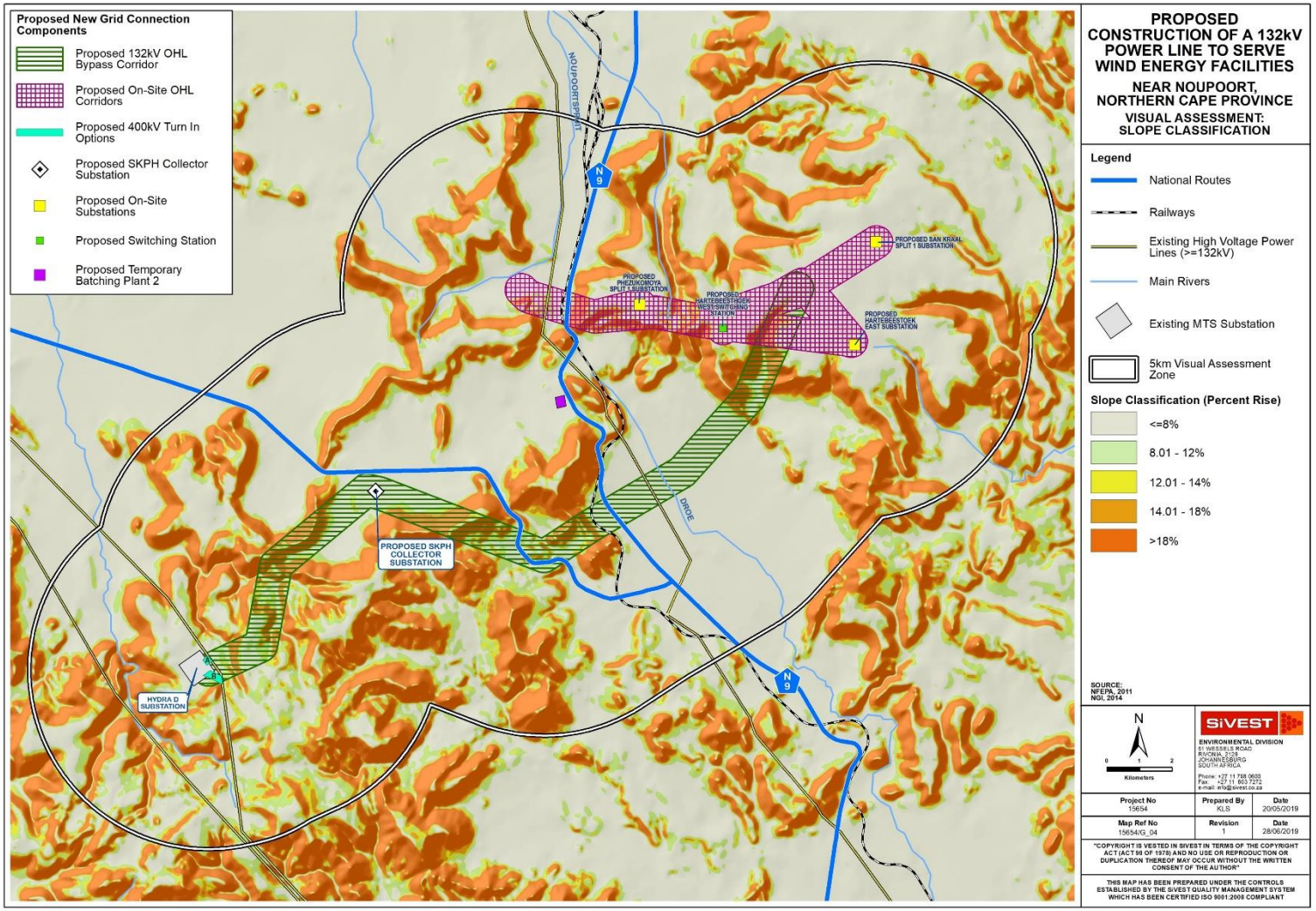

Figure 11: Slope Classification in the study area

Visual Implications

Wide-ranging vistas are experienced from areas of flat relief and from the higher-lying plateaus, (**Figure 12**), although the surrounding hills / “koppies” tend to enclose the visual envelope. In the hillier and higher-lying terrain, the vistas will depend on the position of the viewer. Viewers located within some of the more incised valleys, for example, would have limited vistas (**Figure 13**), whereas much wider vistas would be experienced by viewers on higher-lying ridges or slopes (**Figure 14**). Importantly in the context of this study, the same is true of objects placed at different elevations and within different landscape settings. Objects placed on high-elevation slopes or ridge tops would be highly visible, while those placed in valleys or on the plateaus would be far less visible.

Figure 12: Generally wide-ranging vistas constrained by surrounding hills.

Figure 13: Example of limited vistas experienced from within an incised valley.

Figure 14: Example of wider vistas experienced from higher elevations.

GIS technology was used to undertake a preliminary viewshed analysis based on the route alignments provided by the EAP. This analysis was based on points at 500m intervals along the centre lines of the corridor and assumes a tower height of 25m. The resulting viewshed indicates the geographical area from where the proposed power lines would theoretically be

visible, i.e. the zone of visual influence. This analysis is based entirely on topography (relative elevation and aspect) and does not consider any existing vegetation cover or built infrastructure, which may screen views of the proposed development. In addition, detailed topographic data was not available for the broader study area, and as such, the viewshed analysis does not consider any localised topographic variations which may constrain views. This analysis should, therefore, be seen as a conceptual representation or a worst-case scenario.

A map showing the potential visual influence of the proposed power line has been provided in **Figure 15** below, and from this, it is evident that, while the grid infrastructure would not be visible from significant sections of the study area, it would be highly visible from the central sectors of the study area.

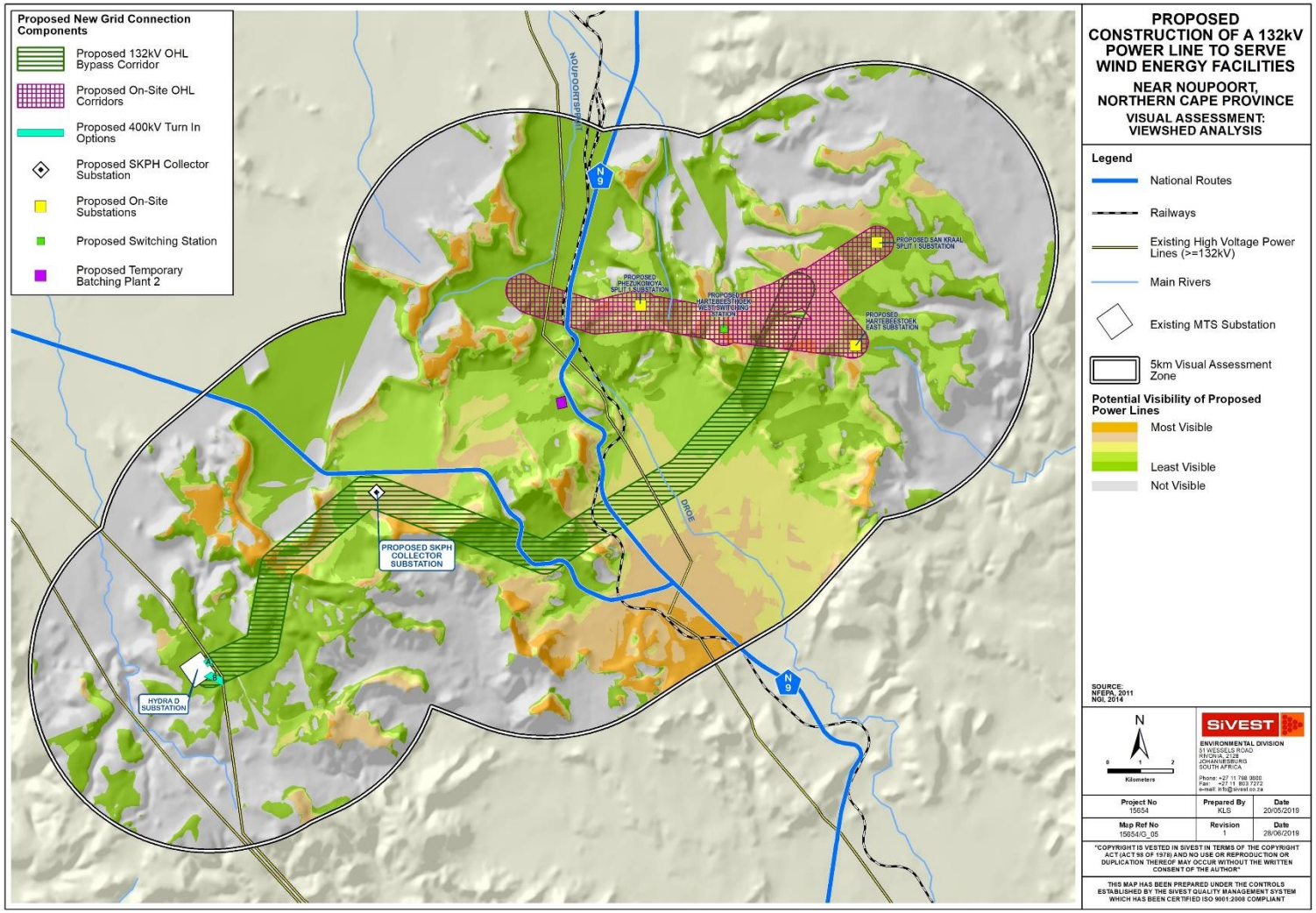

Figure 15: Map showing the potential visual influence of the proposed power line.

3.1.2 Vegetation

According Mucina and Rutherford (2006), the areas of the visual assessment zone which are characterised by flatter Karoo plains are largely covered by the Eastern Upper Karoo vegetation type, while the hillier areas in the east and west of the study area are largely characterised by Karoo Escarpment Grassland and Besemkaree Koppies Shrubland (**Figure 16**). The aridity of the area has restricted the vegetation to low shrubs distributed uniformly across the landscape, except in areas of disturbance where patches of bare earth occur (**Figure 17**). Some tree species are present in the study area and in some areas, man has had an impact on the natural vegetation, especially around some farmsteads, where tall exotic trees and other typical garden vegetation have been established over many years (**Figure 18**).

Visual Implications

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

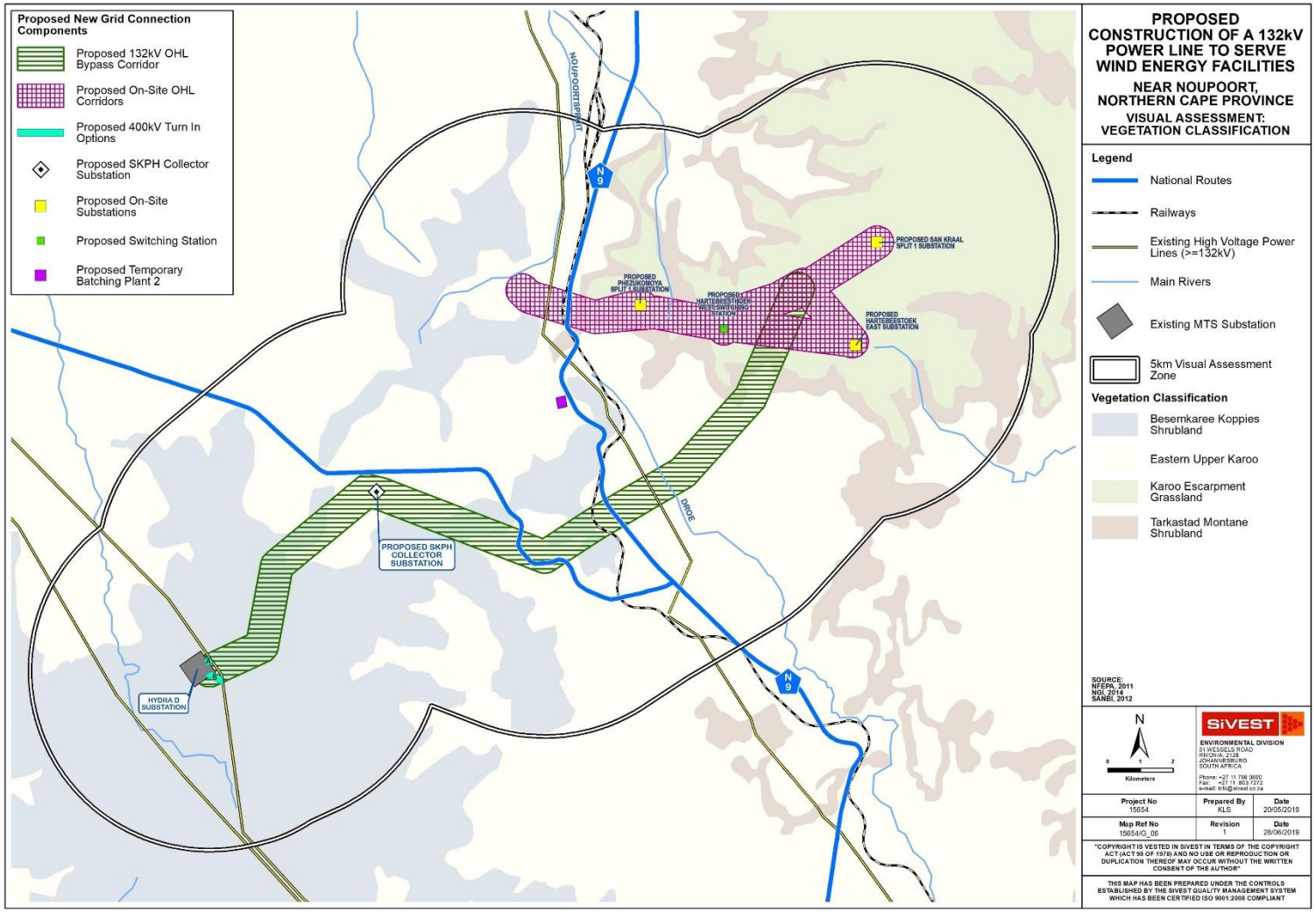

Figure 16: Vegetation Classification

Figure 17: Typical vegetation cover across much of the study area.

Figure 18: Example of trees and garden vegetation established around a farmhouse in the area

3.1.3 Land Use

According to the South African National Land Cover dataset (2013-2014) from Geoterraimage (2014), much of the visual assessment area is characterised by natural unimproved vegetation which is dominated by low shrubland (**Figure 19**). Agricultural activity in the area is severely restricted by the arid nature of the local climate, and livestock rearing (sheep) is the dominant activity (**Figure 20**). The nature of the climate and corresponding land use has also resulted in low stocking densities and relatively large farm properties across the area. Only very small areas along valley bottoms have been cultivated (**Figure 21**), and as such, the natural vegetation has been retained across much of the study area.

The area has a very low density of rural settlement, with relatively few scattered farmsteads occurring across the area. Built form across much of the study area is largely associated with pastoral elements and includes isolated farmsteads, ancillary farm buildings, livestock enclosures, windmills, fences, gravel access roads and telephone lines (**Figure 22**).

Railway lines (**Figure 23**), high voltage power lines and the N9 and N10 national routes (**Figure 24** and **Figure 25**) however form significant man-made features in an otherwise undeveloped landscape. It should also be noted that the recently constructed Noupoort Wind Farm is situated to the north of the proposed grid connection infrastructure, but only partially inside the visual assessment zone. Comprising some 35 wind turbines with associated infrastructure, this development has significantly transformed the natural environment in this area and is highly visible from the northern sector of the study area.

The closest built-up area is the town of Noupoort, which is situated approximately 8km north-west of the proposed grid connection infrastructure and well outside the visual assessment zone. Thus, the presence of the town is not expected to have an impact on the visual character of the study area.

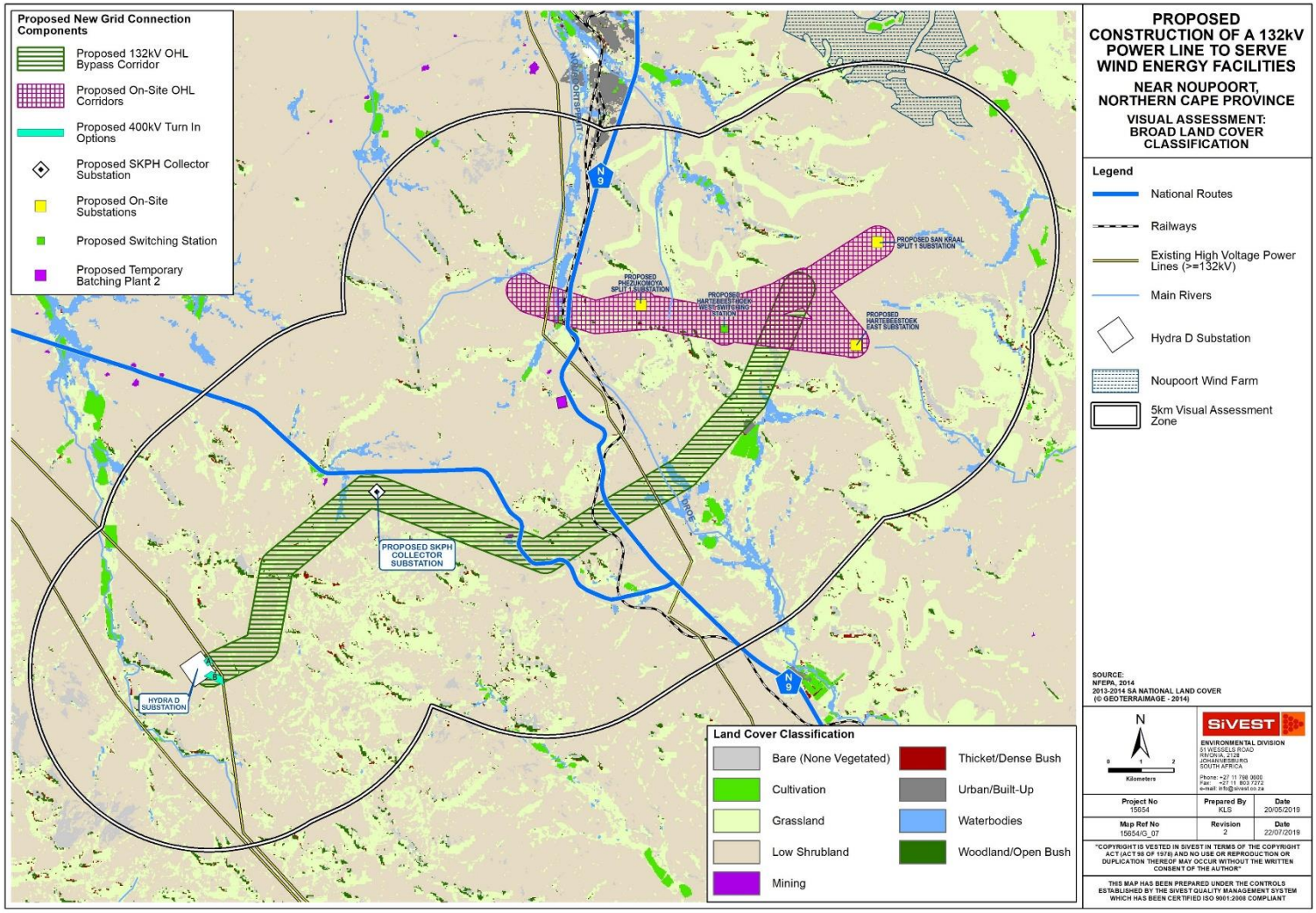

Figure 19: Land Cover Classification

Figure 20: Typical view of the sheep farming activities in the broader study area.

Figure 21: Typical view of a small patch of cultivated land.

Figure 22: Example of typical pastoral elements (such as livestock enclosures / camps and windmills) in the study area.

Figure 23: Railway infrastructure in the study area.

Figure 24: View of high voltage power lines traversing the N9 national route.

Figure 25: View of the N10 national route in the south-western sector of the study area.

Visual Implications

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

Significant elements of human transformation are however present in the form of high voltage power lines, railway infrastructure and the N9 and N10 national routes and these elements are considered to have degraded the visual character to some degree. The operational Noupoort Wind Farm situated on the northern boundary of the visual assessment also represents a significant element of transformation in the landscape.

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

3.2 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 and other objects such as telephone or electrical infrastructure.

As mentioned above, much of the study area is characterised by natural landscapes with rural elements and low densities of human settlement. Livestock grazing is the dominant land use, with a few small, isolated patches of cultivation in evidence in parts of the study area. These activities have not transformed the natural landscape to any significant degree, and as such, a large portion of the study area has retained its natural character and is dominated by largely natural, scenic views.

There are no towns or built-up areas in the visual assessment zone influencing the overall visual character, and thus, there are low levels of human transformation and visual degradation across much of the study area. Prominent anthropogenic elements in the study area, however, include high voltage power lines, rail infrastructure and the N9 and N10 national routes. Other, less prominent elements present in the area include telephone poles, windmills, gravel access roads and farm boundary fences. The presence of this infrastructure is an important factor in this context, as the introduction of the proposed power line and substations would result in less visual contrast where other anthropogenic elements are already present, especially where the scale of those elements is similar to that of the proposed development.

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

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 Karoo or “platteland” landscape that would characteristically be encountered across the high-lying dry western and central interior of South Africa. Much of South Africa’s dry Karoo interior consists of wide-open, uninhabited spaces sparsely punctuated by widely scattered farmsteads and small towns. Over the last couple of decades, a number of tourism routes have been established in the Karoo and in a context of increasing urbanisation in South Africa’s major centres, the Karoo is being marketed as an undisturbed getaway. Examples of this may be found in the “Getaway Guide to Karoo, Namaqualand and Kalahari” (Moseley and Naude-Moseley, 2008).

The typical Karoo landscape can also be considered a valuable ‘cultural landscape’ in the South African context. Although the cultural landscape concept is relatively new, it is becoming an increasingly important concept in terms of the preservation and management of rural and urban settings across the world (Breedlove, 2002).

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

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

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

In light of this, the study area, as visible to the viewer, represents a typical Karoo cultural landscape. This is important in the assessment of potential visual impacts associated with the development of grid connection infrastructure as introducing this type of development could be considered to be a degrading factor in the context of the natural Karoo character of the study area.

In this instance, however, visual impacts on the cultural landscape would be reduced by the fact that the area is relatively remote, and there are very few tourism or nature-based facilities in the study area. In addition, although the elements of the proposed development will be visible from the N9 and N10 national routes, the sections of these routes that traverse the study area do not form part of any designated tourism route.

It should be noted that the visual character of the broader study area has already undergone some transformation as a result of the operational Noupoort Wind Farm which is situated on the northern boundary of the visual assessment zone.

3.3 Visual Sensitivity

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

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

Based on the criteria in the matrix (**Table 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 power line and substation 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	RATING									
	1	2	3	4	5	6	7	8	9	10
Pristine / natural character of the environment										
Presence of sensitive visual receptors										
Aesthetic sense of place / scenic visual character										
Value to individuals / society										
Irreplaceability / uniqueness / scarcity value										
Cultural or symbolic meaning										
Scenic resources present in the study area										
Protected / conservation areas in the study area										
Sites of special interest present in the study area										
Economic dependency on scenic quality										
Local jobs created by scenic quality of the area										
International status of the environment										
Provincial / regional status of the environment										
Local status of the environment										
**Scenic quality under threat / at risk of change										

**Any rating above '5' 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	110	120	130	140	150

Based on the above factors, the study area is rated as having a moderate visual sensitivity, mainly due to the natural, scenic character 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, however, 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 relatively few or leisure / nature-based tourism activities or sensitive / potentially sensitive receptors were found to be present. The area would still. However, be valued as a typical Karoo cultural landscape, and the scenic mountainous terrain would have some visual appeal.

3.4 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 undulating topography in the study area would increase the visual absorption capacity, this would be offset by the lack of screening provided by the predominant shrubland vegetation type. However, the area has undergone some transformation as a result of high voltage power lines and road and rail infrastructure, thus increasing the visual absorption capacity of the landscape. In addition, significant transformation has occurred on the northern boundary of the visual assessment zone with the development of the Noupoort Wind Farm.

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

4 TYPICAL VISUAL IMPACTS ASSOCIATED WITH ON-SITE SUBSTATIONS, POWER LINES AND ASSOCIATED INFRASTRUCTURE

4.1 Grid Connection Infrastructure

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

Power line towers and substations are very large objects and thus highly visible. 132kV power lines typically require tower heights of up to 25m (equivalent in height to an eight-storey building). Although a pylon/tower structure would be less visible than a building, the height of the structure means that the pylon would still typically be visible from a considerable distance. Visibility would be increased by the fact that the power line comprises a series of these towers typically spaced approximately 170m to 250m apart in a linear alignment.

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

As described above, power lines and substations are not features of the natural environment but are rather representative of human (anthropogenic) alteration of the natural environment. Thus, a power line or substation could be perceived to be highly incongruous in the context of a largely natural landscape. The height and linear nature of the power line will exacerbate this incongruity, as the towers may intrude upon views within the landscape. In addition, the practice of clearing any taller vegetation from areas within the power line servitude can increase the visibility and incongruity of the power line. In a largely natural, bushier setting, vegetation clearance will cause fragmentation of the natural vegetation cover, thus making the power line more visible and drawing the viewer's attention to the power line servitude.

As mentioned above, the viewer's / receptor's perception of the development is also very important, as certain receptors may not consider the development of a power line or substation to be a negative visual impact. The scenic / aesthetic value of an area and the prevalent land-use practices also tend to affect people's perception of whether a power line and/or substation is an unwelcome intrusion, and this, in turn, will determine the sensitivity of the identified receptors to the proposed development.

Power lines and substations are often perceived as visual impacts in areas where value is placed on the scenic or aesthetic character of the area, and where activities, which are based upon the enjoyment of, or exposure to, the scenic or aesthetic features of the area are practised. Sensitivity to visual impacts is typically most pronounced in areas set aside for conservation of the natural environment (such as protected natural areas or conservancies), or in areas where the natural character or scenic beauty of the area attracts visitors (tourists). Residents and visitors to these areas may perceive power lines and associated infrastructure to be an unwelcome intrusion that would degrade the natural character and scenic beauty of the area, and which could potentially even compromise the practising of tourism activities in the area.

Conversely, the presence of other anthropogenic objects associated with the built environment may influence the perception of whether a power line and/or substation is a visual impact. Where industrial-type built-form exists, (such as renewable energy facilities, roads, railways and other power lines and substations), the visual environment could be considered to be "degraded" and thus the introduction of a new power line and substation into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible. In this context, therefore, the presence of high voltage power lines traversing the study area, in conjunction with the rail infrastructure and the N9 and N10 national routes, is expected to lessen the visual contrast associated with the introduction of a new power line and substation.

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

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

In this instance, the proposed power line and substations are intended to serve the proposed San Kraal Split 1, Hartebeesthoek East, Phezukomoya Split 1 and Hartebeesthoek West WEFs and as such, will only be built if these projects go ahead. The power line and substations are therefore likely to be perceived to be part of the greater WEF development, and the visual impact will be relatively minor when compared to the visual impact associated with the WEFs as a whole.

4.2 Associated Infrastructure

Additional on-site infrastructure being assessed as part of this BA will include the following:

- Infrastructure associated with additional access points to the WEFs.
- A temporary batching plant located within the approved Phezukomoya WEF site.

Surface clearance for access roads and the batching plant may result in the increased visual prominence of these features, thus increasing the level of contrast with the surrounding landscape. In addition, any security lighting provided at the access points or the batching plant may impact on the nightscape (**Section 6.2**).

The visual impact of this additional infrastructure is generally not regarded as a significant factor when compared to the visual impact associated with the WEF and grid connection infrastructure as a whole.

5 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 receptors would 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 certain residential dwellings in natural settings.

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

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

As the visibility of the development would diminish exponentially over distance (refer to **section 2.4** above), receptor locations which are closer to the power lines and / or substations would experience greater adverse visual impact than those located further away. Zones of visual impact were therefore delineated based on distance bands measured from the outer boundary of the power line corridors, inclusive of the substation sites. Based on the height and scale of the project, the distance intervals chosen for these zones of visual impact are as follows:

- 0 - 500m (high impact zone)
- 500m < 2km (moderate impact zone)
- 2km < 5km (low impact zone)

The receptors previously identified for the San Kraal and Phezukomoya WEF VIAs was refined to identify only those receptors located within 5km of the proposed power line corridors (**Figure 26**). Two (2) receptor locations were identified as being visually sensitive to the proposed

development, these being the Carlton Heights Lodge and the Wildberg Game and Guest Farm. Both of these receptors are regarded as sensitive visual receptors as they are used as tourism facilities and visitors to these facilities may perceive the proposed development in a negative light.

Wildberg Game and Guest Farm is located more than 4kms from the nearest section of the power line corridor and is outside the viewshed for the proposed grid connection infrastructure. As such, this facility has been removed from the list of potentially sensitive receptors.

Carlton Heights Lodge (VR 36) is situated approximately 16km south of Noupoort (**Figure 27**) and 1.5km from the N9 national highway. It should be noted that this facility is situated approximately 1.6km from the nearest section of the corridor and is located within the moderate zone of potential visual impact. Aside from accommodation facilities in a Karoo Style farmhouse (**Figure 28**), the lodge offers scenic views, walking opportunities, bird watching and game viewing opportunities as well as scenic 4x4 routes on the farm and a campsite.

This guesthouse is situated within a largely natural or rural setting and as such views from this location are considered to be mostly natural and scenic. Some views are however characterised by the presence of anthropogenic elements such as existing power lines (**Figure 29**), while other views are constrained by tall trees which provide a significant amount of screening (**Figure 30**).

A total number of seventeen (17) potentially sensitive receptors were identified within the visual assessment zone for the proposed grid connection infrastructure, all of which appear to be existing farmsteads or farmhouses. Seven (7) of these receptor locations were found to be outside the viewshed for the proposed power line, and substations and such were removed from the list of potentially sensitive receptors. The remaining ten (10) receptors, which are inside the viewshed, 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 dwellings.

It should be noted that seven (7) of these receptors are located on the application sites for the approved San Kraal and Phezukomoya WEFs. As such, it is assumed that the occupants would have a vested interest in the overall WEF and associated grid connection developments and would therefore not perceive the proposed power lines and substations in a negative light.

In many cases, roads along which people travel, are regarded as sensitive receptors. The N9 national route traverses the study area in a north-south direction, passing through a very scenic area as it approaches the town of Noupoort, and can be considered to be the primary sensitive receptor road through the area. Although the nearest proposed substation is more than 2kms from the N9, the power line corridors traverse the road and as such will be highly visible from sections of this road.

The N10 national route, running west from the N9, has been identified as a second potentially sensitive receptor road. This is a national route linking Port Elizabeth on the Eastern Cape coast with Upington and the Namibian border to the west. Although this road will not be affected

by the proposed substations, both the proposed southerly 132 kV OHL (HBH Corridor) and the proposed SKPH collector substation will be highly visible from sections of this road.

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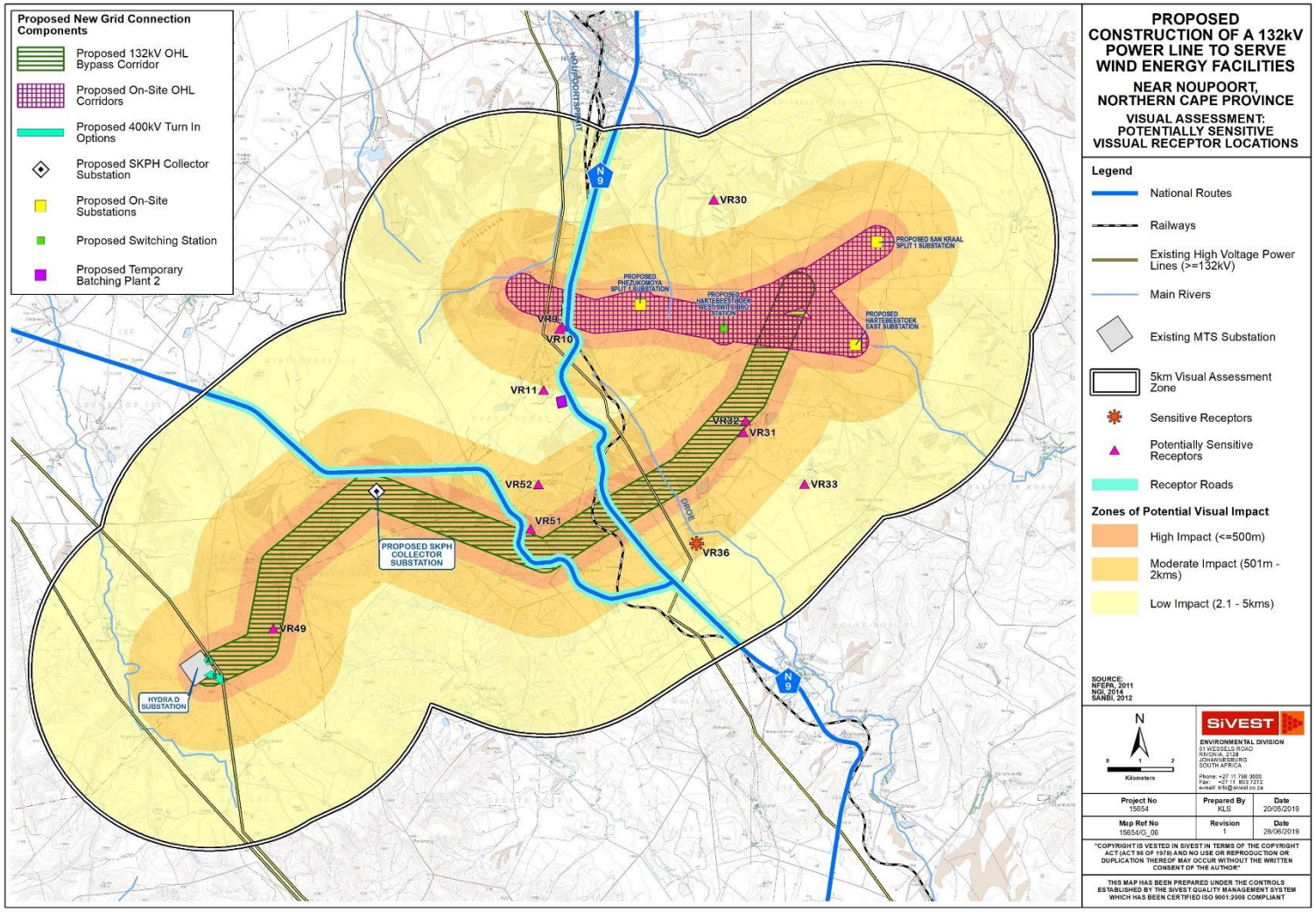

Figure 26: Potentially sensitive visual receptors

Figure 27: View of entrance to Carlton Heights Guest Lodge

Figure 28: View of the accommodation facilities (farmhouse) at the Carlton Heights Lodge (VR 36).

Figure 29: Power lines visible from Carlton Heights (VR36).

Figure 30: Trees providing screening around Carlton Heights Lodge (VR36).

6 IMPACT ASSESSMENT

6.1 Receptor Impact Rating

A matrix has been developed to assess the visual impact of the proposed development on the identified potentially sensitive receptor locations. This matrix is applied to each receptor and takes into account the factors listed below:

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

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

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

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 range 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 negligible impact rating, as the development would not impose any impact on the receptor.

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

In order to determine the likely visual compatibility of the proposed development, the level of visual contrast is determined as follows:

- **High –** undeveloped / natural / rural areas.
- **Moderate-** – intensively cultivated land or areas within close proximity (i.e. within approximately 500m) of existing power line, road or rail infrastructure in undeveloped / natural / rural areas. and
- **Low –** within approximately 1 km of visually transformed urban / built-up areas.

The matrix returns a score (**Table 2**), which in turn determines the visual impact rating assigned to each receptor location. An explanation of the matrix is provided in **Table 3**.

Table 2: Rating scores

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

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

	VISUAL IMPACT RATING			
VISUAL FACTOR	**HIGH**	**MEDIUM**	**LOW**	**OVERRIDING FACTOR: NEGLIGIBLE**
Distance of receptor away from proposed development	0 - 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 landform), 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 landform), typical land use and/or human elements (infrastructural form) **Score 2**	**Corresponds** with the pattern and form of the natural landscape elements (vegetation and landform), 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 the study area. As previously mentioned, due to access limitations and the nature of the study area, the identified potentially sensitive visual receptor locations could not be fully investigated from a visual perspective during the time of the field investigation. Notwithstanding this limitation, these receptor locations were still regarded as being potentially sensitive to the visual impacts associated with the proposed development and were assessed as part of the VIA.

Table 4: Potentially sensitive visual receptor impact rating

Receptor Number	Distance		Screening	Contrast	OVERALL IMPACT RATING
VR 36 – Carlton Heights Guest Lodge	Mod (2)	1.6km	Mod (2)	Mod (2)	**MODERATE (6)**
VR9 – Farmstead*	High (3)	0.1km	Low (1)	Mod (2)	**MODERATE (6)**
VR10 – Farmstead*	High (3)	0.2km	Low (1)	Mod (2)	**MODERATE (6)**
VR 11 – Farmstead*	Low (1)	2.1km	Low (1)	Mod (2)	**LOW (4)**
VR30 – Farmstead*	Low (1)	3km	Mod (2)	Mod (2)	**MODERATE (5)**
VR 31 – Farmstead*	High (3)	0.1km	High (3)	Mod (2)	**HIGH (8)**
VR 32 – Farmstead*	High (3)	#	High (3)	Mod (2)	**HIGH (8)**
VR 33- Farmstead	Low (1)	2.5km	Low (1)	High (3)	**MODERATE (5)**
VR49 - Farmstead	High (3)	#	Mod (2)	High (3)	**HIGH (8)**
VR 51 - Farmstead	High (3)	0.1km	Mod (2)	Mod (2)	**MODERATE (7)**
VR 52 - Middelburg Hang-gliding*	Mod (2)	1.4km	Mod (2)	Mod (2)	**MODERATE (6)**

**Receptor is located within the approved San Kraal or Phezukomoya WEF application site, and it is assumed that the occupants would have a vested interest in the development. As the proposed power lines and substations are intended to serve the WEF developments, it is unlikely that persons residing at this receptor location would perceive the proposed power line and substations in a negative light.*

#Receptor is located inside the assessment corridor.

The table above shows that the sensitive receptor identified (VR 36) is expected to experience moderate levels of visual impact as a result of the proposed grid connection infrastructure.

Three of the potentially sensitive receptors would experience high levels of visual impact as a result of the proposed grid connection infrastructure, namely VR31, VR32 and VR49. VR32 is the main farmhouse at Beskuitfontein, while VR32 represents additional dwellings / farm workers houses on the same property. Although trees planted around the main farmhouse would screen views towards the proposed southerly 132 kV OHL (HBH Corridor) to some extent, this receptor has been assigned a high impact rating. This rating is based on information provided by Social Impact specialists (Barbour, T & van der Merwe, S, 2019) which highlighted concerns raised by the owner of Beskuitfontein about the fact that the southerly 132 kV OHL

(HBH Corridor) is closer to his farmhouse than the approved assessment corridor and thus more visible from the dwelling as well as the access road.

VR49 is located inside the approved section of the assessment corridor for the proposed southerly 132 kV OHL (HBH Corridor), and to date, SiVEST has not been made aware of any objections raised by the occupants of the farmstead in respect of the proposed power lines.

Seven (7) receptor locations are expected to experience moderate levels of impact, while the remaining receptor location would experience low levels of impact.

6.2 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 have a significant impact on the nightscape. In contrast, introducing new light sources into a relatively dark night sky will impact on the visual quality of the area at night. It is thus important to identify a night-time visual baseline before exploring the potential visual impact of the proposed development at night.

Much of the study area is characterised by natural areas with pastoral elements and low densities of human settlement. As a result, relatively few light sources are present in the broader study. At night, the general study area is characterised by a picturesque dark starry sky, and the visual character of the night environment is largely 'unpolluted' and pristine. Sources of light in the area mostly comprise isolated lighting from surrounding farmsteads and transient light from the passing cars travelling along the N9 and N10 national routes.

The closest built-up area is the town of Noupoort, which is situated approximately 8km north-west of the proposed development and is thus too far away to have significant impacts on the night scene.

Other prominent light sources within the study area at night include the operational and security lighting at the Noupoort Wind Farm. In addition, permanent aviation lights or hazard lights placed on the top of each wind turbine have created a network of red lights in the dark night-time sky. As such, the northern sections of the study area situated within close proximity to the Noupoort Wind Farm have already seen some form of disturbance of the night environment.

Power lines and associated towers or pylons are not lit up at night and, thus, light spill associated with the proposed electrical infrastructure project is only likely to emanate from the proposed substations. It should also be noted that the power lines and substations will only be constructed if the proposed San Kraal Split 1, Hartebeesthoek East, Phezukomoya Split 1 and Hartebeesthoek West WEFs are also developed. Light sources for the WEFs will include operational and security lighting as well as permanent aviation lights on individual wind turbines. The lighting impacts from the proposed substation would, therefore, be subsumed by the glare and contrast of the lights associated with the WEFs. As such, the substations alone are not expected to result in significant lighting impacts.

6.3 Cumulative Impacts

Although it is important to assess the visual impacts of the proposed power lines and substations 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. 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.

Eighteen (18) renewable energy projects were identified within a 35 km radius of the proposed power lines and substations (**Figure 31)**, including the approved San Kraal and Phezukomoya WEFs. These projects, as listed in Error! Reference source not found. below, were identified using the DEA's Renewable Energy EIA Application Database for SA in conjunction with information provided by Independent Power Producers operating in the broader region. It is assumed that all of these renewable energy developments include grid connection infrastructure, although few details of this infrastructure were available at the time of writing this report.

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

Table 5: Renewable energy developments proposed within a 35km radius of the proposed power line and substations.

Project	DEA Reference No	Technology	Capacity	Status of Application / Development
Aggenys SEF	14/12/16/3/3/1/530	Solar	20MW	Approved
Allemans Fontein SEF	14/12/16/3/3/1/730	Solar	20MW	Approved
Carolus Poort SEF	14/12/16/3/3/1/729	Solar	20MW	Approved
Collett SEF	14/12/16/3/3/2/385	Solar	20MW	Approved
Damfontein SEF	14/12/16/3/3/1/728	Solar	20MW	Approved

Dida SEF	14/12/16/3/3/1/530	Solar	20MW	Approved
Gillmer SEF	14/12/16/3/3/1/735	Solar	20MW	Approved
Inkululeko SEF	14/12/16/3/3/1/553	Solar	20MW	Approved
Kleinfontein SEF	12/12/20/2654	Solar	20MW	Approved
Klip Gat SEF	14/12/16/3/3/2/354	Solar	75M	Approved
Middelburg Solar Park 1	12/12/20/2465/2	Solar	75MW	Approved
Middelburg Solar Park 2	12/12/20/2465/1	Solar	75MW	Approved
Naauw Poort SEF	14/12/16/3/3/2/355	Solar	75MW	Approved
Toitdale SEF	12/12/20/2653	Solar	20MW	Approved
Noupoort Wind Farm	12/12/20/2319	Wind	188MW	In Operation
Phezukomoya WEF	14/12/16/3/3/1/1028	Wind	315MW	Approved
San Kraal WEF	14/12/16/3/3/1/1029	Wind	390MW	Approved
Umsobomvu WEF	14/12/16/3/3/2/730	Wind	140MW	Approved

As can be seen from this table, fourteen (14) of these projects are Solar Energy facilities (SEFs), eleven (11) of which are located more than 10kms from the proposed development. Given the distance from the study area and the concentration of these facilities in close proximity to existing built infrastructure, it is not anticipated that these developments will result in any significant cumulative impacts affecting the landscape or the visual receptors within the visual assessment zone for the proposed grid connection infrastructure. It should be noted that although all of these SEF applications were approved at least five years ago, to date none have been constructed.

The remaining three (3) SEF projects, namely Middelburg Solar 1 and 2 and Naauwpoort SEF are all located on the flatter terrain in the central sector of the study area. Also lying in close proximity to the proposed grid connection are the proposed Umsobomvu WEF, as well as the approved San Kraal and Phezukomoya WEFs. It is understood that most of the proposed turbines on the WEF development sites will be located on high-lying plateaus and ridges and as such they will be visible to many of the visual receptors in the assessment area.

These proposed WEFs, in conjunction with the three proposed solar PV facilities and associated grid connection infrastructure, will inevitably introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts.

It should be noted however that PV panels, at an approximate height of 4m, are considerably less visible than wind turbines and as such the proposed solar PV facilities would be outside the viewshed of many of the potentially sensitive receptor locations identified in the study area. Cumulative impacts affecting these receptors would, therefore, be reduced, and the severity of these impacts would depend on the perceptions of the receptors.

A cursory examination of the literature available for the environmental assessments undertaken for many of these renewable energy applications showed that the visual impacts identified, and the recommendations and mitigation measures provided are consistent with those identified in this report.

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.

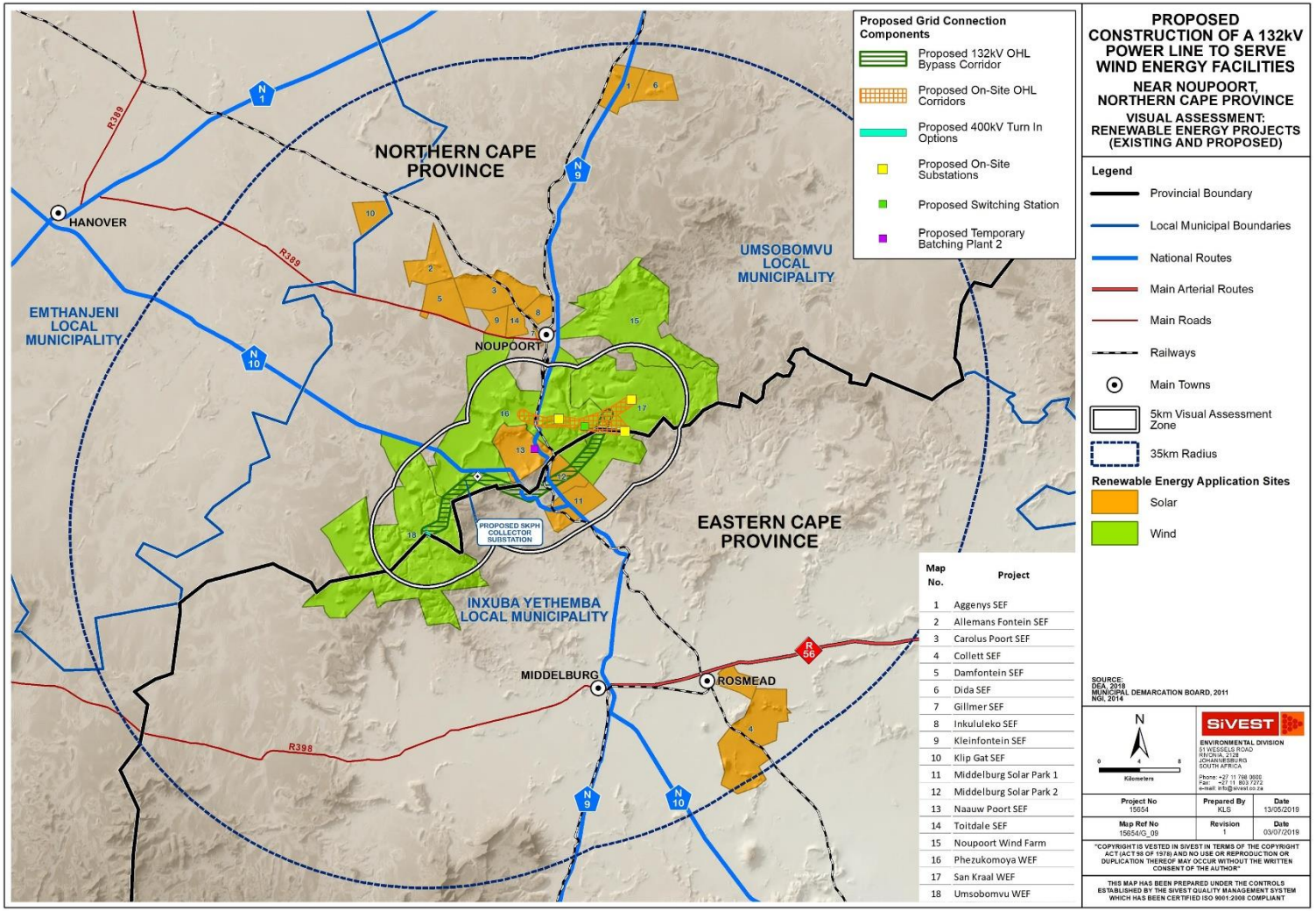

Figure 31: Renewable energy facilities proposed within a 35km radius of the proposed grid connection infrastructure.

6.4 Overall Visual Impact Rating

The EIA regulations 2014 (as amended) require that an overall rating for visual impact be provided to allow the visual impact to be assessed alongside other environmental parameters. The tables below present the impact matrix for visual impacts associated with the construction and operation of the proposed 132kV power lines and substations to serve the San Kraal Split 1, Hartebeesthoek East, Phezukomoya Split 1 and Hartebeesthoek West WEFs.

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

It should be noted that the additional grid infrastructure to serve the proposed split WEFs is located within either the approved San Kraal WEF site or the approved Phezukomoya WEF site. As such, this infrastructure forms an integral part of the overall WEF project, and this factor would reduce the visual impacts of the proposed power lines and substations. Elements of the proposed grid infrastructure which are located outside the approved WEF sites, however, specifically the proposed 400 kV turn-in options and a significant portion of the southerly 132 kV OHL (HBH Corridor), could potentially be associated with increased visual impacts. Accordingly, impacts in respect of this infrastructure have been assessed separately, as reflected in the rating tables below.

6.4.1 Construction

Table 6: Rating of visual impacts of the proposed 132 kV power lines and substations to serve the proposed split WEFs during construction.

Impact Phase:							
Potential impact description: ▪ 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 gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil, which could visually contrast with the surrounding environment. ▪ Vegetation clearance required for the construction of the proposed substation is expected to increase dust emissions and alter the natural character of the surrounding area, thus creating a visual impact. ▪ 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.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence

Without Mitigation	L	L	L	Negative	L	M	M
With Mitigation	L	L	L	Negative	L	M	M
Can the impact be reversed?			YES – the negative effects of construction will cease once construction is complete				
Will impact cause irreplaceable loss or resources?			YES – there will be marginal loss of resources				
Can impact be avoided, managed or mitigated?			YES – mitigation measures can reduce impacts				

Mitigation measures to reduce residual risk or enhance opportunities:

- Carefully plan to minimise the construction period and avoid construction delays.
- Inform receptors 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.
- Maintain a neat construction site by removing rubble and waste materials regularly.
- Make use of existing gravel access roads where possible.
- Limit the number of vehicles and trucks travelling to and from the construction site, where possible.
- Unless there are water shortages, ensure that dust suppression techniques are implemented
  - on all access roads;
  - in all areas where vegetation clearing has taken place;
  - on all soil stockpiles.

Residual impact	YES - mitigation measures can reduce impacts

Table 7: Rating of visual impacts of the proposed 400 kV turn-in options and the southerly 132 kV OHL (HBH Corridor) during construction.

Impact Phase:
Potential impact description:
▪ 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 gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil, which could visually contrast with the surrounding environment. ▪ Vegetation clearance required for the construction of the proposed substation is expected to increase dust emissions and alter the natural character of the surrounding area, thus creating a visual impact. ▪ 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.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	L	L	Negative	L	M	M
With Mitigation	L	L	L	Negative	L	M	M
Can the impact be reversed?			YES – the negative effects of construction will cease once construction is complete				
Will impact cause irreplaceable loss or resources?			YES – there will be marginal loss of resources				
Can impact be avoided, managed or mitigated?			YES – mitigation measures can reduce impacts				

Mitigation measures to reduce residual risk or enhance opportunities:

- Carefully plan to minimise the construction period and avoid construction delays.
- Inform receptors 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.
- Maintain a neat construction site by removing rubble and waste materials regularly.
- Make use of existing gravel access roads where possible.
- Limit the number of vehicles and trucks travelling to and from the construction site, where possible.
- Unless there are water shortages, ensure that dust suppression techniques are implemented
  - on all access roads;
  - in all areas where vegetation clearing has taken place;
  - on all soil stockpiles.

Residual impact	YES - mitigation measures can reduce impacts

Table 8: Rating of cumulative visual impacts as a result of the renewable energy developments (including associated infrastructure) proposed nearby during construction.

Impact Phase:
Potential impact description:
▪ Large construction vehicles and equipment associated with nearby renewable energy developments will alter the natural character of the study area and expose a greater number of visual receptors to impacts associated with construction. ▪ Visual intrusion of the additional construction activities may be exacerbated, particularly in more natural undisturbed settings. ▪ Additional construction activities in the area would generate additional traffic on gravel roads in the area, thus resulting in increased impacts from dust emissions and dust plumes. ▪ Additional areas of visual contrast may occur as a result of surface disturbance at other renewable energy construction sites. Further alteration of the landscape and increased

dust emissions could occur as a result of temporary stockpiling of soil at other renewable energy construction sites.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	H	Negative	M	M	M
With Mitigation	M	M	M	Negative	M	M	M

Can the impact be reversed?	YES – The impact is partly reversible. The negative effects of construction will cease once construction is complete
Will impact cause irreplaceable loss or resources?	YES – there will be significant loss of resources
Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts

Mitigation measures to reduce residual risk or enhance opportunities:

- Carefully plan to minimise the construction period and avoid construction delays.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Vegetation clearing should take place in a phased manner.
- Maintain a neat construction site by removing rubble and waste materials regularly.
- Make use of existing gravel access roads, where possible.
- Limit the number of vehicles and trucks travelling to and from the construction site, where possible.
- 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.

Residual impact	YES - mitigation measures can reduce impacts

6.4.2 Operation

Table 9: Rating of visual impacts of the proposed 132kV power line and substations to serve the proposed split WEFs during operation

Impact Phase:
Potential impact description:
▪ The proposed power line and substations could alter the visual character of the surrounding area and expose sensitive visual receptor locations to visual impacts. ▪ The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. ▪ The night time visual environment could be altered as a result of operational and security lighting at the proposed substations.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	M	L	Negative	L	M	M
With Mitigation	L	M	L	Negative	L	M	M
Can the impact be reversed?			YES – if the WEF is decommissioned				
Will impact cause irreplaceable loss or resources?			YES – there will be marginal loss of resources				
Can impact be avoided, managed or mitigated?			YES – mitigation measures can reduce impacts				
Mitigation measures to reduce residual risk or enhance opportunities: ▪ Where possible, limit the amount of security and operational lighting present at the on-site substation. ▪ Light fittings for security at night should reflect the light toward the ground and prevent light spill. ▪ Where possible, limit the number of maintenance vehicles using access roads. ▪ Non-reflective surfaces should be utilised where possible.							
Residual impact	YES - mitigation measures can reduce impacts						

Table 10: Rating of visual impacts of the proposed 400 kV turn-in options and the southerly 132 kV OHL (HBH Corridor) during operation.

Impact Phase:							
Potential impact description: ▪ The proposed power lines could alter the visual character of the surrounding area and expose sensitive visual receptor locations to visual impacts. ▪ The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. ▪ The night time visual environment could be altered as a result of operational and security lighting at the proposed substations.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	M	M	Negative	M	M	M
With Mitigation	L	M	M	Negative	M	M	M
Can the impact be reversed?			YES – if the power lines are decommissioned				
Will impact cause irreplaceable loss or resources?			YES – there will be marginal loss of resources				
Can impact be avoided, managed or mitigated?			YES – mitigation measures can reduce impacts				
Mitigation measures to reduce residual risk or enhance opportunities: ▪ Where possible, limit the number of maintenance vehicles using access roads. ▪ Non-reflective surfaces should be utilised where possible.							
Residual impact	YES - mitigation measures can reduce impacts						

Table 11: Rating of cumulative visual impacts as a result of the renewable energy developments (including associated infrastructure) proposed nearby during operation.

Impact Phase:

Potential impact description:

- 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.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	M	Negative	M	M	M
With Mitigation	M	M	M	Negative	M	M	M

Can the impact be reversed?	YES – if the WEF and power lines and other infrastructure are decommissioned
Will impact cause irreplaceable loss or resources?	YES – there will be marginal loss of resources
Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts

Mitigation measures to reduce residual risk or enhance opportunities:

- Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity.
- Medium-high visual impact zones should be viewed as zones where the number of turbines should be limited, where possible.
- Light fittings for security at night should reflect the light toward the ground (except for aviation lighting) and prevent light spill.
- The operations and maintenance buildings should not be illuminated at night, if possible.
- Turbines should be painted plain white, as this is a less industrial colour (Vissering, 2011). Bright colours or obvious logos should not be permitted.
- Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work) (Vissering, 2011).
- The operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible.
- If required, turbines should be replaced with the same model or one of equal height and scale. Repeating elements of the same height, scale and form can result in unity and lessen the visual impact that would typically be experienced in a chaotic landscape made up of diverse colours, textures and patterns (Vissering, 2011).

▪ As far as possible, limit the number of maintenance vehicles, which are allowed to access the sites. ▪ Bury cables under the ground where possible. ▪ Ensure that dust suppression techniques are implemented on all access roads. ▪ Select the alternatives that will have the least impact on visual receptors. ▪ Institute a rigorous planting regime along sections of the project boundaries and along major transportation routes. Buildings and similar structures must be in keeping with regional planning policy, especially the principles of critical regionalism (namely sense of place, sense of history, sense of nature, sense of craft and sense of limits).	
Residual impact	YES - mitigation measures can reduce impacts

6.4.3 Decommissioning

Visual impacts during the decommissioning phase are potentially similar to those associated with the construction phase.

7 CONCLUSION

A BA-level visual study was conducted to assess the magnitude and significance of the visual impacts associated with the development of the proposed power lines and substations to serve the proposed San Kraal Split 1, Hartebeesthoek East, Phezukomoya Split 1 and Hartebeesthoek East WEFs near Noupoort in the Northern Cape Province. Overall, sparse human habitation and the predominance of natural vegetation cover across much of the study area and would give the viewer the general impression of a large natural setting with some pastoral elements. As such, the proposed power line and substation development would alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across the broader study area. The level of contrast will, however, be reduced in some areas by the presence of high voltage power lines, railway infrastructure and the N9 and N10 application sites.

A total of eleven (11) potentially sensitive receptors were identified in the study area, only one (1) of which is considered to be a sensitive receptor as it is linked to tourism activities. Only three (3) of these receptors are expected to experience high levels of visual impact from the proposed grid connection infrastructure. One of these receptors is however located inside the approved section of the assessment corridor for the proposed southerly 132 kV OHL (HBH Corridor), and to date, SiVEST has not been made aware of any objections raised by the occupants of the farmstead in respect of the proposed power lines. In addition, although the N9 and N10 receptor roads traverse the study area, motorists travelling along these routes are only expected to experience moderate impacts from the proposed grid connection infrastructure.

The assessment revealed that impacts associated with elements of the proposed grid connection infrastructure located within the approved San Kraal and Phezukomoya WEF sites will be of low significance during construction and operation. Impacts associated with the proposed 400 kV turn-in options and the southerly 132 kV OHL (HBH Corridor) will be of low significance during construction and medium significance during operation.

Although eighteen (18) proposed renewable energy developments and infrastructure projects were identified within a 35km radius of the proposed grid connection infrastructure, it was determined that only six (6) of these would have any significant impact on the landscape within the visual assessment zone. These projects, WEFs and SEFs, and their associated grid connection infrastructure will alter the inherent sense of place and introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts. 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 respective visual specialists. In light of this, and the relatively low level of human habitation in the study area, however, cumulative impacts have been rated as medium.

7.1 Visual Impact Statement

It is SiVEST's opinion that the visual impacts associated with the proposed power lines and substations overall are of moderate significance. Given the low level of human habitation and the absence of sensitive receptors, the project is deemed acceptable from a visual perspective, and the EA should be granted. SiVEST is of the opinion that the impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

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Appendix A

IMPACT RATING METHODOLOGY

AN INNOVATIVE APPROACH TO STRUCTURING ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

Part 2: Ranking the Significance of Environmental Aspects and Impacts

By: T. Hacking

Anglo American plc

(Currently Environmental Manager at Konkola Copper Mines plc, Zambia)

Abstract

This paper (Part 2) describes a qualitative/ semi-quantitative approach to assessing the significance of environmental aspects and environmental impacts. The approach is intended as a tool for use together with the general framework presented in Part 1.

INTRODUCTION

Owing to the complexity of many of the systems that need to be considered when undertaking an Environmental Impact Assessment (EIA), it is not always possible to obtain quantitative data on which to base the impact assessment. Therefore, it is often necessary to use qualitative or semi-quantitative methods to determine the significance of environmental impacts.

The significance ranking approach presented in this paper is intended as a tool for use together with the general framework presented in Part 1 and is the final step in completing the structured and systematic approach. In Part 1 it was shown how environmental impacts can be linked to the project activities via the responsible "mechanisms", which are defined as *environmental aspects* in the ISO 14 000 series of standards. It was explained that significant impacts would only be present if significant aspects are present. Hence, a method for ranking the significance of aspects is required. Once the significance aspects have been identified, it is necessary to rank the significance of the impacts that could result form them.

SIGNIFICANCE OF ENVIRONMENTAL ASPECTS

The significance of environmental aspects can be determined and ranked by considering the criteria presented in Table 1. In some cases it may be necessary to undertake the impact assessment to determine whether a particular aspect is significant. Therefore, a fair degree of iteration is unavoidable during the assessment process.

Table 1 – Criteria used to determine the significance of environmental aspects

Significance Ranking	Negative Aspects	Positive Aspects
H (High)	Will always/often exceed legislation or standards. Has characteristics that could cause significant negative impacts.	Compliance with all legislation and standards. Has characteristics that could cause significant positive impacts.
M (Moderate)	Has characteristics that could cause negative impacts.	Has characteristics that could cause positive impacts.
L (Low)	Will never exceed legislation or standards. Unlikely to cause significant negative impacts.	Will always comply with all legislation and standards. Unlikely to cause significant positive impacts.

The aspect identification and ranking process is largely a screening exercise whereby the aspects that do not have the potential to cause significant impacts are eliminated. Aspects ranked "high" and "moderate" are significant and the possible impacts associated with their presence will need to be determined. Aspects ranked "low" do not warrant further attention.

The significance of the aspects should be ranked on the assumption that the management recommended in the EIA will be in place i.e. *with management*. This represents the scenario that the proponent wishes to have considered for approval. The environmental aspects associated with the proposed project activities during the construction, operational, closure phases (where appropriate) need to be identified. The influence of various project alternatives on the significance of the aspects must also be considered.

It may be desirable to also undertake a *without management* aspect ranking, since this highlights the sensitivity of the key risk areas to management and, hence, the management priorities. However, the dilemma in such an exercise is deciding on how much management to include. In the case of a mining project, for example, does one assume that the tailings dam will be completely absent or merely operated poorly? A useful rule of thumb is to assume that all the management required for operational reasons will be in place, but that any management specifically for environmental control will be absent. The danger in presenting *without management* ranking scenario in an EIA report is that it does not represent the scenario that the proponent wishes to have approved.

SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

Where significant environmental aspects are present ("high" or "moderate"), significant environmental impacts ***may*** result. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

Severity of Impacts

Table 2 presents the ranking criteria that can used to determine the severity of impacts on the bio-physical and socio-economic environment. Table 3 provides additional ranking criteria for determining the severity of negative impacts on the bio-physical environment.

Table 2 – Criteria for ranking the *Severity* of environmental impacts

Type of Criteria	Negative			Positive		
	H-	M-	L-	L+	M+	H+
Qualitative	Substantial deterioration. Death, illness or injury.	Moderate deterioration. Discomfort.	Minor deterioration. Nuisance or minor irritation.	Minor improvement.	Moderate improvement.	Substantial improvement.
Quantitative	Measurable deterioration.		Change not measurable i.e. will remain within current range.		Measurable improvement.	
	Recommended level will often be violated.	Recommended level will occasionally be violated.	Recommended level will never be violated.		Will be within or better than recommended level.	
Community Response	Vigorous community action.	Widespread complaints.	Sporadic complaints.		No observed reaction.	Favourable publicity

Table 3 – Criteria for ranking the *Severity* of negative impacts on the bio-physical environment

Environment	Ranking Criteria		
	Low (L-)	Medium (M-)	High (H-)
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments (e.g. ecology).	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g. ecology).
Ecology (Plant and animal life)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or prevalence.	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or prevalence.	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or endangered species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

Spatial Extent and Duration of Impacts

The duration and spatial scale of impacts can be ranked using the following criteria:

Table 4 – Ranking the *Duration* and *Spatial Scale* of impacts

	Ranking Criteria		
	L	**M**	**H**
Duration	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
Spatial Scale	Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national

Where the severity of an impact varies with distance, the severity should be determined at the point of compliance or the point at which sensitive receptors will be encountered. This position corresponds to the spatial extent of the impact.

Consequence of Impacts

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the following qualitative guidelines:

Table 5 – Ranking the *Consequence* of an impact

			SEVERITY = L		
DURATION	Long-term	**H**			
	Medium-term	**M**			**MEDIUM**
	Short-term	**L**	**LOW**		
			SEVERITY = M		
DURATION	Long-term	**H**			**HIGH**
	Medium-term	**M**		**MEDIUM**	
	Short-term	**L**	**LOW**		
			SEVERITY = H		
DURATION	Long-term	**H**			
	Medium-term	**M**			**HIGH**
	Short-term	**L**	**MEDIUM**		
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national
			SPATIAL SCALE		

To use Table 5, firstly go to one of the three "layers" based on the severity ranking obtained from Table 2 and/ or Table 3. Thereafter determine the consequence ranking by locating the intersection of the appropriate duration and spatial scale rankings.

Overall Significance of Impacts

Combining the consequence of the impact and the probability of occurrence, as shown by Table 6, provides the overall significance (risk) of impacts.

Table 6 – Ranking the *Overall Significance* of impacts

PROBABILITY	Definite Continuous	**H**	**MEDIUM**		**HIGH**
	Possible Frequent	**M**		**MEDIUM**	
	Unlikely Seldom	**L**	**LOW**		**MEDIUM**
			L	**M**	**H**
			CONSEQUENCE (from Table 5)		

The overall significance ranking of the negative environmental impacts provides the following guidelines for decision making:

Table 7 – Guidelines for decision-making

Overall Significance Ranking	Nature of Impact	Decision Guideline
High	Unacceptable impacts.	Likely to be a fatal flaw.
Moderate	Noticeable impact.	These are unavoidable consequence, which will need to be accepted if the project is allowed to proceed.
Low	Minor impacts.	These impacts are not likely to affect the project decision.

Priority of Primary Impacts

In some cases environmental aspects could result in impacts on a number of environments. For example, the release of contaminated runoff could pollute surface water, which in turn could adversely impact on the ecology. In such cases the impact on the environment in which the first or primary impact occurs should be considered first. In the example "surface water" is the environment on which the primary impact occurs. If it can be shown that the impact on the primary environment will be insignificant, then secondary impacts need not be considered.

CONCLUSIONS

While the significance ranking methodology presented in above is not a substitute for more sophisticated qualitative methods, it is a step forward from the arbitrary methods that are often used to determine the significance of environmental impacts. In many instances it is impractical or prohibitively costly to source the data required to undertake a fully quantitative assessment and, hence, a qualitative or semi-quantities approach is the best option available. If used in conjunction with the general framework outlined in Part 1, it provides a systematic and structured approach to undertaking an EIA.

Appendix B

SPECIALIST CV's

CURRICULUM VITAE

Name	Andrea Gibb
Profession	Environmental Practitioner
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Divisional Manager Environmental Division
Years with Firm	8 Years
Date of Birth	29 January 1985
ID Number	8501290020089
Nationality	South African

Education

Matriculated 2003, Full Academic Colours, Northcliff High School, Johannesburg, South Africa

Professional Qualifications

BSc (Hons) Environmental Management (University of South Africa 2008-2010)

BSc Landscape Architecture (with distinction) (University of Pretoria 2004-2007)
Awards: Cave Klapwijk prize for highest average in all modules in the Landscape Architecture programme, ILASA book prize for the best Landscape Architecture student in third year design, Johan Barnard planting design prize for the highest distinction average in any module of plant science.

ArcGIS Desktop 1 (ESRI South Africa December 2010)
Environmental Impact Assessment (EIA) 2014 Legal Regime Workshop (Imbewu 2015)

Employment Record

Sept 2018 – to date	SiVEST SA (Pty) Ltd: Divisional Manager: Environmental Division
May 2017 – Aug 2018	SiVEST SA (Pty) Ltd: Senior Manager: Environmental Division
Aug 2010 – Apr 2017	SiVEST SA (Pty) Ltd: Environmental Practitioner
Jan 2008 – July 2010	Cave Klapwijk and Associates: Environmental Assistant and Landscape Architectural Technologist
Feb 2006 – Dec 2006	Cave Klapwijk and Associates: Part time student

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent

CURRICULUM VITAE

Andrea Gibb

Key Experience

Andrea has over 10 years' work experience and is employed by SiVEST's Environmental Division as the Divisional Manager heading up the Renewable Energy Sector in the Johannesburg Office. She specialises in overseeing large scale multifaceted Environmental Impact Assessments (EIAs) and Basic Assessments (BAs) throughout South Africa, undertaken according to International Finance Corporation (IFC) standards and Equator Principles, within the renewable energy generation and electrical distribution sectors. From a business development perspective Andrea assists the division by marketing the environmental services and identifying prospective clients. She enjoys guiding, mentoring and motivating the team to find their niche and improve their input. Andrea further specialises in visual impact assessments (VIAs) and has developed a specialist team who she oversees.

Skills include:

- Project and team management
- Marketing and business development
- Financial management
- Client liaison and relationship management
- Team leadership
- Mentorship and training
- Report writing and review
- Documentation / quality control

Projects Experience

Aug 2010 – to date

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) / BASIC ASSESSMENT (BA)

- BA for the proposed construction of the Grasskoppies Substations and Power Line near Loeriesfontein, Northern Cape Province.
- BA for the proposed construction of the Ithemba Substations and Power Line near Loeriesfontein, Northern Cape Province.
- BA for the proposed construction of the Hartebeest Leegte Substations and Power Line near Loeriesfontein, Northern Cape Province.
- BA for the proposed construction of the !Xha Boom Substations and Power Line near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the Grasskoppies Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the !Xha Boom Wind Farm near Loeriesfontein, Northern Cape Province.
- Application for an Amendment of the Environmental Authorisation (EA) for the proposed construction of the Droogfontein II PV Plant near Kimberley, Northern Cape Province.
- Amendment and Resubmission of the FBAR for the Eskom Longdown Substation and Vyeboom 66kV Turn-in Power Lines near Villiersdorp, Western Cape Province.
- BA for the proposed construction of the Leeuwbosch Power Plant near Leeudoringstad, North West Province.

- BA for the proposed construction of the Wildebeestkuil Power Plant near Leeudoringstad, North West Province.
- EIA for the proposed development of the Tlisitseng 1 and 2 75MW Solar Photovoltaic (PV) Energy Facilities near Lichtenburg, North West Province.
- EIAs for the proposed development of the Sendawo 1, 2, and 3 75MW Solar PV Energy Facilities near Vryburg, North West Province.
- EIA for the proposed construction of the Sendawo Common Collector Substation and power line near Vryburg, North West Province.
- EIA for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
- Application for an Amendment of the Environmental Authorisation (EA) for the proposed construction of the 100MW Limestone Solar Thermal Power Project near Danielskuil, Northern Cape Province.
- Applications for the Amendment of the EAs for the proposed construction of three 75MW solar PV facilities near Prieska, Northern Cape Province.
- Applications for the Amendment of the EAs for the proposed construction of the 75MW Arriesfontein and Wilger Solar Power Plants near Danielskuil, Northern Cape Province.
- Completion and submission of the final EIA report for the proposed Rooipunt PV Solar Power Park Phase 1 and proposed Rooipunt PV Solar Power Park Phase 2 near Upington, Northern Cape Province.
- EIAs for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- EIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province.
- EIA for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- BA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.
- BA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.
- BA for the proposed Construction of the SSS1 5MW Solar PV Plant on the Western Part of Portion 6 (Portion of Portion 5) of Farm Spes Bona 2355 near Bloemfontein, Free State Province.
- BA for the proposed Construction of the SSS2 5MW Solar PV Plant on the Eastern Part of Portion 6 (Portion of Portion 5) of Farm Spes Bona 2355 near Bloemfontein, Free State Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of a 132kV power line from the proposed Bophirima Substation to the existing Schweizer-Reneke Substation, North West Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of a 132kV power line from the Mookodi Substation to the existing Magopela Substation, North West Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province.
- Amendment of the Final Environmental Impact Report for the Proposed Mookodi 1 Integration Project near Vryburg, North West Province.
- BA for the proposed 132kV power line and associated infrastructure for the proposed Redstone Solar Thermal Energy Plant near Lime Acres, Northern Cape Province.
- BA for the proposed construction of a 132kV power line and substation associated with the 75MW PV Plant on the Farm Droogfontein (PV 3) in Kimberley, Northern Cape Province.
- BA for the proposed establishment of a Learning and Development Retreat and an Executive Staff and Client Lodge at Mogale's Gate, Gauteng Province.
- Application for an Amendment of the EA to increase the output of the proposed 40MW PV Facility on the farm Mierdam to 75MW, Northern Cape Province.

- BA for the proposed construction of a power line and substation near Postmasburg, Northern Cape Province.
- BA for the proposed West Rand Strengthening Project – 400kV double circuit power line and substation extension in the West Rand, Gauteng.
- EIA for the proposed construction of a wind farm and PV plant near Prieska, Northern Cape Province.
- Public Participation assistance as part of the EIA for the proposed Thyspunt Transmission Lines Integration Project – EIA for the proposed construction of 5 x 400kV transmission power lines between Thyspunt to Port Elizabeth, Eastern Cape Province.
- EIA assistance for the proposed construction of three Solar Power Plants in the Northern Cape Province.
- Public Participation as part of the EIA for the proposed Delareyille Kopela Power Line and Substation, North West Province.
- Public Participation as part of the EIA for the Middelburg Water Reclamation Project, Mpumalanga Province.

VISUAL IMPACT ASSESSMENT (VIA)

- VIA for the proposed construction of the Mlonzi Golf Estate and Hotel Development, Eastern Cape Province.
- VIA for the proposed Tinley Manor South Banks Beach Enhancement Solution, KwaZulu-Natal Province.
- VIA for the proposed construction of the Grasskoppies Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the !Xha Boom Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed Phezukomoya Wind Energy Facility near Noupoort, Northern Cape Province.
- VIA for the proposed San Kraal Wind Energy Facility near Noupoort, Northern Cape Province
- VIA for the proposed Assagay Valley Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed Kassier Road North Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed construction of a power line and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces.
- VIA (Scoping Phase) for the proposed construction of a 3000MW Wind Farm and associated infrastructure near Richmond, Northern Cape Province.
- VIA for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
- VIA for the proposed construction of a power line and associated infrastructure for the proposed Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province.
- VIAs (Impact Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.
- VIA (Impact Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
- VIAs (Impact Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province.
- VIA for the proposed construction of the Tlisitseng substation and associated 132kV power line near Lichtenburg, North West Province.
- VIA (Scoping Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
- VIA (Scoping Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.

- VIA (Scoping Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province.
- Visual recommendations for Phase 1 of the proposed Renishaw Estate Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed Tinley Manor South Banks Development, KwaZulu-Natal Province.
- VIAs (Impact Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- VIA (Scoping Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- Visual Due Diligence Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
- Visual Status Quo and Constraints Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
- VIA for the proposed agricultural components of the Integrated Sugar Project in Nsoko, Swaziland.
- VIA for the proposed Tweespruit to Welroux power lines and substation, Free State Province.
- VIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province.
- VIA (Impact Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed amendment to the authorised power line route from Hera Substation to Westgate Substation, Gauteng Province.
- VIA (Impact Phase) for the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province.
- VIA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.
- VIA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.
- VIA (Scoping Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed Rorqual Estate Development near Park Rynie on the South Coast of KwaZulu Natal.
- VIA (Scoping Phase) for the proposed construction of a Coal-fired Power Station, Coal Mine and Associated Infrastructure near Colenso, KwaZulu-Natal Province.
- VIA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province.
- VIA for the proposed construction of the Duma transmission substation and associated Eskom power lines, KwaZulu-Natal Province.
- VIA for the proposed construction of the Madlanzini transmission substation and associated Eskom power lines, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Normandie substation to Hlungwane substation, Mpumalanga and KwaZulu-Natal Provinces.
- VIA for the proposed construction of the Nzalo transmission substation and associated Eskom power lines, KwaZulu-Natal Province.
- VIA for the proposed construction of the Sheepmoor traction substation with two 20MVA transformer bays and a new associated 88kV turn-in power line, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Uitkoms substation to Antra T-off, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Umfolozi substation to Eqwasha traction substation including an 88kV turn-in power line to Dabula traction substation, Kwazulu-Natal Province.
- VIA for the proposed construction of the new 88/25kV Vryheid traction substation with two 20MVA transforma bays and a new associated 88kV turn-in power line, KwaZulu-Natal Province.

- VIA for the proposed construction of a 132kV power line and substation associated with the 75MW PV Plant on the Farm Droogfontein (PV 3) in Kimberley, Northern Cape Province.
- VIA (Impact Phase) for the proposed Construction of a Solar PV Power Plant near De Aar, Northern Cape Province.
- VIA for the (Impact Phase) proposed Construction of the Renosterberg Wind Farm near De Aar, Northern Cape Province.
- VIA for the (Impact Phase) proposed Construction of the Renosterberg Solar PV Power Plant near De Aar, Northern Cape Province.
- VIA for the proposed construction of a 132kV power line for the Redstone Thermal Energy Plant near Lime Acres, Northern Cape Province.
- VIA for the proposed Mookodi Integration phase 2 132kV power lines and Ganyesa substation near Vryburg, North West Province.
- VIA for the proposed 132kV power lines associated with the PV Plants on Droogfontein Farm near Kimberley, Northern Cape Province.
- VIA (Scoping phase) for the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province.
- VIA for the proposed development of a learning and development retreat and an executive and staff lodge at Mogale's Gate, Gauteng Province.
- VIA for the proposed construction of a substation and 88kV power line between Heilbron (via Frankfort) and Villiers, Free State Province.
- Visual Status Quo Assessment for the Moloto Development Corridor Feasibility Study in the Gauteng Province, Limpopo Province and Mpumalanga Province.
- VIA the West Rand Strengthening Project – 400kV double circuit power line and substation extension in the West Rand, Gauteng.
- VIA for the proposed construction of a wind farm and solar photovoltaic plant near Loeriesfontein, Northern Cape Province.
- Visual sensitivity mapping exercise for the proposed Mogale's Gate Expansion, Gauteng.
- VIA (Scoping Phase) for the proposed Renosterberg Solar PV Power Plant and Wind Farm near De Aar, Northern Cape Province.
- Scoping level VIAs for the proposed construction of three Solar Power Plants in the Northern Cape Province.
- VIAs for the Spoornet Coallink Powerline Projects in KZN and Mpumalanga.
- Visual Constraints Analysis for the proposed establishment of four Wind Farms in the Eastern and Northern Cape Province.
- VIA (Scoping Phase) for the proposed development of a solar energy facility in De Aar, Northern Cape.
- VIA (Scoping Phase) for the proposed development of a solar energy facility in Kimberley, Northern Cape.

STRATEGIC ENVIRONMENTAL PLANNING

- Assistance with the Draft Environmental Management Framework for the Mogale City Local Municipality, Gauteng Province.
- Sensitivity Negative Mapping Analysis for the proposed Mogale's Gate Development, Gauteng Province.

CURRICULUM VITAE

Name	Kerry Lianne Schwartz
Profession	GIS Specialist
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Senior GIS Consultant: Environmental Division
Years with Firm	30 Years
Date of Birth	21 October 1960
ID No.	6010210231083
Nationality	South African

Professional Qualifications

BA (Geography), University of Leeds 1982

Membership to Professional Societies

South African Geomatics Council – GTc GISc 1187

Employment Record

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1994 – Present	SiVEST SA (Pty) Ltd - Environmental Division: GIS/Database Specialist.
1988 - 1994	SiVEST (formerly Scott Wilson Kirkpatrick): Town Planning Technician.
1984 – 1988	Development and Services Board, Pietermaritzburg: Town Planning Technician.

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent

Key Experience

Kerry is a GIS specialist with more than 20 years' experience in the application of GIS technology in various environmental, regional planning and infrastructural projects undertaken by SiVEST.

Kerry's GIS skills have been extensively utilised in projects throughout South Africa in other Southern African Countries. These projects have involved a range of GIS work, including:

- Design, compilation and management of a demographic, socio-economic, land use, environmental and infrastructural databases.
- Collection, collation and integration of data from a variety of sources for use on specific projects.
- Manipulation and interpretation of both spatial and alphanumeric data to provide meaningful inputs for a variety of projects.
- Production of thematic maps and graphics.
- Spatial analysis and 3D modelling, including visual and landscape assessments.

Projects Experience

STRATEGIC PLANNING PROJECTS

Provision of database, analysis and GIS mapping support for the following:

- Water Plan 2025: Socio-economic, Land Use and Demographic Update – Umgeni Water (KwaZulu-Natal).
- Eskom Strategic Plan – Eskom (KwaZulu-Natal).
- Umgeni Water Quality Management Plan – Department of Water Affairs and Umgeni Water (KwaZulu-Natal).
- KwaZulu-Natal Development Perspective – Department of Economic Affairs (KwaZulu-Natal).
- Indlovu Regional Integrated Plan – Department of Local Government and Housing (KwaZulu-Natal).
- Umgeni Water and Sanitation Needs Analysis – Umgeni Water (KwaZulu-Natal).
- Metro Waste Water Management Plan – Durban Waste Water management, City of Durban (KwaZulu-Natal).
- KwaZulu-Natal Electrification Prioritisation Model – Eskom (KwaZulu-Natal).
- Umzinyathi Regional Development Plan – Umzinyathi Regional Council (KwaZulu-Natal).
- GIS driven model to assess future population growth in quaternary catchments under different growth scenarios – Umgeni Water (KwaZulu-Natal).
- Ubombo Master Water Plan Study – Mhlathuze Water Board (KwaZulu-Natal).
- Development strategy for local economic development and social reconstruction of the Germiston-Daveyton Activity Corridor – Eastern Gauteng Services Council (Gauteng).
- Land identification study for low cost housing in the Indlovu Region – Indlovu Regional Council (KwaZulu-Natal).
- Local Development Plan for Manzini – Manzini Town Council (Swaziland).
- Database development for socio-economic and health indicators arising from Social Impact Assessments conducted for the Lesotho Highlands Development Association – Lesotho.
- Development Plan for the adjacent towns of Kasane and Kazungula - Ministry of Local Government, Land and Housing (Botswana).
- Development Plan for the rural village of Hukuntsi - Ministry of Local Government, Land and Housing (Botswana).
- Integrated Development Plans for various District and Local Municipalities including:
  - Nquthu Local Municipality (KwaZulu-Natal)
  - Newcastle Local Municipality (KwaZulu-Natal)
  - Amajuba District Municipality (KwaZulu-Natal)
  - Jozini Local Municipality (KwaZulu-Natal)
  - Umhlabuyalingana Local Municipality (KwaZulu-Natal)
- uMhlathuze Rural Development Initiative – uMhlathuze Local Municipality (KwaZulu-Natal).
- Rural roads identification – uMhlathuze Local Municipality (KwaZulu-Natal).
- Mapungubwe Tourism Initiative – Development Bank (Limpopo Province).
- Northern Cape Tourism Master Plan – Department of Economic Affairs and Tourism (Northern Cape Province).
- Spatial Development Framework for Gert Sibande District Municipality (Mpumalanga) in conjunction with more detailed spatial development frameworks for the 7 Local Municipalities in the District, namely:
  - Albert Luthuli Local Municipality
  - Msukaligwa Local Municipality
  - Mkhondo Local Municpality

  - Pixley Ka Seme Local Municipality
  - Dipaleseng Local Municipality
  - Govan Mbeki Local Municipality
  - Lekwa Local Municipality
- Land Use Management Plans/Systems (LUMS) for various Local Municipalities including:
  - Nkandla Local Municipality (KwaZulu-Natal)
  - Hlabisa Local Municipality (KwaZulu-Natal)
  - uPhongolo Local Municipality (KwaZulu-Natal)
  - uMshwathi Local Municipality
- Spatial Development Framework for uMhlathuze Local Municipality (KwaZulu-Natal).
- Spatial Development Framework for Greater Clarens – Maloti-Drakensberg Transfrontier Park (Free State).
- Land use study for the Johannesburg Inner City Summit and Charter – City of Johannesburg (Gauteng).
- Port of Richards Bay Due Diligence Investigation – Transnet
- Jozini Sustainable Development Plan – Jozini Local Municipality (KwaZulu-Natal)
- Spatial Development Framework for Umhlabuyalingana Local Municipality (KwaZulu-Natal)

BUILT INFRASTRUCTURE

- EIA and EMP for a 9km railway line and water pipeline for manganese mine – Kalagadi Manganese (Northern Cape Province).
- EIA and EMP for 5x 440kV Transmission Lines between Thyspunt (proposed nuclear power station site) and several substations in the Port Elizabeth area – Eskom (Eastern Cape Province).
- Initial Scoping for the proposed 750km multi petroleum products pipeline from Durban to Gauteng/Mpumalanga – Transnet Pipelines.
- Detailed EIA for multi petroleum products pipeline from Kendall Waltloo, and from Jameson Park to Langlaagte Tanks farms –Transnet Pipelines.
- Environmental Management Plan for copper and cobalt mine (Democratic Republic of Congo).
- EIA and Agricultural Feasibility study for Miwani Sugar Mill (Kenya).
- EIAs for Concentrated Solar and Photovoltaic power plants and associated infrastructure (Northern Cape, Free State, Limpopo and North West Province).
- EIAs for Wind Farms and associated infrastructure (Northern Cape and Western Cape).
- Basic Assessments for 132kV Distribution Lines (Free State, KwaZulu-Natal, Mpumalanga and North West Province).
- Environmental Assessment for the proposed Moloto Development Corridor (Limpopo).
- Environmental Advisory Services for the Gauteng Rapid Rail Extensions Feasibility Project.
- Environmental Screening for the Strategic Logistics and Industrial Corridor Plan for Strategic Infrastructure Project 2, Durban-Free State-Gauteng Development Region.

STATE OF THE ENVIRONMENT REPORTING

- 2008 State of the Environment Report for City of Johannesburg.
- Biodiversity Assessment – City of Johannesburg.

STRATEGIC ENVIRONMENTAL ASSESSMENTS AND ENVIRONMENTAL MANAGEMENT FRAMEWORKS

- SEA for Greater Clarens – Maloti-Drakensberg Transfrontier Park (Free State).

- SEA for the Marula Region of the Kruger National Park, SANParks.
- SEA for Thanda Private Game Reserve (KwaZulu-Natal).
- SEA for KwaDukuza Local Municipality (KwaZulu-Natal).
- EMF for proposed Renishaw Estate (KwaZulu-Natal).
- EMF for Mogale City Local Municipality, Mogale City Local Municipality (Gauteng).
- SEA for Molemole Local Municipality, Capricorn District Municipality (Limpopo).
- SEA for Blouberg Local Municipality, Capricorn District Municipality (Limpopo).
- SEA for the Bishopstowe study area in the Msunduzi Local Municipality (KwaZulu-Natal).

WETLAND STUDIES

- Rehabilitation Planning for the Upper Klip River and Klipspruit Catchments, City of Johannesburg (Gauteng).
- Wetland assessments for various Concentrated Solar and Photovoltaic power plants and associated infrastructure (Limpopo, Northern Cape, North West Province and Western Cape).
- Wetland assessments for Wind Farms and associated infrastructure (Northern Cape and Western Cape).
- Wetland assessments for various 132kV Distribution Lines (Free State, KwaZulu-Natal, Mpumalanga and North West Province).

VISUAL IMPACT ASSESSMENTS

- VIA for the Thyspunt Transmission Lines Integration Project (Eatern Cape).
- VIA s for various Solar Power Plants and associated grid connection infrastructure (Northern Cape, Free State, Limpopo and North West Province).
- VIAs for various Wind Farms and associated grid connection infrastructure (Northern Cape and Western Cape), the most recent projects including:
    - Graskoppies, Hartebeest Leegte, Ithemba and !Xha Boom Wind Farms near Loeriesfontein (Northern Cape);
    - Kuruman 1 and 2 WEFs near Kuruman (Northern Cape);
    - San Kraal and Phezukomoya WEFs near Noupoort (Northern Cape);
    - Paulputs WEF near Pofadder (Northern Cape)
    - Kudusberg WEF near Matjiesfontein (Western Cape);
    - Tooverberg WEF, near Touws River (Western Cape);
    - Rondekop WEF, near Sutherland (Northern Cape).
- VIAs for various 132kV Distribution Lines (Free State, KwaZulu-Natal, Mpumalanga and North West Province).
- VIA for the proposed Rorqual Estate Development near Park Rynie on the South-Coast of KwaZulu-Natal Province.
- VIA for the proposed Assagay Valley Mixed Use Development (KwaZulu-Natal).
- VIA for the proposed Kassier Road North Mixed Use Development (KwaZulu-Natal).
- VIA for the proposed Tinley Manor South Banks Development (KwaZulu-Natal).
- VIA for the proposed Tinley Manor South Banks Beach Enhancement Solution, (KwaZulu-Natal).
- VIAs for the proposed Mlonzi Hotel and Golf Estate Development (Eastern Cape Province).
- Visual sensitivity mapping exercise for the proposed Mogale's Gate Lodge Expansion (Gauteng).
- Analysis phase visual assessment for the proposed Renishaw Estate Environmental Management Framework in the Scottburgh Area (KwaZulu-Natal).
- Landscape Character Assessment for Mogale City Environmental Management Framework (Gauteng).

Appendix C

MAPS

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