PROPOSED POORTJIE WES CLUSTER GRID CONNECTION INFRASTRUCTURE, WESTERN CAPE PROVINCE, SOUTH AFRICA

PREPARED BY:

LOGIS in collaboration with Nuleaf Planning and Environmental (Pty) Ltd

PREPARED FOR:

Savannah Environmental

APPLICANT:

Poortjie Wes Cluster Grid (Pty) Ltd

DATE:

April 2022

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Applicant:	**Poortjie Wes Cluster Grid (Pty) Ltd** Remaining extent of Portion 2 of the Farm Belvedere Nr. 73, in the Beaufort West Municipality, Division of Murraysburg, Western Cape Province.
Report date:	April 2022
Report number:	01

DECLARATION

I, **Bryony van Niekerk**, as an independent consultant compiled this Visual Impact Assessment and declare that it correctly reflects the findings made at the time of the report's compilation. I further declare that I, act as an independent consultant in terms of the following:

- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act107 of 1998);
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act,1998 (Act 107 of 1998);
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, will present the results and conclusion within the associated document to the best of my professional judgement.

Bryony van Niekerk
Environmental Assessment Practitioner
EAPASA Reg nr: 2019/655

1. INTRODUCTION

1.1. QUALIFICATION AND EXPERIENCE OF THE PROFESSIONAL TEAM

LOGIS in collaboration with Nuleaf Planning and Environmental (Pty) Ltd, specialising in Visual Impact Assessment, undertook the visual assessment.

The team undertaking the visual assessment has extensive practical knowledge in spatial analysis, environmental modelling and digital mapping, and applies this knowledge in various scientific fields and disciplines. The expertise of these practitioners is often utilised in Environmental Impact Assessments, State of the Environment Reports and Environmental Management Plans.

The visual assessment team is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments. Although the guidelines have been developed with specific reference to the Western Cape Province of South Africa, the core elements are more widely applicable.

LOGIS in collaboration with NuLeaf Planning and Environmental have been appointed as an independent specialist consultant to undertake the visual impact assessment. Neither the author, nor LOGIS/ Nuleaf Planning and Environmental will benefit from the outcome of the project decision-making.

1.2. LEGAL FRAMEWORK

The following legislation and guidelines have been considered in the preparation of this report:

- The Environmental Impact Assessment Amendment Regulations, 2017;
- Guideline on Generic Terms of Reference for EAPs and Project Schedules (DEADP, Provincial Government of the Western Cape, 2011).
- Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (DEADP, Provincial Government of the Western Cape, 2005).

1.3. INFORMATION BASE

This assessment was based on information from the following sources:

- Topographical maps and GIS generated data were sourced from the Surveyor General, Surveys and Mapping in Mowbray, Cape Town;
- Observations made and photographs taken during site visits;
- Professional judgement based on experience gained from similar projects; and
- Literature research on similar projects.

1.4. ASSUMPTIONS AND LIMITATIONS

This Report has been prepared by Nuleaf on behalf, and at the request, of Savannah Environmental to provide them with an independent specialist assessment. Unless otherwise agreed by Nuleaf in writing, Nuleaf does not accept responsibility or legal liability to any person other than the CES for the contents of, or any omissions from, this Report.

To prepare this Report, Nuleaf utilised only the documents and information provided by Savannah Environmental or any third parties directed to provide information and documents by Savannah Environmental. Nuleaf has not consulted any other documents or information in relation to this Report, except where otherwise indicated.

The findings, recommendations and conclusions given in this report are based on the author's best scientific and professional knowledge, as well as, the available information. This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. Nuleaf and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field, or pertaining to this investigation.

Although Nuleaf exercises due care and diligence in rendering services and preparing documents, Nuleaf accepts no liability, and Savannah Environmental, by receiving this document, indemnifies Nuleaf and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with the services rendered, directly or indirectly by the use of the information contained in this document.

This report may not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If this report is used as part of a main report, the report in its entirety must be included as an appendix or separate section to the main report.

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

This Visual Impact Assessment and all associated mapping has been undertaken according to the worst-case scenario.

1.5. LEVEL OF CONFIDENCE

Level of confidence[1] is determined as a function of:

- The information available, and understanding of the study area by the practitioner:
    - **3**: A high level of information is available of the study area and a thorough knowledge base could be established during site visits, surveys etc. The study area was readily accessible.
    - **2**: A moderate level of information is available of the study area and a moderate knowledge base could be established during site visits, surveys etc. Accessibility to the study area was acceptable for the level of assessment.
    - **1**: Limited information is available of the study area and a poor knowledge base could be established during site visits and/or surveys, or no site visit and/or surveys were carried out.

- The information available, understanding of the project and experience of this type of project by the practitioner:
    - **3**: A high level of information and knowledge is available of the project and the visual impact assessor is well experienced in this type of project and level of assessment.
    - **2**: A moderate level of information and knowledge is available of the project and the visual impact assessor is moderately experienced in this type of project and level of assessment.
    - **1**: Limited information and knowledge is available of the project and the visual impact assessor has a low experience level in this type of project and level of assessment.

These values are applied as follows:

	Information on the project & experience of the practitioner			
Information on the study area		**3**	**2**	**1**
	3	9	6	3
	2	6	4	2
	1	3	2	1

Table 1: Level of confidence

The level of confidence for this assessment is determined to be **9** and indicates that the author's confidence in the accuracy of the findings is Moderate to High:

- The information available, and understanding of the study area by the practitioner is rated as **3**

[1] Adapted from Oberholzer (2005).

- The information available, understanding and experience of this type of project by the practitioner is rated as **3**

2. METHODOLOGY

The study was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed development. A detailed Digital Terrain Model (DTM) for the study area was created from 5m interval contours from the National Geo-spatial Information data supplied by the Department: Rural Development and Land Reform.

The approach utilised to identify potential issues related to the visual impact included the following activities:

- Undertaking a site visit
- The creation of a detailed digital terrain model (DTM) of the potentially affected environment;
- The sourcing of relevant spatial data. This includes cadastral features, vegetation types, land use activities, topographical features, site placement, etc.;
- The identification of sensitive environments upon which the proposed Poortjie Wes Cluster Grid Connection could have a potential visual impact;
- The creation of viewshed analyses from the proposed study area in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analyses take into account the dimensions of the proposed structures.

This report (visual impact assessment) sets out to identify and quantify the possible visual impacts related to the proposed Poortjie Wes Cluster Grid Connection, as well as, offer potential mitigation measures, where required.

The following methodology has been followed for the assessment of visual impact:

UNDERTAKE A SITE VISIT

A site visit was undertaken in order to verify the results of the spatial analyses and to identify any additional site-specific issues that may need to be addressed in the VIA report. The season was not a consideration, nor had any effect on the carrying out of the visual assessment. A photographic survey was made of the site and surrounding potentially affected area from several selected viewpoints. The site visit was undertaken on the 3 April 2022.

DETERMINE THE POTENTIAL VISUAL EXPOSURE

The visibility or visual exposure of any structure or infrastructure is the point of departure for the visual impact assessment. It stands to reason that if the proposed infrastructure were not visible, no impact would occur.

Viewshed analyses of the proposed infrastructure indicates the potential visibility.

DETERMINE THE VISUAL DISTANCE AND OBSERVER PROXIMITY

In order to refine the visual exposure of the infrastructure on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence.

Proximity radii for the proposed facility are created in order to indicate the scale and viewing distance of the infrastructure and to determine the prominence thereof in relation to their environment.

The visual distance theory and the observer's proximity to the infrastructure are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly negative visual perception of the proposed infrastructure.

DETERMINE VIEWER INCIDENCE, PERCEPTION AND SENSITIVITY

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, then there would be no visual impact. If the visual perception of a structure is favourable to all observers, then the visual impact would be positive.

It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed facility and its related infrastructure.

It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options.

DETERMINE THE VISUAL ABSORPTION CAPACITY (VAC)

This is the capacity of the receiving environment to absorb the potential visual impact of the proposed infrastructure. The digital terrain model utilised in the calculation of the visual exposure of the facility does not incorporate the potential visual absorption capacity (VAC) of the natural vegetation of the region. It is therefore necessary to determine the VAC by means of the interpretation of the vegetation cover and other landscape characteristics.

DETERMINE THE VISUAL IMPACT INDEX OF THE PROPOSED DEVELOPMENT

The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the magnitude of each impact.

DETERMINE THE IMPACT SIGNIFICANCE

The potential visual impacts identified and described are quantified in their respective geographical locations in order to determine the significance of the anticipated impact. Significance is determined as a function of extent, duration, magnitude and probability.

FORMULATION OF MITIGATION MEASURES

Recommendation of mitigation measures (if possible) to avoid or minimise potential negative visual impacts of the proposed facility, for inclusion in the EMPr and authorisation conditions.

3. PROJECT DESCRIPTION

The Poortjie Wes Cluster entails the development of six (6) solar energy facilities, namely Belvedere, Brakpan 1, Brakpan 2, Montana 1, Montana 2 and Montana 3. All six (6) of these renewable energy ("RE") facilities will connect to the Eskom grid via the following proposed infrastructure:

- A 132kV Belvedere Collector Switching Station (the "Collector Switching Station") via 132kV Overhead Lines ("OHLs"). The Collector Switching Station will be +/-16ha in extent and will be located on Remaining extent of Portion 2 of the Farm Belvedere Nr. 73, in the Beaufort West Municipality, Division of Murraysburg, Western Cape Province.
- The proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILO MTS ("Poortjie Wes LILO MTS") via a 132kV OHL (approximately 7km). This OHL will cross the 400kV Droërivier/Hydra OHL. A corridor of 300m is being considered in the BA process, within which the 32m servitude for this power line will be located.
- The MTS will connect to either of the existing 400kV Droërivier/Hydra OHL) traversing the property via a Loop-in Loop-out ("LILO") connection. The 2 x 400kV LILO OHLs will be +/- 1km in length. It is unclear at this stage which of the two OHLs will be approved by Eskom. A corridor of 500m is being considered in the BA process, within which the two 55m servitudes for these power lines will be located.

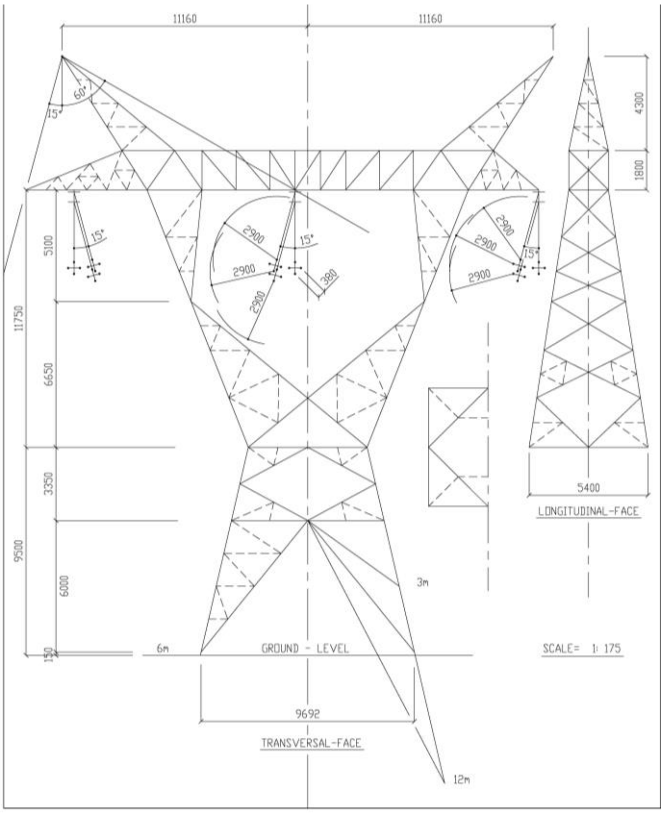
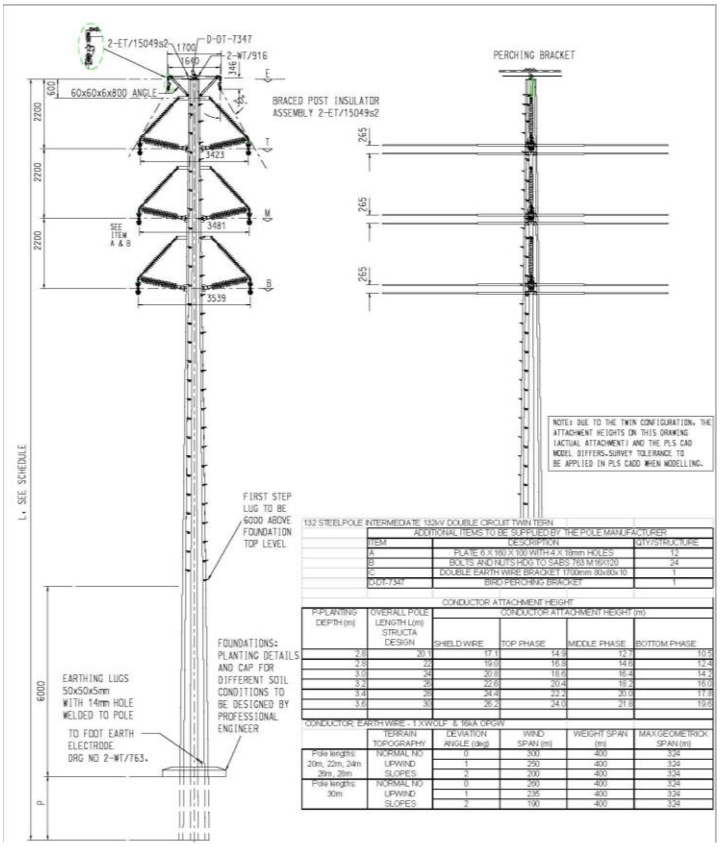


Figure 1: Illustration of the transmission lines



ADDITIONAL ITEMS TO BE SUPPLIED BY THE POLE MANUFACTURER

ITEM	DESCRIPTION	QTY/STRUCTURE
A	PLATE 6 X 160 X 100 WITH 4 X 18mm HOLES	12
B	BOLTS AND NUTS HDG TO SABS 763 M16X120	24
C	DOUBLE EARTH WIRE BRACKET 1700mm 80x80x10	1
D-DT-7347	BIRD PERCHING BRACKET	1

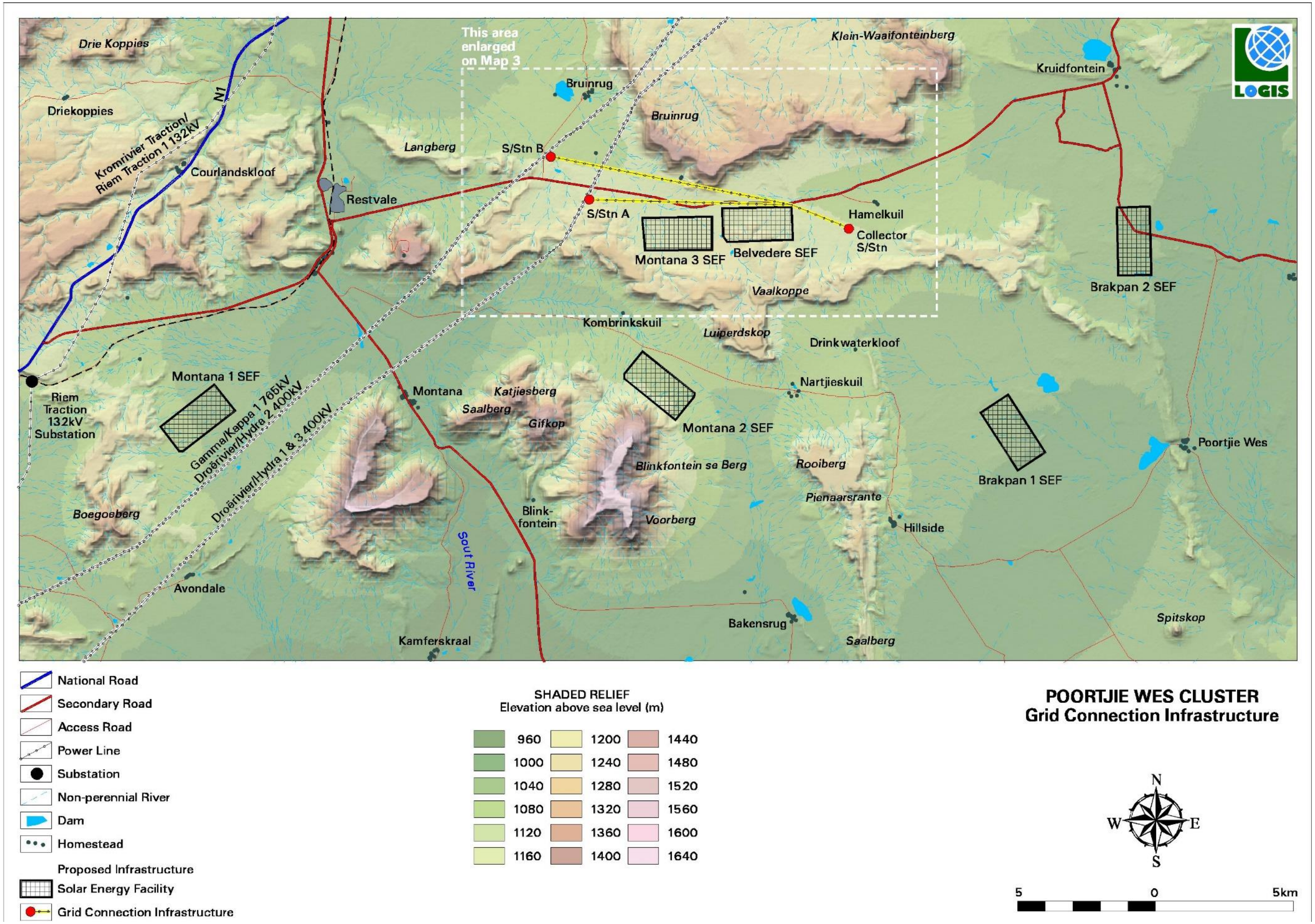
CONDUCTOR ATTACHMENT HEIGHT

P-PLANTING DEPTH (m)	OVERALL POLE LENGTH L(m) STRUCTA DESIGN	CONDUCTOR ATTACHMENT HEIGHT (m)			
		SHIELD WIRE	TOP PHASE	MIDDLE PHASE	BOTTOM PHASE
2.8	20.1	17.1	14.9	12.7	10.5
2.8	22	19.0	16.8	14.6	12.4
3.0	24	20.8	18.6	16.4	14.2
3.2	26	22.6	20.4	18.2	16.0
3.4	28	24.4	22.2	20.0	17.8
3.6	30	26.2	24.0	21.8	19.6

CONDUCTOR; EARTH WIRE - 1 X WOLF & 16kA OPGW

	TERRAIN TOPOGRAPHY	DEVIATION ANGLE (deg)	WIND SPAN (m)	WEIGHT SPAN (m)	MAXGEOMETRICK SPAN (m)
Pole lengths: 20m, 22m, 24m 26m, 28m	NORMAL NO	0	300	400	324
	UPWIND	1	250	400	324
	SLOPES	2	200	400	324
Pole lengths: 30m	NORMAL NO	0	260	400	324
	UPWIND	1	235	400	324
	SLOPES	2	190	400	324

Figure 2: Illustration of the distribution lines



Map 1: Shaded relief map of the proposed study area

4. SCOPE OF WORK

The scope of work for this assessment includes the determination of the potential visual impacts in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation of the proposed Poortjie Wes Cluster Grid Connection. Mitigation measures are recommended where appropriate.

Anticipated issues related to the potential visual impact of the proposed infrastructure include the following:

- The visibility of the proposed infrastructure to, and potential visual impact on, observers travelling along the secondary roads within the study area.
- The visibility of the proposed infrastructure to, and potential visual impact on residents of farmsteads and settlements within the study area.
- The potential visual impact of associated infrastructure (i.e. access roads and cleared servitudes) on sensitive visual receptors.
- Potential visual impacts associated with the construction phase on observers in close proximity to the proposed power lines.
- The potential visual impact of operational, safety and security lighting of the facility at night.
- The potential visual impact of the proposed infrastructure on the visual quality of the landscape and sense of place of the region.
- The potential cumulative visual impact of the proposed power lines in relation to other infrastructure and built forms.
- Potential residual visual impacts after the decommissioning of the proposed power lines.
- The potential to mitigate visual impacts and inform the design process.

It is envisaged that the issues listed above may constitute a visual impact at a local and/or regional scale.

5. THE AFFECTED ENVIRONMENT

The proposed Poortjie Wes Cluster Grid Connection infrastructure is located approximately 15km north-west of Nelspoort and 60km south-west of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The Project site is located within the Beaufort West Renewable Energy Development Zone (“REDZ 11”) and the Central Transmission Corridor.

Figure 3: Nelspoort, the nearest town to the proposed study area

Figure 4: Nelspoort

The study area is located on flat high lying land with hills to the north and south where the elevation ranges from 1120 m above sea level (a.s.l) on the site itself to1520 a.s.l for the Bruinrug and Vaalkoppe to the north and south respectively.

Land cover consists predominately of shrubland and bare rock and soil. Small areas of dryland agriculture and exotic plantations are present. The study area is located predominately within the Nama Karoo biome, with rainfall ranging from 123 mm -248 mm per annum. The vegetation type is classified as Gamka Karoo which is a low-lying vegetation type with small portions of Southern Karoo Riviere.

The majority of the study area is sparsely populated and consists of a landscape of wide-open expanses and extreme isolation. The scarcity of water and other natural resources has influenced settlement within this region, keeping numbers low, and distribution limited to the availability of permanent water. Settlements, where they occur, are usually rural homesteads and farmsteads.

Access to the study area is via secondary roads which link with one another, providing access to farmsteads.

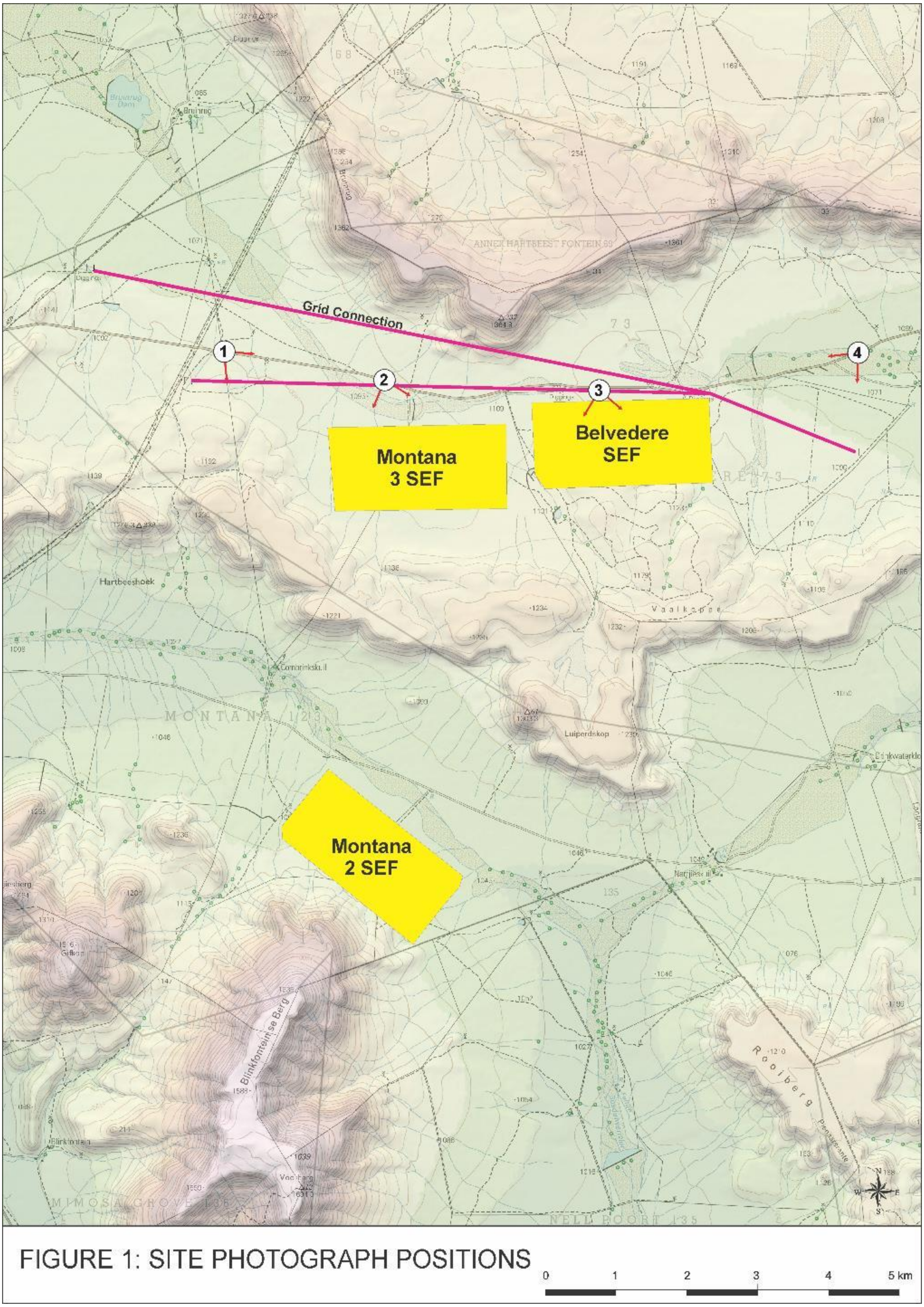


Figure 5: Plan indicating mapped positions of site photographs

Figure 6: Overview of site photographs

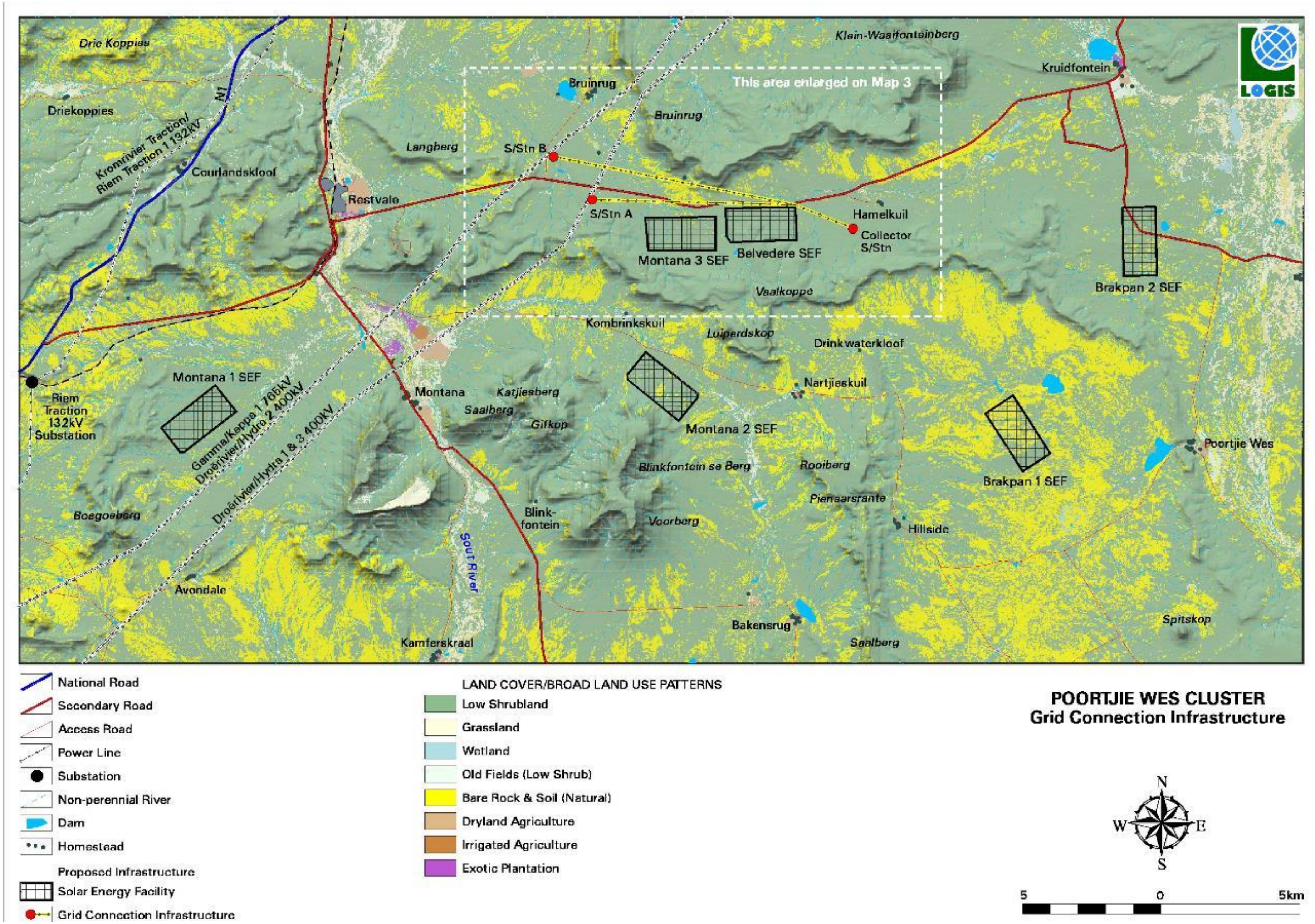
Figure 7: View of the OHL from the access road with the Bruinrug in the north

Figure 8: where the OHL will cross the existing Droerivier/Hyra 1&3 400 kV OHL before connecting to substation B

Figure 9: Area to the east of the access road where the OHL line traverse

Figure 10: Area the OHL will traverse from east to west before connecting to substation A

Figure 11: View from the access road looking east before the OHL splits



Map 2: Land cover/broad land use patterns map of the study area

6. VIEWSHED ANALYSIS

6.1 VISUAL DISTANCE AND OBSERVER PROXIMITY

Nuleaf Planning and Environmental determined proximity offsets based on the anticipated visual experience of the observer over varying distances. In general, the severity of the visual impact on visual receptors decreases with increased distance from the proposed infrastructure. Therefore, in order to refine the visual exposure of the proposed substation and powerlines on surrounding areas/receptors, the principle of reduced impact over distance is applied. This allows for a core area of visual influence for the proposed substation and powerlines to be determined. Proximity offsets for the proposed alignments are thus established in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment.

These proximity offsets are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger facilities and downwards for smaller facilities (i.e. depending on the size and nature of the proposed infrastructure).

The proximity offsets (calculated from the centre line of each power line alignment) are as follows:

- 0 – 0.5km. Short distance view where the infrastructure would dominate the frame of vision and constitute a very high to high visual prominence.
- 0.5 – 1.5km. Medium distance view where the infrastructure would be easily and comfortably visible and constitute a high to moderate visual prominence.
- 1.5 – 3km. Medium to longer distance view where the infrastructure would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a medium visual prominence.
- Greater than 3km. Long distance view where the structures may still be visible though not as easily recognisable. This zone constitutes a low visual prominence for the power line.

Refer to **Map 3.**

6.2 VIEWER INCIDENCE, PERCEPTION AND SENSITIVITY

Since the number of potential sensitive receptors and their perception of the development in question ultimately determines the concept of a visual impact (i.e. without receptors there would be no impact), the visual distance theory and the receptors proximity to the development works hand in hand and is especially relevant when considered from areas with a high viewer incidence and a potentially negative visual perception of the proposed facility. It is, therefore, necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed solar energy facility.

Viewer incidence is calculated to be the highest along the secondary roads within the study area, as well as homesteads/dwellings within the area. Commuters and possible tourists (though unlikely) using these roads may be negatively impacted upon by the visual exposure to the proposed infrastructure.

Homesteads and farmsteads, by virtue of their visually exposed nature, are also considered to be sensitive visual receptors. Residential receptors in natural contexts are more sensitive than those in more built-up contexts, due to the absence of visual clutter in these undeveloped and undisturbed areas. Receptors within built up areas are less sensitive to potential visual impact due to the presence of structures, infrastructure and general visual clutter. However, due to the extremely low density of homesteads/dwellings within the immediate area (within 1 Km), it is highly unlikely that any residents would be negatively impacted.

No specific report can be made on viewer perception regarding the proposed Poortjie Wes Cluster Grid Connection, as no reported stakeholder feedback has been received by the specialist. However, considering there are existing high voltage power lines traversing the study area and the low number of sensitive visual receptors, an overall neutral perception is anticipated.

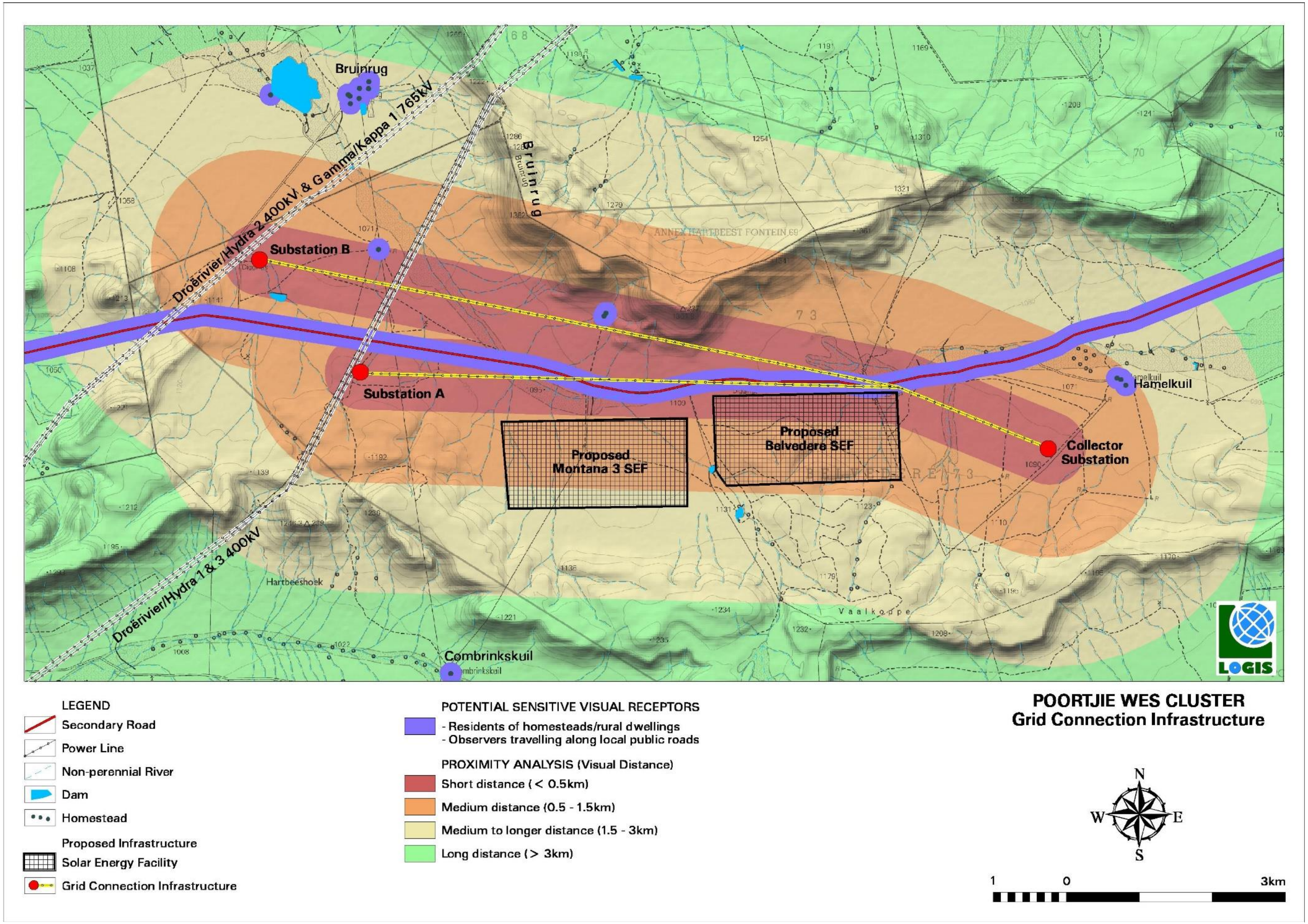
The potential sensitive visual receptors within a 0.5km, 1.5km and 3km radius as identified on Error! Reference source not found. are as follows:

- < 0.5km – Short Distance
  Observers travelling along the secondary road and residents of unknown dwellings/homesteads.

- 0.5 – 1.5km – Short to Medium Distance
  Residents of Hamelkuil and observers travelling along the secondary road.

- 1.5 - 3km – Medium to Long Distance
  Residents of Bruinrug, as well as observers travelling along the secondary roads.

- > 3km – Long Distance
  Residents homesteads/dwellings within the area, along with observers travelling along the secondary roads.



Map 3: Visual proximity analysis of the proposed Poortjie Wes Cluster Grid Connection

6.3 VISUAL ABSORPTION CAPACITY

Visual Absorption Capacity (VAC) is the capacity of the receiving environment to absorb the potential visual impact of the proposed infrastructure. VAC is primarily a function of the vegetation and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC. The VAC would also be high where the environment can readily absorb the development in terms of texture, colour, form and light / shade characteristics. On the other hand, the VAC for a development contrasting markedly with one or more of the characteristics of the environment would be low. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and development decreases.

The land cover within the study area is predominately low shrubland and bare rock and soil with small scattered areas of dryland agriculture and exotic plantations. As a result, the landscape is characterised by wide-open expanses of extreme isolation. Overall, the Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low by virtue of the low growing vegetation and sparsely populated/limited development overall.

The significant height of power line structures adds to the potential visual intrusion of the power lines, with the tall towers (pylons) against the background of the horizon. In addition, the scale and form of the structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics.

Overall, the Visual Absorption Capacity (VAC) of the receiving environment and the areas in close proximity to the proposed substations and powerline alignments is deemed to be low by virtue of the low-growing vegetation.

Where homesteads do occur, some more significant vegetation and trees may have been planted, which would contribute to the visual absorption. As this is not a consistent occurrence and majority of the settlements are informal in nature, VAC will not be taken into account for any of the homesteads or settlements, again assuming a worst-case scenario.

As a result of the low lying vegetation, undeveloped nature of the study area, and the high contrast of the infrastructure within the surrounding receiving environment, VAC will not be taken into account for the visual impact assessment of the Poortjie Wes Cluster Grid Connection infrastructure.

6.4 POTENTIAL VISUAL EXPOSURE

The result of the viewshed analyses for the proposed Poortjie Wes Cluster Grid Connection infrastructure is shown on Error! Reference source not found. that follows. An analysis has been undertaken within the proposed development corridor in order to determine the general visual exposure (visibility) of the area under investigation. A generic height of 36m was used in order to illustrate the anticipated visual exposure of the proposed infrastructure (i.e. the maximum height of the power line structures). The visibility analysis for each alignment was generated from a number of points along the alignment, spaced at intervals of approximately 400m. Receptor height was set at eye level.

The height of the substations will not exceed two storeys (i.e. 6m), therefore the visual exposure of this component will fall within the viewshed generated for the power line alignment.

The viewshed analysis does not include the effect of vegetation cover or existing structures on the exposure of the proposed facility, therefore signifying a worst-case scenario.

Map 4 indicates that the proposed grid connection infrastructure will be visually exposed to some extent within the study area, due to the tall power line infrastructure. It is thus anticipated that the infrastructure would be visible to observers (i.e. people travelling along roads, residing in homesteads or visiting the region), and could potentially constitute a high visual prominence, potentially resulting in a visual impact.

The following is an overview of the findings of the viewshed based on the layout illustrated on the Map provided:

- The potential visual exposure of the infrastructure is contained to a core area on the site itself and within a 0.5 km radius thereof.

  Sensitive visual receptors are observers travelling along the secondary road and residents of unknown dwellings/homesteads.

- Potential visual exposure in the short to medium distance (i.e. between 0.5 and 1.5km), is concentrated throughout this radius with small pockets of visually screened areas to the south west and north owing to the Bruinrug mountain.

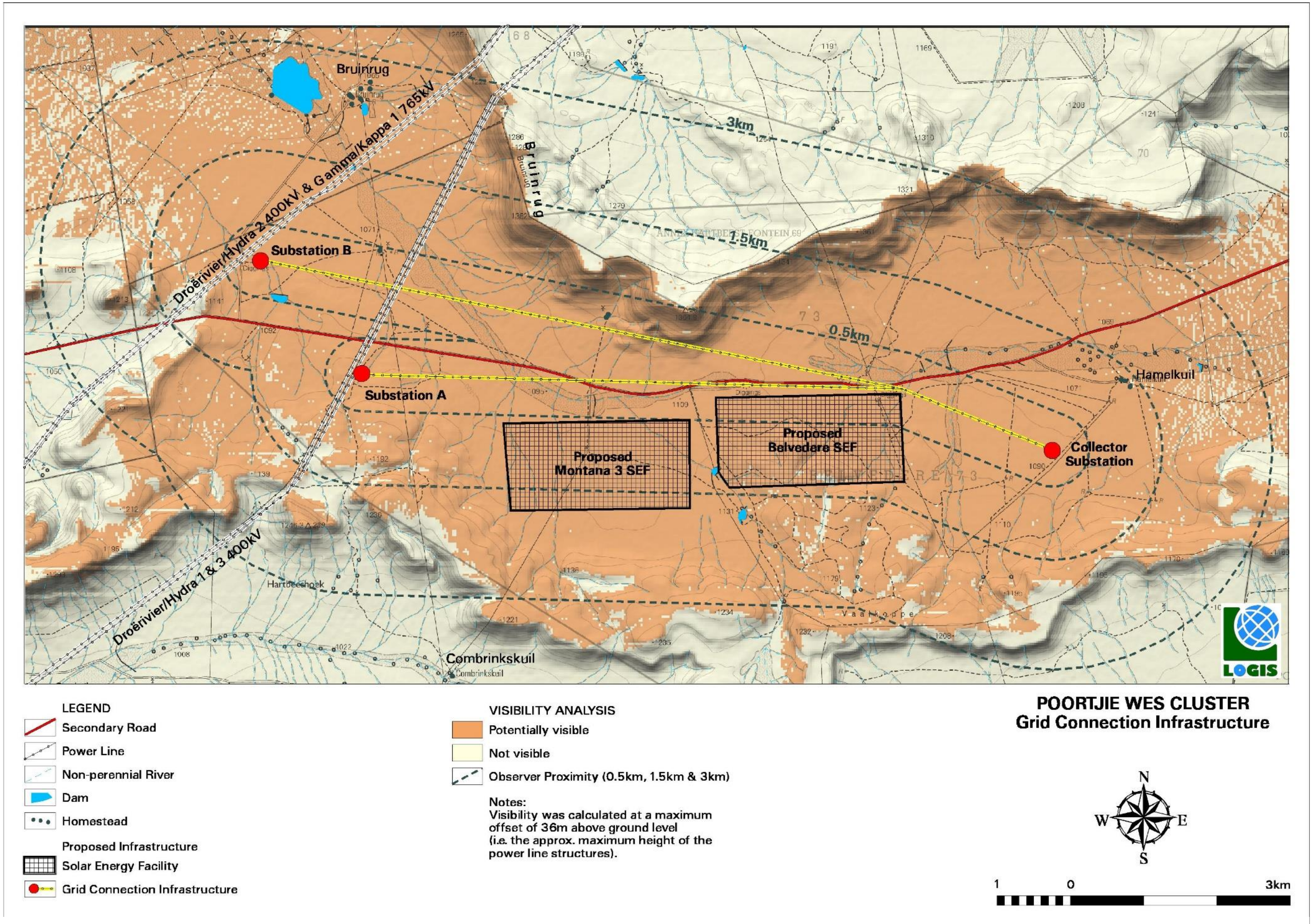
  Sensitive visual receptors include residents of Hamelkuil and observers travelling along the secondary road

- In the medium to long distance (i.e. between 1.5 and 3km offset), the extent of potential visual exposure is reduced largely owing to the hilly and mountainous topography. Visually exposed areas are found to the north east, east, south, south west and north west with large areas to the north, south east, south west and west being visually screened.

  Sensitive visual receptors include residents of Bruinrug, as well as observers travelling along the secondary roads.

- Beyond the 3km offset from the proposed facility, potential visual exposure becomes extremely scattered and very low. Sensitive visual receptors are not likely to be visually exposed to the proposed facility, despite lying within the viewshed.

In general, as a result of the scattered and lower population density of the study area, the Poortjie Wes Cluster Grid Connection may constitute a visual prominence, potentially resulting in a moderate- low visual impact.



Map 4: Potential visual exposure (viewshed analysis) of the proposed Poortjie Wes Cluster Grid Connection Infrastructure

6.5 VISUAL IMPACT INDEX

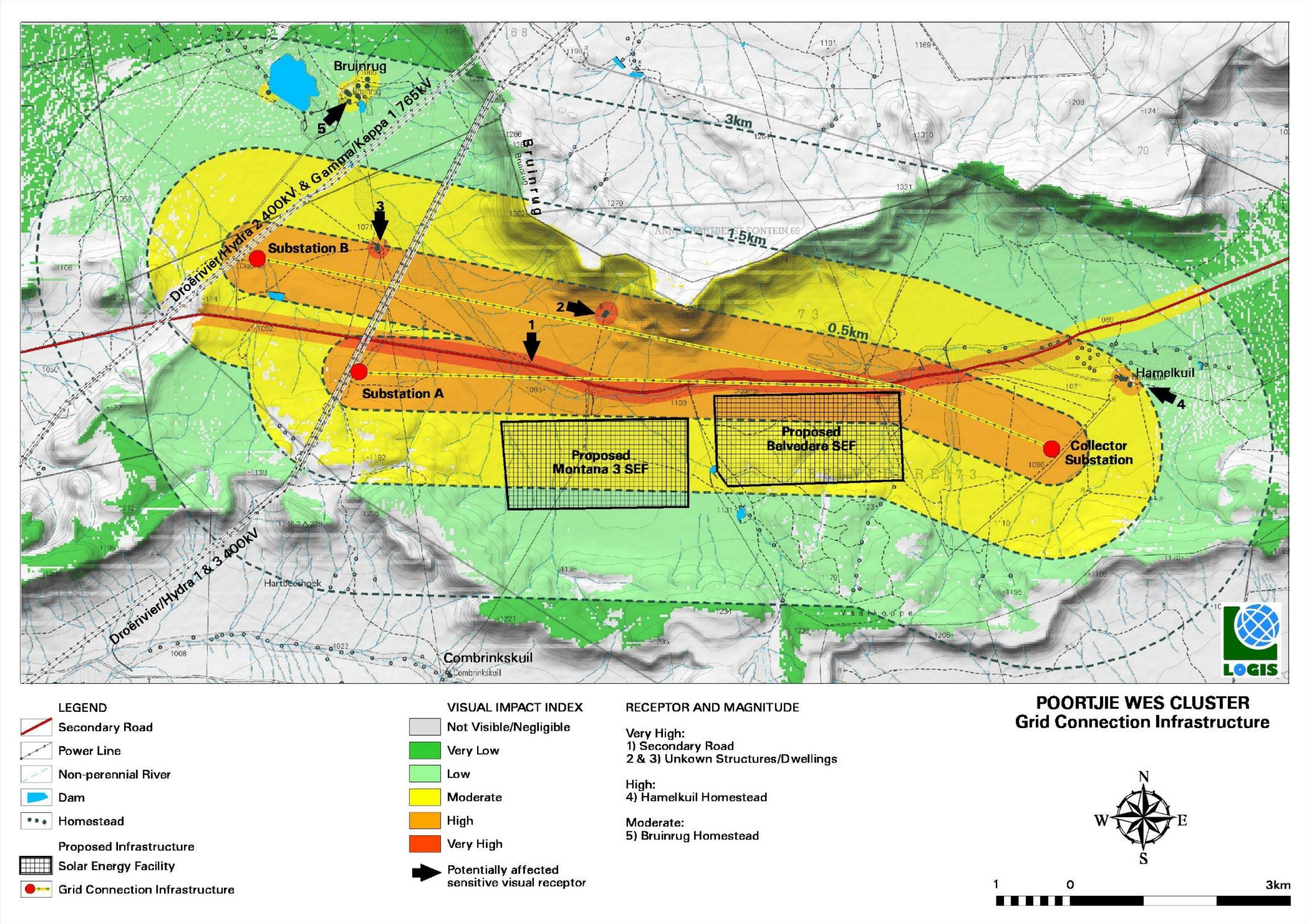
The results of visual exposure, viewer incidence / perception and visual distance of the proposed facility are displayed on **Map 6**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index. An area with short distance, a high viewer incidence and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact when evaluating the issues related to the visual impact. The visual impact index for the proposed infrastructure is further described as follows.

- The visual impact index map indicates a core zone of **high** visual impact within 0.5km of the proposed infrastructure. Users of the secondary road and residents of unknown dwellings/homesteads are likely to experience a **very high** visual impact.

- Visual impact is predominantly **moderate** between 0.5km and 1.5km of the proposed infrastructure. The identified receptors between 0.5km and 1.5km of the proposed infrastructure, as listed below, are likely to experience **high** visual impact should no mitigation be undertaken. Sensitive visual receptors within this zone comprise mainly of the following:
  - Users traveling along a small portion of a secondary road, it is expected that the visual intrusion where possible will be brief
  - Residents of Hamelkuil located to the east.

- Visual impact is prominently **low** between 1.5 km and 3 km of the proposed infrastructure. The identified receptors between 1.5km and 3km of the proposed infrastructure, as listed below, are likely to experience **moderate** visual impact, should no mitigation be undertaken. Sensitive visual receptors within this zone comprise mainly of the following users:
  - Users traveling along the secondary Road, potential visibility is however scattered along the length of the roads and visual intrusion where possible will be brief
  - Residents of Bruinrug

- Beyond the 3 km of the proposed infrastructure, the extent of potential visual impact is greatly reduced, and the magnitude is predominantly **very low** to negligible. It is not expected that sensitive receptors, if any, will be impacted visually by the proposed facility.



Map 5: Visibility index illustrating the frequency of exposure for the proposed Poortjie Wes Cluster Grid Connection

7. VISUAL IMPACT ASSESSMENT

7.1 METHODOLOGY

The previous section of the report identified specific areas where likely visual impacts would occur. This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues related to the visual impact.

The methodology for the assessment of potential visual impacts states the nature of the potential visual impact (e.g., the visual impact on users of major roads in the vicinity of the proposed infrastructure) and includes a table quantifying the potential visual impact according to the following criteria:

Extent - How far the visual impact is going to extend and to what extent it will have the highest impact. In the case of this type of development the extent of the visual impact is most likely to have a higher impact on receptors closer to the development and decrease as the distance increases.

- (1) Very low: Long distance > 3 Km
- (2) Low: Medium to long 1.5-3 Km
- (3) Medium: Short distance 0.5-1.5 Km
- (4) High: Very Short < 0.5 Km

Duration - The timeframe over which the effects of the impact will be felt.

- (1) Very short: 0-1 years
- (2) Short: 2-5 years
- (3) Medium: 5-15 years
- (4) Long: >15 years
- (5) Permanent

Magnitude - The severity or size of the impact. This value is read off the Visual Impact Index maps.

- (0) None
- (2) Minor
- (4) Low
- (6) Moderate
- (8) High
- (10) Very High

Probability - The likelihood of the impact actually occurring.

- (1) Very improbable: Less than 20% sure of the likelihood of an impact occurring
- (2) Improbable: 20-40% sure of the likelihood of an impact occurring
- (3) Probable: 40-60% sure of the likelihood of an impact occurring
- (4) Highly probable: 60-80% sure of the likelihood of that impact occurring
- (5) Definite: More than 80% sure of the likelihood of that impact occurring

Significance - The significance weighting for each potential visual impact (as calculated above) is as follows:

- (0-12) Negligible:
  Where the impact would have no direct influence on the decision to develop in the area. The impact would be of a very low order. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap, and simple.
- (13-30) Low:
  Where the impact would have a very limited direct influence on the decision to develop in the area. The impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved or little would be required, or both.
- (31-60) Moderate:
  Where the impact could influence the decision to develop in the area. The impact would be real but not substantial. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible.
- (61-80) High:

Where the impact must have an influence on the decision to develop in the area. The impacts are of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these.

- (81-100) Very High:
  Where the impact will definitely have an influence on the decision to develop in the area. The impacts are of the highest order possible. In the case of negative impacts, there would be no possible mitigation and / or remedial activity possible.

The **significance** of the potential visual impact is equal to the **consequence** multiplied by the **probability** of the impact occurring, where the consequence is determined by the sum of the individual scores for magnitude, duration and extent (i.e., **significance = consequence (magnitude + duration + extent) x probability**).

Status – The perception of Interested and Affected Parties towards the proposed development.

- Positive
- Negative
- Neutral

Reversibility – The possibility of visual recovery of the impact following the decommissioning of the proposed development

- (1) Reversible
- (3) Recoverable
- (5) Irreversible

7.2 PRIMARY IMPACTS

7.2.1 POTENTIAL VISUAL IMPACT ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE PROPOSED INFRASTRUCTURE

The visual impacts on sensitive visual receptors (i.e. residents of homesteads and users of secondary roads) in close proximity to the proposed infrastructure (i.e. within 0.5km) is expected to be of **high** significance.

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment. Additionally, observers traveling along the secondary road will only be exposed to the visual intrusion for a short period of time. This reduces the probability of this impact occurring.

No mitigation is possible within this environment or for this type of infrastructure, but measures have been included as best practice guidelines. The table below illustrates this impact assessment.

Table 2: Impact table summarising the significance of sensitive visual receptors in close proximity to the proposed infrastructure

Nature of Impact: Visual impact on the users of secondary roads and residents of homesteads in close proximity to the proposed infrastructure.		
	No mitigation	***Mitigation considered***
Extent	High **(4)**	N/A
Duration	Long term **(4)**	N/A
Magnitude	Very high **(10)**	N/A
Probability	Highly probable **(4)**	N/A
Significance	High **(72)**	N/A
Status (positive or negative)	Negative	N/A
Reversibility	Recoverable **(3)**	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	No	
Mitigation / Management: Planning: ➢ Respond to the natural environment during the planning of buildings and infrastructure. ➢ Consolidate development and make use of already disturbed sites rather than pristine areas. ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Wherever possible, use materials, coatings, or paints that have little or no reflectivity.		

➢ Commercial messages, symbols and/logos are not permitted on structures. ➢ Use slight variations in topography to screen PV panels, where possible. Design linear features to follow natural land contours rather than straight lines. Construction: ➢ Ensure that vegetation is not unnecessarily removed during the construction period. ➢ Reduce the construction period through careful logistical planning and productive implementation of resources. ➢ Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) wherever possible. ➢ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ➢ Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. ➢ Reduce and control construction dust using approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent). ➢ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ➢ Rehabilitate all disturbed areas immediately after the completion of construction works.
Cumulative impacts: The construction of the infrastructure will increase the cumulative visual impact of electrical type infrastructure within the region. This is specifically relevant in light of the existing power lines in the area and the Riem Traction Substation present in the study area.
Residual impacts: None, provided that rehabilitation works are carried out as specified.

7.2.2 POTENTIAL VISUAL IMPACT ON SENSITIVE VISUAL RECEPTORS WITHIN THE REGION

The visual impact on sensitive visual receptors (i.e. residents of homesteads and users of roads.) within the region (i.e., beyond the 0.5km offset) is expected to be of **moderate** significance. The low occurrence of visual receptors reduces the probability of this impact occurring.

No mitigation is possible within this environment and for a facility of this scale, but measures have been included as best practice guidelines. The table below illustrates this impact assessment.

Table 3: Impact table summarising the significance of visual impacts on sensitive receptors within the region

Nature of Impact: Visual impact on the residents of farm and homesteads and users of secondary road on the periphery of the 0.5km offset and within the region beyond		
	No mitigation	***Mitigation considered***
Extent	Low **(2)**	N/A
Duration	Long **(4)**	N/A
Magnitude	Moderate **(6)**	N/A
Probability	Probable **(3)**	N/A
Significance	Moderate **(36)**	N/A
Status (positive or negative)	Negative	N/A
Reversibility	Recoverable **(3)**	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	Yes	
Mitigation / Management: Planning: ➢ Respond to the natural environment during the planning of buildings and infrastructure. ➢ Consolidate development and make use of already disturbed sites rather than pristine areas. ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Wherever possible, use materials, coatings, or paints that have little or no reflectivity. ➢ Commercial messages, symbols and/logos are not permitted on structures. ➢ Use slight variations in topography to screen PV panels, where possible. Design linear features to follow natural land contours rather than straight lines. Operations: ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Maintain the general appearance of the facility as a whole.		

➢ Monitor rehabilitated areas, and implement remedial action as and when required. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions.
Cumulative impacts: The construction of the infrastructure will increase the cumulative visual impact of electrical type infrastructure within the region. This is specifically relevant in light of the existing power lines in the area and the Riem Traction Substation present in the study area.
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

7.2.3 POTENTIAL VISUAL IMPACT OF ASSOCIATED INFRASTRUCTURE ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY

The height of the proposed new collector substation will not exceed two storeys (i.e. 6m), therefore the visual exposure of this component will fall within the view sheds generated for the power line infrastructure (which is not expected to exceed 36m). Other associated infrastructure would include access roads and cleared servitudes along the alignments.

Servitudes will need to be maintained along the length of the proposed power lines for their entire operational life and access roads will be required both to construct the power lines, and to maintain the servitudes (operational phase). These servitudes and access roads have the potential of manifesting as landscape scarring, and thus represent a potential visual impact within the viewshed areas. This is especially relevant for steep slopes where erosion could occur over time. Such erosion and landscape scarring could represent a visual impact.

As access roads and servitudes have no elevation or height, so the visual impact of this associated infrastructure will be absorbed by the visual impact the primary infrastructure.

The potential visual impact of the associated infrastructure on sensitive visual receptors in close proximity thereto is expected to be of **moderate** significance pre mitigation ad may be mitigated to **low** post mitigation**.** The table illustrates the assessment of this anticipated impact.

Note: The proximity of existing infrastructure (i.e. existing power line infrastructure) reduces the probability of this impact occurring.

Table 4: Impact table summarising the significance of the visual impacts of associated infrastructure on sensitive visual receptors in close proximity

Nature of Impact: Visual impact of the associated infrastructure located on site on residents of farm and homesteads and users of the secondary road within close proximity to the proposed facility (within the 0.5 Km offset)		
	No mitigation	***Mitigation considered***
Extent	High **(4)**	High **(4)**
Duration	Long **(4)**	Long **(4)**
Magnitude	Very High **(10)**	Moderate **(3)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(54)**	Low **(22)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation / Management: Site development & Operation: ➢ Retain / re-establish and maintain large trees, natural features and noteworthy natural vegetation in all areas outside of the activity footprint. ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.		

➢ Use existing roads wherever possible. Where new roads are required these should be planned carefully, taking due cognisance of the local topography. All efforts should be employed to try and align roads along the landscape contours wherever possible. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems. ➢ Keeping infrastructure at minimum heights. ➢ Introducing landscaping measures such as vegetating berms. ➢ Avoid the use of highly reflective material. ➢ Maintain the general appearance of the site as a whole. <u>Lighting</u> ➢ Lighting should be kept to a minimum wherever possible. ➢ Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the activity – this is especially relevant where the edge of the activity is exposed to residential properties. ➢ Wherever possible, lights should be directed downwards to avoid illuminating the sky. ➢ Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement. <u>Construction:</u> ➢ Rehabilitate all construction areas, when no longer required. ➢ Keep vegetation clearing to a minimum. <u>Operations:</u> ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Maintain the general appearance of the facility as a whole. ➢ Monitor rehabilitated areas, and implement remedial action as and when required. <u>Decommissioning:</u> ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.
Cumulative impacts: The construction of the infrastructure will increase the cumulative visual impact of electrical type infrastructure within the region. This is specifically relevant in light of the existing power lines in the area and the Riem Traction Substation present in the study area.
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

7.2.4 POTENTIAL VISUAL IMPACT OF CONSTRUCTION ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE PROPOSED INFRASTRUCTURE

During the construction period, there will be an increase in heavy vehicles utilising the roads to the construction sites that may cause, at the very least, a visual nuisance to other road users and landowners in the area in close proximity. Mitigation entails proper planning, management and rehabilitation of all construction sites to forego visual impacts.

The table below illustrates the assessment of the anticipated visual impact of construction on sensitive visual receptors in close proximity to the proposed infrastructure. Visual impacts are likely to be of **moderate** significance for all proposed lines and may be mitigated to **low.**

Table 5: Impact table summarising the significance of visual impact of construction on visual receptors in close proximity

Nature of Impact: Visual impact of construction on sensitive visual receptors in close proximity to the proposed facility		
	No mitigation	***Mitigation considered***
Extent	High **(4)**	High **(4)**
Duration	Short term **(1)**	Short term **(1)**
Magnitude	Very High **(10)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(45)**	Low **(18)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation / Management: Lighting ➢ Lighting should be kept to a minimum wherever possible. ➢ Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the activity – this is especially relevant where the edge of the activity is exposed to residential properties. ➢ Wherever possible, lights should be directed downwards to avoid illuminating the sky. ➢ Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement. Construction: ➢ Keep vegetation removal to a minimum where possible. ➢ If possible keep the construction period to a minimum. ➢ Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible. ➢ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ➢ Ensure that rubble, litter, and disused construction materials are appropriately stored and then disposed regularly at licensed waste facilities. ➢ Employ dust suppression techniques as and when required (i.e. whenever dust becomes apparent). ➢ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ➢ Rehabilitate all disturbed areas as per the rehabilitation plan and schedule. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.
Cumulative impacts: N/A
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

7.2.5 POTENTIAL VISUAL IMPACT OF LIGHTING AT NIGHT ON SENSITIVE VISUAL RECEPTORS IN THE REGION

The receiving environment has a relatively small number of populated places, and it can be expected that any light trespass and glare from the security and after-hours operational lighting for the facility will have some significance. In addition, the remote sense of place and rural ambiance of the local area increases its sensitivity to such lighting intrusions.

The potential lighting impact is known as sky glow. Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the number of light sources. Each new light source, especially upwardly directed lighting, contributes to the increase in sky glow. The general lighting of the collector substation may contribute to the effect of sky glow in an otherwise dark environment.

The visual impacts as a result of lighting at night on sensitive visual receptors in the region is likely to be of **moderate** significance and may be mitigated to **low**. Best practice guidelines for general site lighting that may occur on the site has been taken into consideration. The table below illustrates this impact assessment.

Note: The number of farmsteads and settlements exposed to visual impact influences the probability rating.

Table 6: Impact table summarising the significance of operational lightening at night on visual receptors within the region

Nature of Impact: Visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed facility		
	No mitigation	***Mitigation considered***
Extent	High **(4)**	High **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(48)**	Low **(24)**

Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning & operation: ➢ Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). ➢ Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. ➢ Make use of minimum lumen or wattage in fixtures. ➢ Make use of down-lighters, or shielded fixtures. ➢ Make use of Low-Pressure Sodium lighting or other types of low impact lighting. ➢ Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.		
Cumulative impacts: The light generated at night locally is minimal. The impact of the proposed substation infrastructure although in line with current development and land use trends in the region, will certainly will contribute to a regional increase in lighting impact.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

7.3 SECONDARY IMPACTS

7.3.1 POTENTIAL VISUAL IMPACT ON THE VISUAL CHARACTER OF THE LANDSCAPE AND SENSE OF PLACE OF THE REGION

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.) play a significant role.

A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

In general, the landscape character of the greater study area and site itself presents as undeveloped and largely natural in character. The visual quality of the region is generally high by virtue of the vast and undeveloped nature of the environment. This lends a distinct sense of place to the area, but the landscape is not unique. As such, the entire study area is considered sensitive to visual impacts due to its generally low levels of transformation.

The anticipated visual impact on the visual character and sense of place of the study area is expected to be of **moderate** significance. The low occurrence of visual receptors and the remote location of the study area relative to tourism areas reduces the probability of this impact occurring. Additionally, the presence of existing electrical infrastructure within the region reduces the probability of this impact occurring.

No mitigation is possible within this environment and for a facility of this scale, but measures have been included as best practice guidelines. The table below illustrates this impact assessment.

Table 7: Impact table summarising the significance of visual impacts on landscape character and sense of place within the region

Nature of Impact: Visual impact of the proposed development on the visual quality of the landscape and sense of place of the region		
	No mitigation	***Mitigation considered***
Extent	Low **(2)**	N/A
Duration	Long **(4)**	N/A
Magnitude	High **(8)**	N/A
Probability	Probable **(3)**	N/A
Significance	Moderate **(42)**	N/A
Status (positive or negative)	Negative	N/A

Reversibility	Recoverable **(3)**	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

- Respond to the natural environment during the planning of buildings and infrastructure.
- Consolidate development and make use of already disturbed sites rather than pristine areas.
- Retain vegetation in all areas outside of actual built footprints wherever possible.
- Visually break up large bulky buildings into smaller, subtler, less prominent shapes and planes.
- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.
- Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised.
- Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible, and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
- Wherever possible, use materials, coatings, or paints that have little or no reflectivity.
- Commercial messages, symbols and/logos are not permitted on structures.
- Use slight variations in topography to screen PV panels, where possible. Design linear features to follow natural land contours rather than straight lines.

Construction:

- Rehabilitate all construction areas.
- Ensure that vegetation is not cleared unnecessarily to make way for infrastructure.

Operations:

- Maintain the general appearance of the facility as a whole.
- Monitor rehabilitated areas, and implement remedial action as and when required.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site.
- Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative impacts:

The construction of the infrastructure will increase the cumulative visual impact of electrical type infrastructure within the region. This is specifically relevant in light of the existing power lines in the area and the Riem Traction Substation present in the study area.

Residual impacts:

The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

7.3.2 POTENTIAL CUMULATIVE VISUAL IMPACT WITHIN THE REGION

There are already existing high voltage power lines that traverse the study area, namely the Droerivier/hydra 2 400 kV and Gamma/Kappa 1 765 kV and the droerivier/Hyrda 1&3 400 kV overhead lines. The addition of the proposed Poortjie Wes Cluster Grid Connection will result in an increase in this type of infrastructure within the region and could result in a cumulative visual impact.

The table below illustrates the assessment of the anticipated cumulative visual impact of infrastructure on sensitive visual receptors within the region. Visual impacts are likely to be of **moderate** significance with no mitigation possible.

Table 8: Impact table summarising the potential cumulative visual impact on sensitive visual receptors within the region

Nature of Impact:
Potential cumulative visual impact of infrastructure on visual receptors within the region

	Overall impact of the project considered in isolation (with mitigation)	***Cumulative impact of the project and other projects within the area (with mitigation)***
Extent	Low **(2)**	Medium to longer distance (2)
Duration	Long **(4)**	Long **(4)**
Magnitude	Moderate **(6)**	High **(8)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Moderate **(36)**	Moderate **(42)**
Status (positive or negative)	Negative	Negative

Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

- Respond to the natural environment during the planning of buildings and infrastructure.
- Consolidate development and make use of already disturbed sites rather than pristine areas.
- Retain vegetation in all areas outside of actual built footprints wherever possible.
- Visually break up large bulky buildings into smaller, subtler, less prominent shapes and planes.
- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.
- Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised.
- Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible, and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
- Wherever possible, use materials, coatings, or paints that have little or no reflectivity.
- Commercial messages, symbols and/logos are not permitted on structures.
- Use slight variations in topography to screen PV panels, where possible. Design linear features to follow natural land contours rather than straight lines.

Construction:

- Rehabilitate all construction areas.
- Ensure that vegetation is not cleared unnecessarily to make way for infrastructure.

Operations:

- Maintain the general appearance of the facility as a whole.
- Monitor rehabilitated areas, and implement remedial action as and when required.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site.
- Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual impacts:

The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

7.4 THE POTENTIAL TO MITIGATE VISUAL IMPACTS

The primary visual impact, namely the presence of the proposed Poortjie Wes Cluster Grid connection, is not possible to mitigate especially in this receiving environment. Low lying vegetation, the undeveloped nature of the study area, and the high contrast of the infrastructure within the surrounding receiving environment results in a low VAC.

The following is, however possible and is recommended as general good practice:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.
- Plan ancillary infrastructure (i.e., substation and workshop) in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible and make use of already disturbed areas rather than pristine sites wherever possible.
- Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
- Access roads, which are not required post-construction, should be ripped and rehabilitated.

- Mitigation of visual impacts associated with the construction phase, albeit temporary, entails proper planning, management and rehabilitation of all construction sites. Construction should be managed according to the following principles:

  - Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
  - Reduce the construction period through careful logistical planning and productive implementation of resources.
  - Plan the placement of lay-down areas and any potential temporary construction camps along the corridor in order to minimise vegetation clearing.

- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent).
- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
- Ensure that all infrastructure and the site and general surrounds are maintained and kept neat.
- Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.
- Monitor all rehabilitated areas for at least a year for rehabilitation failure and implement remedial action as required. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.

- Mitigation of other lighting impacts includes the pro-active design, planning and specification lighting for the substation. The correct specification and placement of lighting and light fixtures will go far to contain rather than spread the light. Additional measures include the following:

  - Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself).
  - Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights;
  - Making use of minimum lumen or wattage in fixtures.
  - Making use of down-lighters, or shielded fixtures.
  - Making use of Low-Pressure Sodium lighting or other types of low impact lighting.
  - Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

- During Operations, monitor the general appearance of the facility as a whole, as well as, all rehabilitated areas.
  - The maintenance of the buildings and ancillary structures and infrastructure will ensure that the facility does not degrade, thus aggravating visual impact. Implement remedial action where required.
  - Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as a when required.
- Secondary impacts anticipated as a result of the proposed infrastructure (i.e., impacts on landscape character and sense of place) are not possible to mitigate.

- After decommissioning, all infrastructure should be removed and all disturbed areas appropriately rehabilitated. Monitor rehabilitated areas post-decommissioning and implement remedial actions and consult an ecologist regarding rehabilitation specifications if necessary.

The possible mitigation of both primary and secondary visual impacts as listed above should be implemented and maintained on an on-going basis.

8. SUMMARY OF VISUAL IMPACTS ASSESSED

In light of the results and findings of the Visual Impact Assessment undertaken for the Poortjie Wes Cluster Grid Connection it is acknowledged that the receiving environment will be visually transformed for the entire operational lifespan of the facility.

The following is a summary of the impacts assessed:

- The potential visual impact of the facility on sensitive visual receptors within 0.5km (residents of homesteads/dwellings and users of the secondary roads), in close proximity to the proposed facility is likely to be **high.**
- The possible visual impact of the facility on the residents homesteads and users of secondary road on the periphery of the 0.5km offset and within the region beyond is likely to be of **moderate** significance.
- The potential visual impact of the associated infrastructure on residents of homesteads/dwellings and users of the secondary road within close proximity of the proposed facility is likely to be of **moderate** significance and may be mitigated to **low** should the possible best practice mitigation measures be implemented.
- The potential visual impact of construction on sensitive visual receptors in close proximity to the facility is likely to be of **moderate** significance before mitigation and **low** post mitigation.
- The anticipated visual impact of operational lighting at night on sensitive visual receptors within the study area is likely to be of **moderate** significance and may be mitigated to **low** should the possible best practice mitigation measures be implemented.
- The potential visual impact of the proposed development on the visual quality of the landscape and sense of place of the region is likely to be of **moderate** significance both before and after mitigation.
- The potential cumulative visual impact on sensitive visual receptors within the region is likely to be of **moderate** significance.

9. CONCLUSION AND RECOMMENDATIONS

The visual assessment of the proposed Poortjie Wes Cluster Grid Connection indicates that the construction and operation of the proposed infrastructure will have a visual effect on both the rural landscape and on sensitive receptors in the study area.

The proposed infrastructure will be visible within an area that is generally characterised by low growing shrubland and wide-open undeveloped spaces. The infrastructure would thus be highly visible and impossible to hide within an area that incorporates potentially various sensitive visual receptors that may consider visual exposure to this type of infrastructure to be intrusive.

The low occurrence of such sensitive visual receptors within this environment, specifically in close proximity to the proposed infrastructure as well as the presence of existing high voltage overhead powerlines, is of relevance however, and has affected the significance rating of the anticipated visual impacts.

Overall, the post mitigation significance of the visual impacts is predominately **moderate** to **low.** A **high** significance rating is anticipated for users travelling along the secondary roads and residents of dwellings within 0.5 km from the proposed infrastructure. However, due to the low number/ density of homesteads/dwellings within the study area and the fact that observers travelling along the secondary road will only experience a visual intrusion for a short period of time, this impact is anticipated to be greatly reduced.

Notwithstanding the above, there are not many options as to the mitigation of the visual impact of the proposed infrastructure. No amount of vegetation screening or landscaping would be able to hide structures of these dimensions, especially within this receiving environment.

In order to ensure that all the spatial analyses and mapping undertaken in this report is as accurate as possible, a transparent and scientifically defensible approach in line with best practice methodology for this type of assessment, has been utilised. The objective of this process is to quantify the potential visual impacts associated with the proposed Poortjie Wes Cluster Grid Connection, using visibility analyses, proximity analyses and the identification of sensitive receptors. However, it must be noted that visual impact is a very subjective concept, personal to each individuals' backgrounds, opinions and

perceptions. The subjects in this case are the identified sensitive receptors such as the residents of homesteads/dwellings and users of roads.
According to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005), the criteria that determine whether or not a visual impact constitutes a potential fatal flaw are categorised as follows:

1. Non-compliance with Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites.
2. Non-compliance with conditions of existing Records of Decision.
3. Impacts that may be evaluated to be of high significance and that are considered by the majority of the stakeholders and decision-makers to be unacceptable.

In terms of the above and to the knowledge of the author, the proposed development is compliant with all Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites, as well as, conditions of existing Records of Decisions and only one impact of high significance have been evaluated post mitigation though it is not deemed to be unacceptable.

This assessment has adopted a risk averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors (bar the landowners of the properties earmarked for the development), would be predominantly negative towards the Poortjie Wes Cluster Grid Connection in the region. While still keeping in mind that there are also likely to be supporters of the facility (as a possible employer and income generator in the region) amongst the population of the larger region, but they are largely expected to be indifferent to the construction of the facility and not as vocal in their support for the facility as the detractors thereof.

Therefore, with the information available to the specialist at the time of writing this report, it cannot be empirically determined that the statistical majority of objecting stakeholders were exceeded. If evidence to the contrary surfaces during the progression of the development application, the specialist reserves the right to revise the statement below.

Therefore, the likelihood that the proposed development will be met with concern and objections from some of the affected sensitive receptors in the region, this report cannot categorically state that any of the above conditions were transgressed. As such these visual impacts are not considered to be fatal flaws for a development of this nature particularly due to the remote location of the study area and very low density of visual receptors. It is, therefore, suggested that the proposed Poortjie Wes Cluster Grid Connection, as per the assessed layout be supported from a visual perspective, subject to the implementation of the suggested best practice mitigation measures provided in this report.

10. REFERENCES

DEADP, Provincial Government of the Western Cape, 2011. Guideline on Generic Terms of Reference for EAPS and Project Schedules.

Oberholzer, B. (2005). Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1.