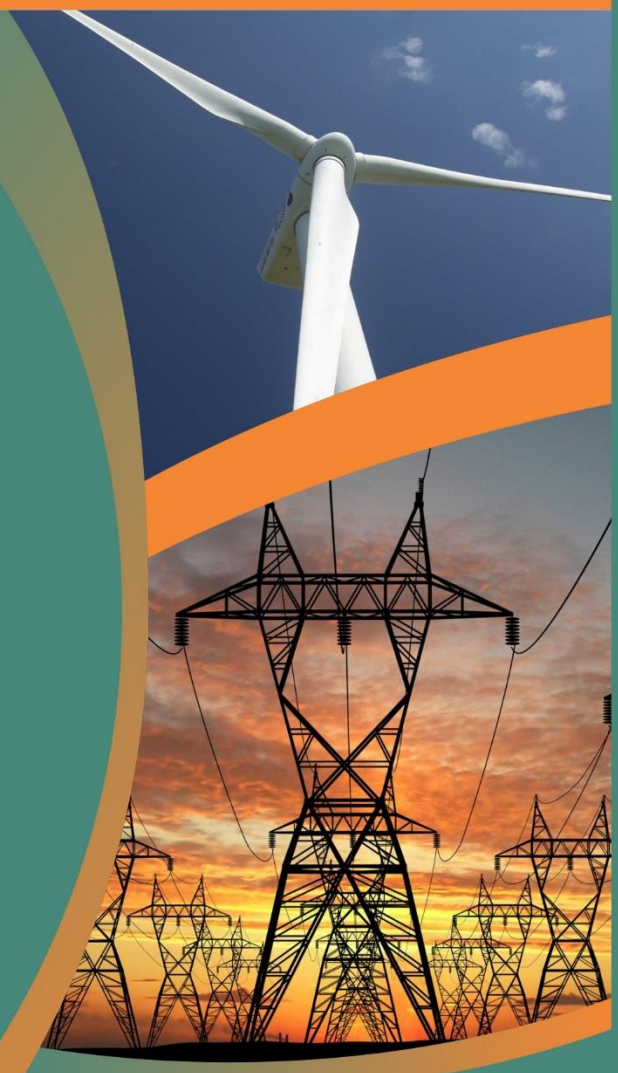
BASIC ASSESSMENT REPORT

Basic Assessment for the Proposed Construction and Operation of Electrical Grid Infrastructure to support the Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities (WEFs), Northern and Western Cape Provinces



APPENDIX D.3: Visual Impact Assessment

Electrical Grid Infrastructure to Support the Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities:

Visual Impact Assessment Addendum

Report Prepared for

CSIR - Environmental Management Services

Report Prepared by

srk consulting

Report Number 553476

September 2019

Electrical Grid Infrastructure to Support the Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities:

Visual Impact Assessment Addendum

CSIR - Environmental Management Services

SRK Project Number 553476
September 2019

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Source of cover page image: Holland, 2017

Profile and Expertise of Specialists

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by the Council for Scientific & Industrial Research (CSIR) to compile a Visual Impact Assessment (VIA) Addendum Report for proposed amendments to the Electrical Grid Infrastructure (EGI) for the Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities (WEFs). SRK Consulting comprises over 1 400 professional staff worldwide, offering expertise in a wide range of environmental and engineering disciplines. SRK's Cape Town environmental department has a distinguished track record of managing large environmental and engineering projects, extending back to 1979. SRK has rigorous quality assurance standards and is ISO 9001 accredited. The qualifications and experience of the key individual specialists involved in the study are detailed below.

Project Review: Christopher Dalgliesh, BBusSc (Hons); MPhil (EnvSci)

Certified with the Interim Board for Environmental Assessment Practitioners South Africa (CEAPSA)

Chris Dalgliesh is a Partner and Principal Environmental Consultant with over 26 years' experience, primarily in South Africa, Southern Africa, West Africa and South America (Suriname). Chris has worked on a wide range of projects, notably in the natural resources, Oil & Gas, waste, infrastructure (including rail and ports) and industrial sectors. He has directed and managed numerous Environmental and Social Impact Assessments (ESIAs) and associated management plans, in accordance with international standards. He regularly provides high level review of ESIAs, frequently directs Environmental and Social Due Diligence studies for lenders, and also has a depth of experience in Strategic Environmental Assessment (SEA), State of Environment Reporting and Resource Economics. He holds a BBusSci (Hons) and M Phil (Env) and is a CEAPSA.

Visual Specialist: Scott Masson, BSc (Hons) (EnvMan); MLA (L.Arch.)

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Scott Masson is a Senior Environmental Consultant and has been involved in the environmental and landscape architectural field for the past 10 years. His expertise includes Visual Impact Assessment, Environmental Impact Assessment, Environmental Management Plans and Environmental Control Officer work, Integrated Water and Waste Management Plans, environmental planning and sensitivity studies; and landscape architectural planning and design. Scott holds a BSc (Hons) in Environmental Management, a MLA in Landscape Architecture, and is a CEAPSA.

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Disclaimer

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Acronyms and Abbreviations

BA	Basic Assessment
CSIR	Council for Scientific & Industrial Research
EA	Environmental Authorisation
EGI	Electrical Grid Infrastructure
EIA	Environmental Impact Assessment
MTS	Major Transmission Substation
NEMA	National Environmental Management Act 107 of 1998
SRK	SRK Consulting (South Africa) (Pty) Ltd
ToR	Terms of Reference
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
WEF	Wind Energy Facility

Glossary

Landscape Integrity	The compatibility of the development/visual intrusion with the existing landscape.
Landscape Unit	Portion of an area with similar morphological characteristics.
Sense of Place	The identity of a place related to uniqueness and/or distinctiveness. Sometimes referred to as genius loci meaning 'spirit of the place'.
Viewshed	The topographically defined area from which the project *could* be visible.
Visibility	The area from which the project components would actually be visible and which depends upon topography, vegetation cover, built structures and distance.
Visual Absorption Capacity	The potential for the area to conceal the proposed development.
Visual Character	The elements that make up the landscape including geology, vegetation and land-use of the area.
Visual Exposure	The zone of visual influence or viewshed. Visual exposure tends to diminish exponentially with distance.
Visual Impact	A change to the existing visual, aesthetic or scenic environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.
Visual Intrusion	The nature of intrusion of an object on the visual quality of the environment resulting in its compatibility (absorbed into the landscape elements) or discord (contrasts with the landscape elements) with the landscape and surrounding land uses.
Visual Obtrusion	When an object obstructs the field of view.
Visual Quality	The experience of the environment with its particular natural and cultural attributes.
Visual Receptors	Potential viewers (individuals or communities) who are subjected to the visual influence of a project.

1 Introduction

1.1 Background

The Council for Scientific & Industrial Research ("CSIR") was appointed by South Africa Mainstream Renewable Power Developments ("Mainstream") to undertake three separate Basic Assessment (BA) processes for the Electrical Grid Infrastructure (EGI) associated with the proposed Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities (WEFs), near Sutherland, in the Northern and Western Cape Provinces. Mr. Henry Holland ("Holland") was appointed as the visual specialist to assess the visual and aesthetic impacts (Visual Impact Assessments [VIAs]) of the EGI for each WEF.

Amended Environmental Authorisations (EAs) were obtained for the WEFs in August 2017 and EAs for the associated EGI projects were received in February 2018.

CSIR has been appointed by Mainstream to undertake a new BA process to assess the EGI for the WEFs (i.e. EGI associated with all three WEFs). Mainstream proposes to make the following amendments to the proposed EGI:

- **Amendment 1**: Change the preferred route alternative for the 132 kV powerline from Alternative Route 1 to Alternative Route 2;
- **Amendment 2**: Include a new location for the Major Transmission Substation (MTS); and
- **Amendment 3**: Include a ~4 km 400 kV powerline from the proposed MTS to existing Eskom powerlines.

Further information on the proposed amendments is provided in Section 3.1.

SRK Consulting (South Africa) (Pty) Ltd ("SRK") has been appointed by CSIR to undertake a VIA detailing the potential visual impacts of the proposed amendments. The VIA (this report) will be an **addendum** to the VIAs conducted by Holland for the EGI.

2 Approach and Method

Given the subjective nature of visual issues, assessing the visual impacts of a development / site in absolute and objective terms is not achievable. Thus, qualitative as well as quantitative techniques are required. Emphasis is therefore placed on ensuring that the methodology and rating criteria are clearly stated and transparent. For impact assessment, all ratings are motivated and, where possible, assessed against explicitly stated and objective criteria.

There are very few guidelines that provide direction for visual assessment; the most relevant are the Landscape Institute's "Guideline for Landscape and Visual Impact Assessments" and the DEA&DP's "Guideline for Involving Visual and Aesthetic Specialists in EIA Processes" (2005), both of which have been considered in this VIA. The VIA is also guided by Appendix 6 of the Environmental Impact Assessment (EIA) Regulations, 2014, which prescribe the required content of a specialist study.

This VIA has also been informed by the following VIAs undertaken by Holland:

- Sutherland WEF EGI VIA;
- Sutherland 2 WEF EGI VIA; and
- Rietrug WEF EGI VIA.

2.1 General Approach to VIAs

SRK's approach to VIAs is selected to be as accurate and thorough as possible. Analytical techniques are selected to endorse the reliability and credibility of the assessment.

Visual impacts are assessed as one of many interrelated effects on people (i.e. the viewers and the impact of an introduced object into a

view or scene) (Young, 2010). In order to assess the visual impact a project has on the affected environment, the visual context (baseline) in which a project is located must be described. The inherent value of the visual landscape to viewers is informed by geology / topography, vegetation and land-use and is expressed *as Visual Character* (overall impression of the landscape), *Visual Quality* (how the landscape is experienced) and *Sense of Place* (uniqueness and identity).

Visual impact is measured as the change to the existing visual environment caused by the project as perceived by the viewers (Young, 2010). The visual impact(s) may be negative, positive or neutral (i.e. the visual quality is maintained). The magnitude or intensity of the visual impacts is determined through analysis and synthesis of the visual absorption capacity (VAC) of the landscape (potential of the landscape to absorb the project), viewshed (zone of visual influence or exposure), visibility (viewing distances), compatibility of the project with landscape integrity (congruence), and the sensitivity of the viewers (receptors).

2.2 Specific Approach to this VIA

A brief description of the visual context of the area and a discussion on the potential visual impacts of the proposed amendments is provided to understand the physical change the proposed amendments may have on the visual environment and sense of place.

Comment is provided on the impact ratings provided by Holland (2017) for Alternative Route 2. The visual impacts of the proposed substation and 400 kV powerline section (not previously assessed) are assessed utilising CSIR's impact rating methodology.

Additional mitigation measures to avoid or minimise visual impacts associated with the proposed amendments are provided.

2.3 Method

The following method was used to conduct the VIA:

- Review the previous VIAs undertaken by Holland and other background information;
- Provide a brief description of the visual environment based on information provided by CSIR and Holland, and a desktop investigation;
- Describe the proposed EGI amendments based on information provided by CSIR / Mainstream;
- Generate a viewshed for the Alternative Route 2 including the additional 4 km powerline section;
- Generate a viewshed for the MTS;
- Comment on the impact ratings for Alternative Route 1 and Alternative Route 2;
- Assess the impacts of the MTS on the visual environment and sense of place;
- Assess the impacts of the additional 4 km 400 kV powerline section on the visual environment and sense of place; and
- Recommend (additional) practicable mitigation measures to avoid and/or minimise impacts associated with the proposed amendments.

2.4 Assumptions and Limitations

As is standard practice, the VIA is based on several assumptions and is subject to certain limitations, which should be borne in mind when considering information presented in this report. These assumptions and limitations include:

- VIA is not, by nature, a purely objective, quantitative process, and depends to some extent on subjective judgments. Where subjective judgments are required, appropriate criteria and motivations for these are clearly stated;
- The assessment is based on technical information supplied to SRK, which is assumed to be accurate. This includes the proposed locations, dimensions and layouts of the EGI;
- The study is desktop-based. No site visit was undertaken as the visual specialist is very familiar with the aesthetic / sense of place characteristics of the wider area and a site visit was not deemed necessary for the purposes of this VIA addendum;
- This VIA addendum has been informed by the VIAs undertaken by Holland and the findings thereof;
- Due to different viewshed methodologies, the viewsheds presented in this VIA addendum (Section 4.4) may differ slightly to those viewsheds generated by Holland; and
- This study does not provide motivation for or against the revised development, but rather seeks to give insight into the potential visual impacts of the proposed amendments.

The findings of the VIA are not expected to be affected by these assumptions and limitations.

3 Project Description

A new 132 kV transmission powerline is required to connect the approved Sutherland WEFs into the national grid. Two route alternatives were initially assessed by Holland in the original VIA:

- Alternative Route 1 (Figure 3-1): From the proposed on-site substation at the Sutherland WEF to a collector hub on Hartbeestefontein Farm (147/RE). Alternative 1 was presented in the BA as the “preferred alternative” and approved in the EA; and
- Alternative Route 2 (Figure 3-2): From the proposed on-site substation at the Sutherland WEF to a proposed third-party substation on Hamelkraal Farm (16/7).

Alternative Route 1 is approximately 14 km long and Alternative Route 2 is approximately 40 km long. The powerline pylons are a maximum height of 32 m.

A service road (jeep track) will be constructed under the powerline to provide access for maintenance and an access road will be constructed to the MTS.

An MTS (on a 400 m x 400 m site) will be constructed at the eastern end/terminal of the 132 kV powerline, and a 400 kV powerline will be constructed from the MTS to connect to an existing Eskom powerline to feed electricity generated by the WEFs into the national grid.

3.1 Proposed Amendments

Mainstream proposes three amendments to the EGI.

Amendment 1: Change the preferred route alternative for the 132 kV powerline from Alternative Route 1 to Alternative Route 2

Alternative Route 1 was submitted as the preferred alternative in the original BA and subsequently approved in the EA. Alternative Route 2

was assessed in the original BA and no environmental fatal flaws were identified.

Mainstream would like to obtain EA (through a new BA process) for Alternative Route 2.

Amendment 2: Include a new location for the substation

As Alternative Route 1 was presented as the preferred alternative in the original BA, the substation (collector hub) location for Alternative Route 1 (refer to Figure 3-1) received EA (via a third party applicant).

Mainstream would like to obtain EA for a new MTS (refer to Figure 3-2 and Figure 3-3).

Amendment 3: Include a 4 km 400 kV powerline section

A ~ 4 km 400 kV overhead transmission powerline is required to connect the substation to an existing Eskom powerline (Figure 3-3). This 400 kV powerline was not previously assessed in the BA.

3.2 The No-Go Alternative

The No-Go Alternative implies that the proposed amendments described above will not be implemented, and that the EGI will be constructed as authorised.

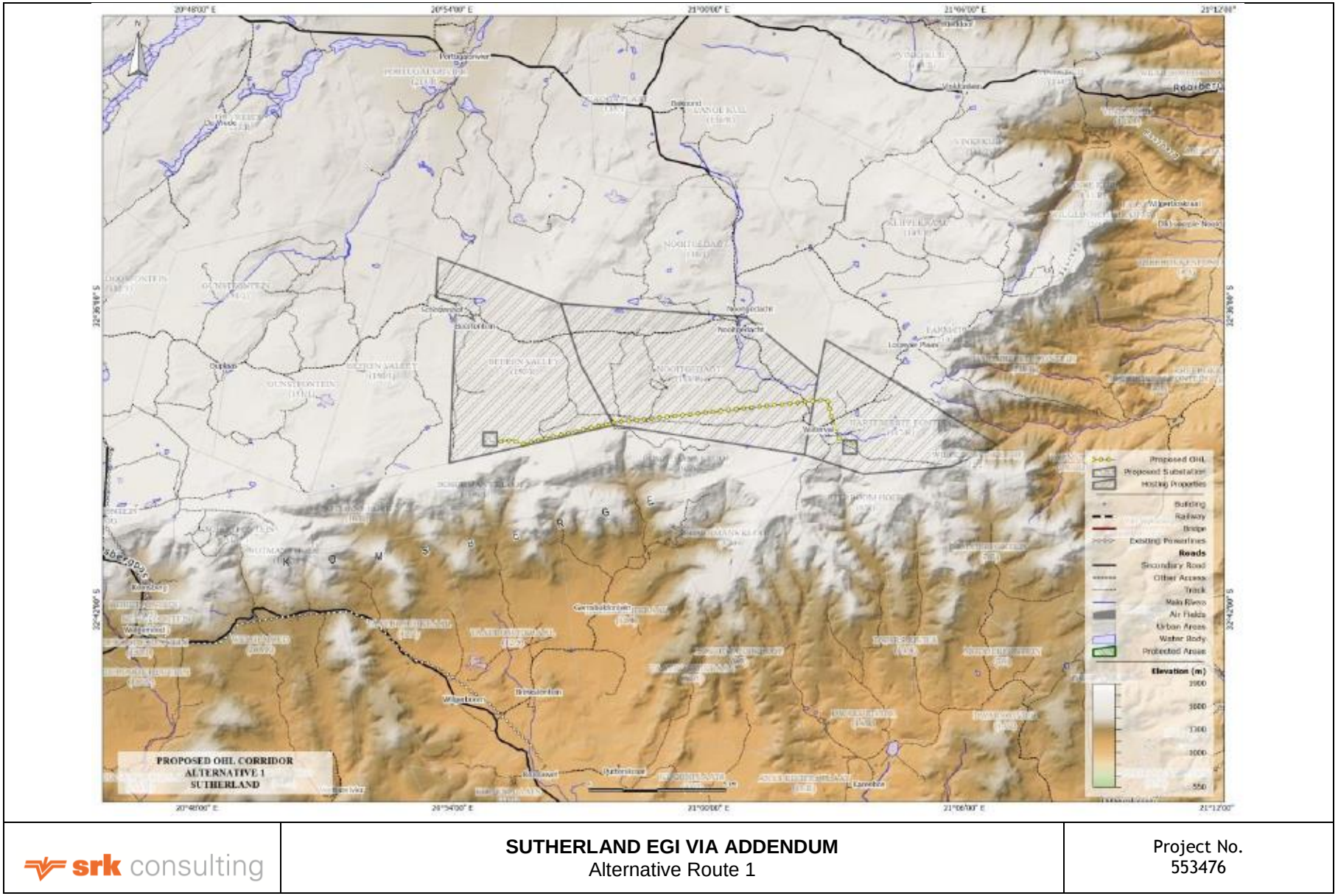
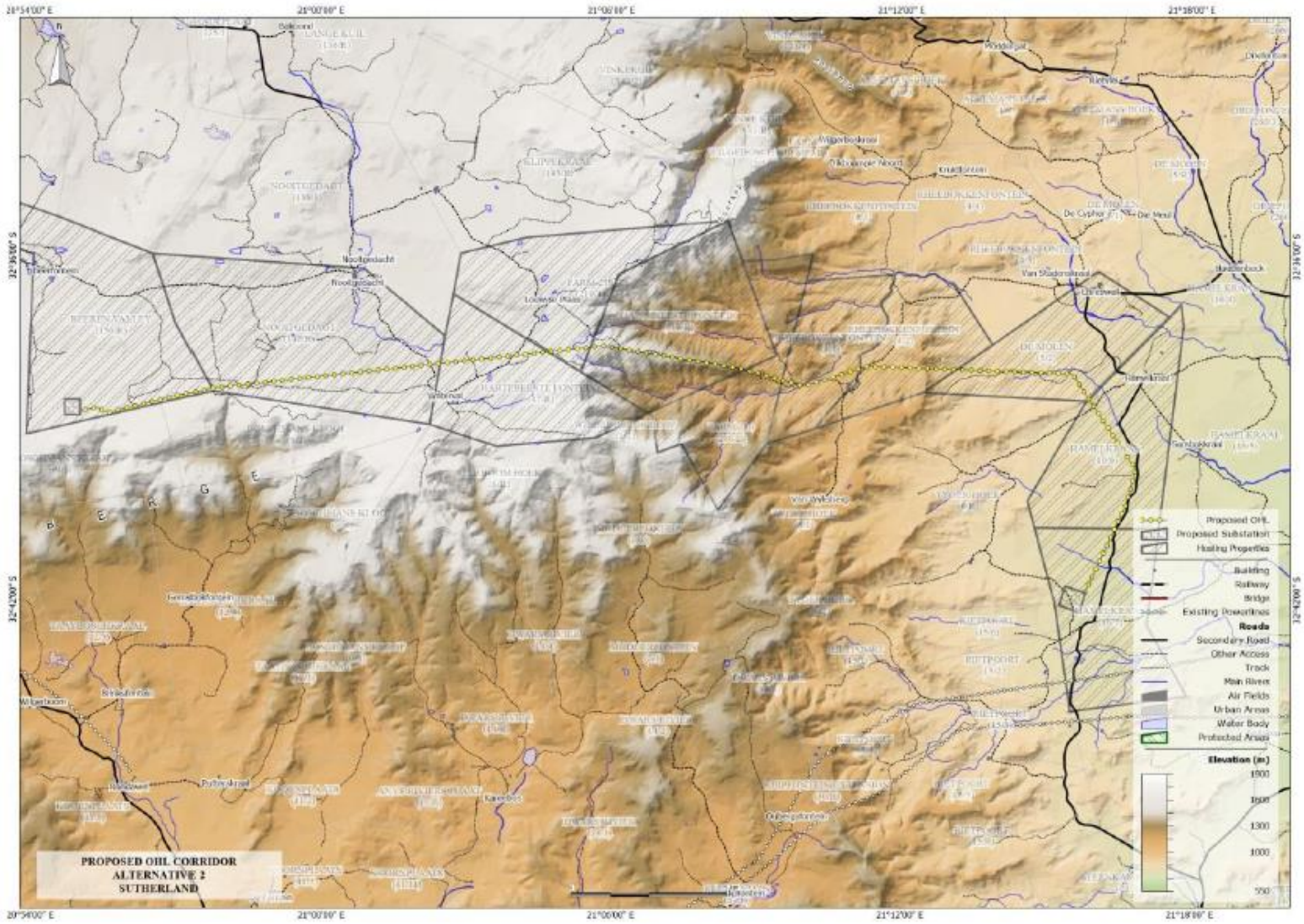


Figure 3-1: Alternative Route 1

Source: Holland, 2017



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SUTHERLAND EGI VIA ADDENDUM
Alternative Route 2

Project No.
553476

Figure 3-2: Alternative Route 2

Source: Holland, 2017

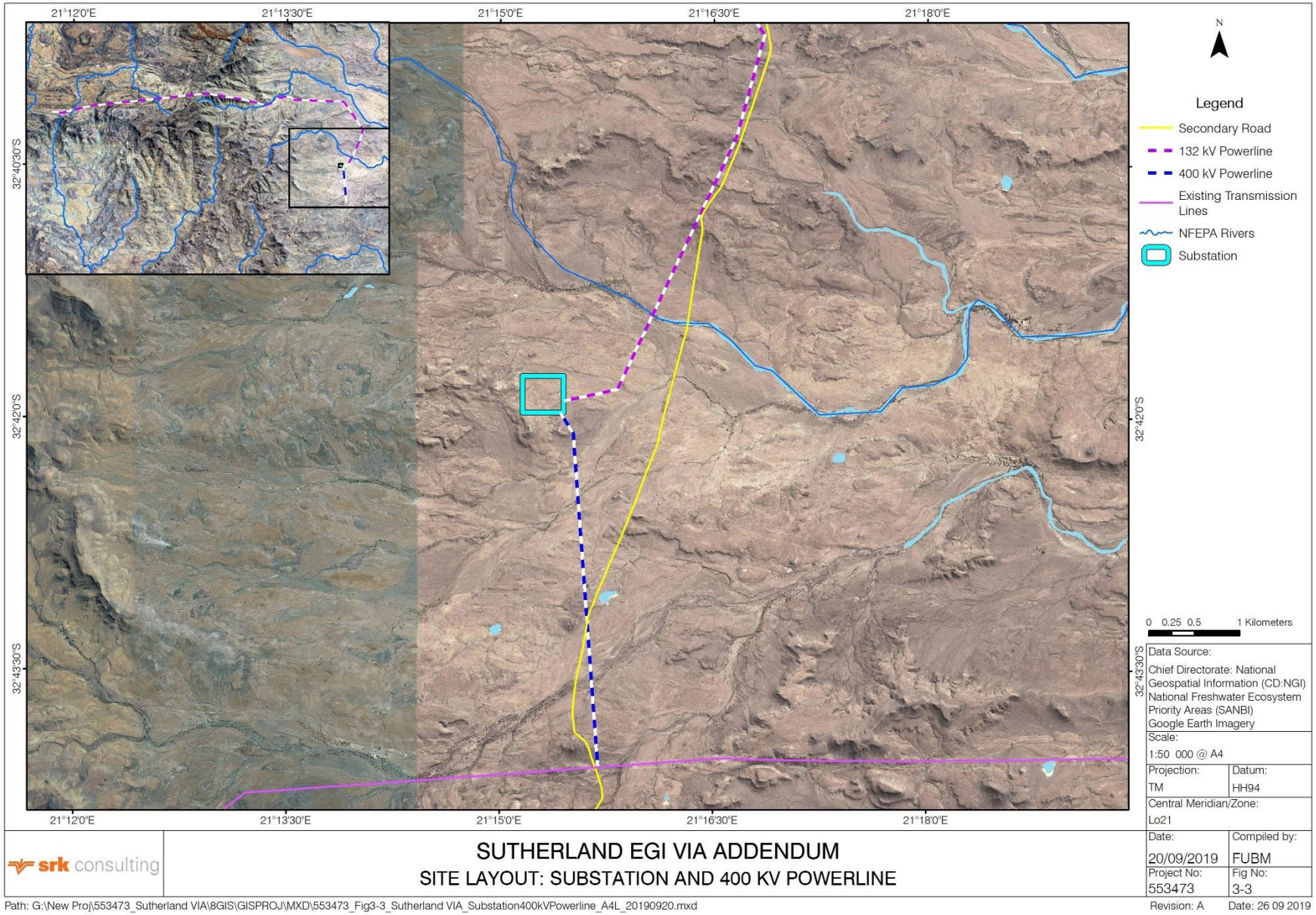


Figure 3-3: Proposed substation location and 400 kV powerline route

Source: CSIR, 2019

4 Visual Baseline (Affected Environment)

The following description of the affected environment focuses on the *Visual Character* of the area surrounding and including the project (the study area) and discusses the *Visual Quality* and *Sense of Place*[1]. The visual baseline is informed by desktop research and the VIAs undertaken by Holland.

4.1 Visual Character

Visual character is descriptive and non-evaluative, which implies that it is based on defined attributes that are neither positive nor negative. A change in visual character cannot be described as having positive or negative attributes until the viewer's response to that change has been taken into consideration. The probable change caused by the project is assessed against the existing degree of change caused by previous development.

The basis for the visual character of the study area is provided by the geology, vegetation and land use of the area, giving rise to a typical Karoo landscape – a predominantly mountainous / hilly landscape under predominantly natural cover with wide vistas and limited rural activities (grazing and game farming) and isolated farmsteads. The visual environment is dominated by the dramatic escarpment (Great Escarpment). From the lower lying regions in the south and east, the escarpment appears as a steep mountain range known as the Komsberg.

The remoteness of the study area and the low level of human influence results in a mostly *untransformed / natural landscape* as explained in Figure 4-2.

4.2 Visual Quality

Aesthetic value is an emotional response derived from our experience and perceptions. As such, it is subjective and difficult to quantify in absolute terms. Studies in perceptual psychology have shown that humans prefer landscapes with higher complexity (Crawford, 1994). Landscape quality can be said to increase when:

- Topographic ruggedness and relative relief increases;
- Water forms are present;
- Diverse patterns of grasslands, shrubs and trees occur;
- Natural landscape increases and man-made landscape decreases; and
- Where land use compatibility increases.

The visual quality of the area is largely ascribable to the open character of the landscape with spectacular and rugged mountains covered in natural shrub vegetation. The landscape and lack of human influence creates a sense of 'wilderness'.

The steeply incised valleys of the Dwyka, Tronk and Blouval Rivers provide visual interest in the landscape.

Some vertical elements detract from the visual quality in the study area, notably the existing 132 kV powerlines west of the WEFs and several high voltage transmission lines to the south, below the escarpment.

4.3 Sense of Place

Our sense of a place depends not only on spatial form and quality, but also on culture, temperament, status, experience and the current

[1] These terms are explained in the relevant sections below.

purpose of the observer (Lynch, 1992). Central to the idea of 'sense of place' or *Genius Loci* is identity. An area will have a stronger sense of place if it can easily be identified, that is to say if it is unique and distinct from other places. Lynch defines 'sense of place' as "the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid or unique, or at least a particular, character of its own" (Lynch, 1992:131).

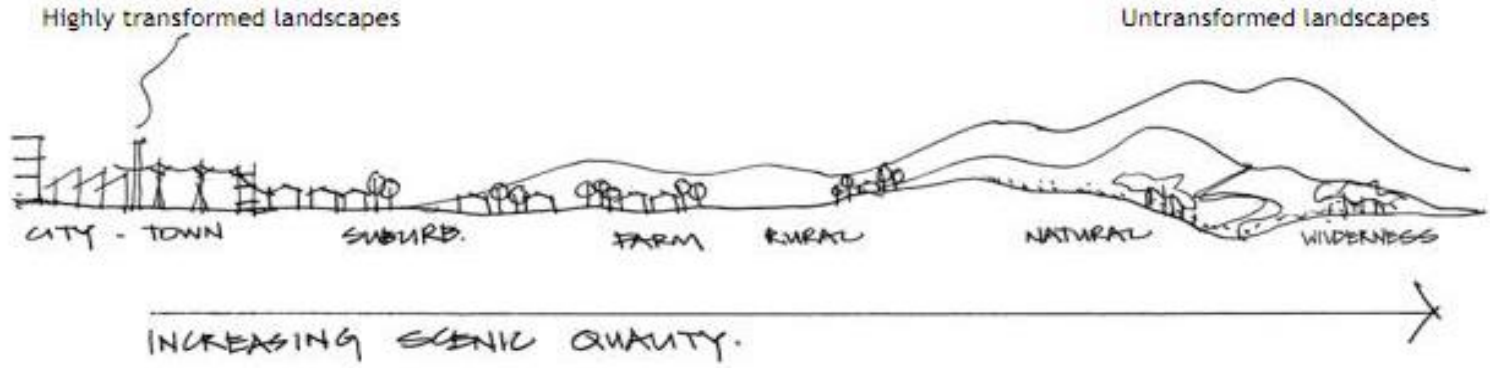
It is often the case that sense of place is linked directly to visual quality and that areas/spaces with high visual quality have a strong sense of place. However, this is not an inviolate relationship and it is plausible that areas of low visual quality may have a strong sense of place or – more commonly – that areas of high visual quality have a weak sense of place. The defining feature of sense of place is uniqueness, generally real or biophysical (e.g. trees in an otherwise treeless expanse), but sometimes perceived (e.g. visible but unspectacular sacred sites and places which evoke defined responses in receptors). Tourism can sometimes serve as an indicator of sense of place insofar as it is often the uniqueness (and accessibility) of a space/place which attracts tourists.

The vast 400 000 km^2 Karoo cultural landscape has a defined sense of place in terms of its open setting and sense of wilderness invoked when visiting, partly due to the predominantly natural landscape and relatively limited human influence throughout the region. The study area is not particularly distinct from the Karoo landscape with possible exception of the dramatic escarpment.

Figure 4-1: Visual character on the plateau (top), plain below the escarpment (middle) and view of the escarpment (bottom)

Source: Holland, 2017

Highly Transformed Landscape – Urban/Industrial	Transition Landscape	Modified Rural Landscape	Natural Transition Landscape	Untransformed Landscape – Natural
Substantially developed landscape. High levels of visual impact associated with buildings, factories, roads and other related infrastructure (e.g. powerlines).	Transitional landscape associated with the interface between, rural, agricultural area and more developed suburban or urban zones.	Typical character is rural landscape, defined by field patterns, forestry plantations and agricultural areas and associated small-scale roads and buildings.	A changing landscape character associated with the interface between natural areas and modified rural / pastoral or agricultural zones.	No / minimal impact associated with the actions of man. National parks, coastlines, pristine forest areas.



Source: CNDV, 2006

http://www.shandinglu.org

http://www.nightjartravel.com

http://www.boschkloof.com

Figure 4-2: Typical Visual Character Attributes

4.4 Visual Exposure

Visual exposure is determined by the zone of visual influence or viewshed. The viewshed is the topographically defined area that includes all the major observation sites from which the project *could* be visible. The boundary of the viewshed connects high points in the landscape and demarcates the zone of visual influence.

For the purposes of this study, the viewshed for the powerline (132 kV route and 400 kV route) is based on the height above ground level (32 m) of the pylons. The viewshed for the MTS assumed a height (of structures) of 10 m above ground level.

The method used to determine the zones of influence included GIS modelling (Digital Elevation Model) based on 20 m contours.

The viewshed analysis assumes maximum visibility of the powerline and substation in an environment stripped bare of vegetation and structures. It is therefore important to remember that the project is ***not necessarily visible from all points within the viewsheds*** as views may be obstructed by elements such as trees, dense scrub, built structures and/or - for this VIA - particularly by localised variations or irregularities in topography.

Analysis of the viewsheds of the proposed powerline and substation is instructive and leads to the following observations:

- The powerline viewshed indicates that the powerline is exposed and will be visible from an extensive area on the plains and in a more restricted area on the plateau;
- Topography effectively screens the powerline from receptors to the south-west and partially screens the powerline from receptors to the south-east; and
- The MTS will be exposed and visible over a distance of approximately 5 km on the plains. Topography effectively screens the substation within and beyond this zone.

4.5 Sensitivity of Viewers (Visual Receptors)

Receptors are important insofar as they inform visual sensitivity. The sensitivity of viewers is determined by the number of viewers and the likelihood that they will be impacted.

Globally it has been noted that many communities, including receptors, may be favourably inclined towards renewable energy projects / infrastructure and may be more predisposed to tolerate impacts they might not have tolerated on other projects. It is difficult to ascribe a level of collective tolerance to receptors, but it is plausible that receptor sensitivity may be muted by the nature of this project.

Holland (2017) notes that very few receptors will be exposed to the proposed powerline and substation. Potential viewers include the following:

- **Residents and visitors:** Holland (2017) states that there are approximately 56 buildings within 5 km of the Alternative Route 2 powerline although many of the buildings are uninhabited. The powerline passes within 1 km of the Waterval farmstead, within 320 m of the farm buildings on Farm Rheebokkenfontein (4/1) and within 600 m of the farmstead on Farm Rheebokkenfontein (4/2). On the plain below the escarpment, the Komsberg will be a backdrop to the proposed powerline for many of the views from farmsteads - the powerline is unlikely to be exposed/silhouetted above the skyline for most of the visual receptors on the plain.

  Potential (additional) receptors have been identified within 5 km of the 400 kV connection point to the existing 400 kV powerline. However, the proposed 400 kV powerline is likely to be visually

screened by topography or visually absorbed by the existing powerline.

- **Motorists:** Motorists using the secondary (gravel) road between Sutherland and Merweville are more than 20 km from the proposed 132 kV powerline. The scenic Rooiberg Pass is further than 10 km from the proposed 132 kV powerline. The secondary road from Houdenbeck farmstead to the N1 passes within 100 m of the proposed 132 kV powerline as the powerline approaches the proposed substation. This road is likely to only be used sporadically by farmers. The proposed 400 kV powerline will traverse this road.

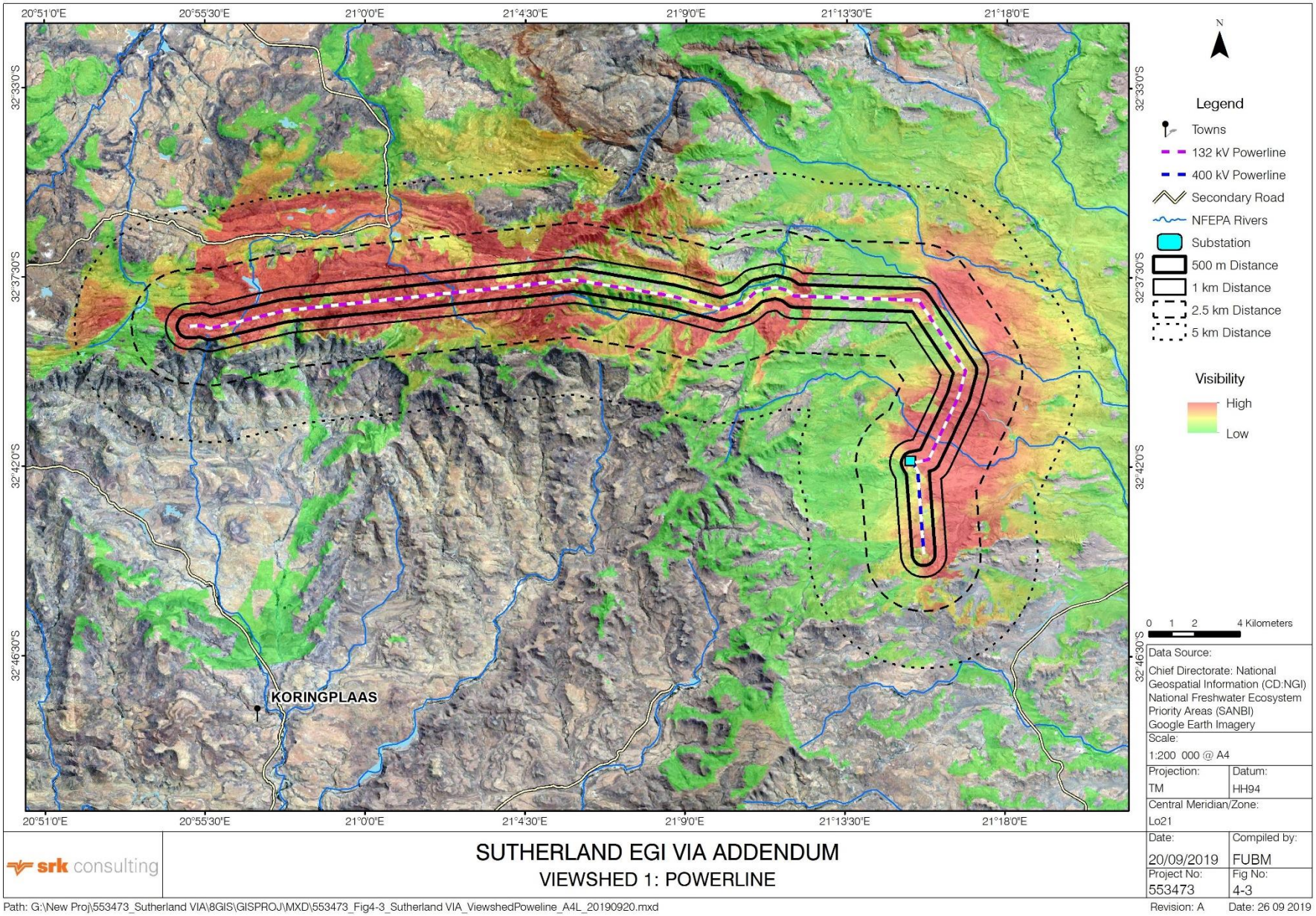


Figure 4-3: Viewshed 1: Powerline Alternative Route 2

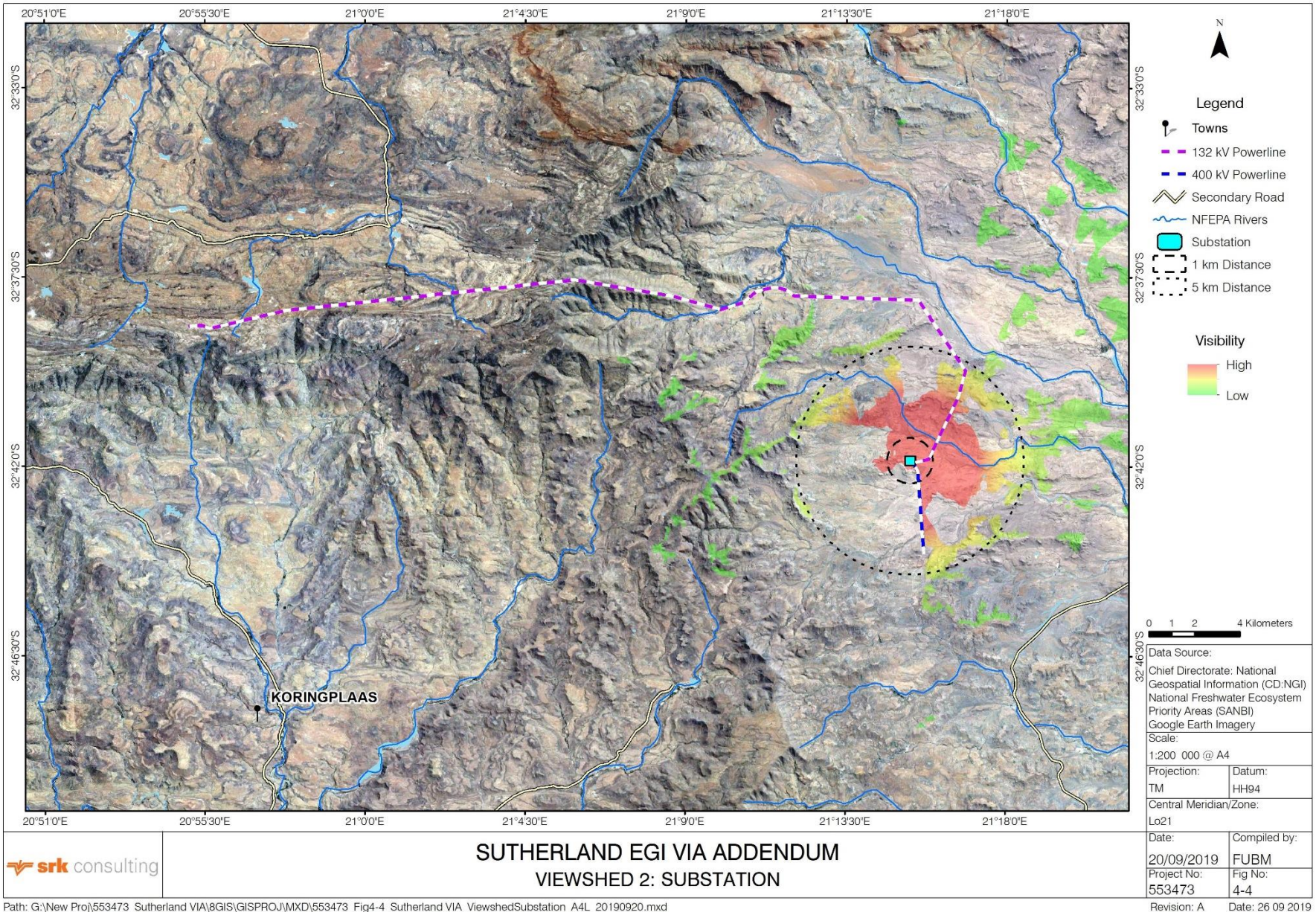


Figure 4-4: Viewshed 2: Substation

5 Impact Assessment and Mitigation Measures

5.1 Amendment 1: Change the preferred route alternative for the 132 kV powerline from Alternative Route 1 to Alternative Route 2

Alternative Route 1 was submitted as the preferred alternative in the original BA and subsequently approved in the EA. Mainstream would like to obtain EA for Alternative Route 2.

5.1.1 Previous Assessment: Construction and Decommissioning Phases

The (previous) visual specialist (Holland) considered the following construction and decommissioning aspects in the assessment:

- Construction / decommissioning equipment, plant and vehicles;
- Construction / decommissioning activity;
- Laydown areas;
- Vegetation clearance for access/service roads and servitudes;
- Construction and decommissioning of service roads;
- Site clearance (scarring); and
- Alien invasive species.

For both Alternative Route 1 and Alternative Route 2, Holland assessed the overall visual impact[2] of construction / decommissioning activities to be of *moderate* significance **without** mitigation.

The specialist recommended several mitigation measures to avoid and/or minimise the visual impact during construction / decommissioning.

For both Alternative Route 1 and Alternative Route 2, Holland assessed the overall visual impact of construction activities to be of *low* significance with mitigation.

5.1.2 Previous Assessment: Operations Phase

Holland (2017) assessed the following visual impacts of the 132 kV powerline in the Operations Phase:

- Change of landscape character; and
- Visual intrusion on views of sensitive visual receptors.

Holland assessed the visual impacts of **Alternative Route 1** to be of *very low and low* significance **without** mitigation and assessed the visual impacts of **Alternative Route 2** to be of *low* significance without mitigation.

The specialist recommended several mitigation measures to avoid and/or minimise visual impacts during the Operations Phase.

Holland assessed the visual impacts of **Alternative Route 1** to be of *very low* significance **with** mitigation. Due to the increased length (and therefore higher number of potentially affected visual receptors) of Alternative Route 2, and the alignment of the powerline over the escarpment and down onto the plains below, Holland assessed the visual impacts of **Alternative Route 2** to be of *low* significance **with** mitigation.

[2] Visual intrusion on existing views of sensitive receptors.

5.1.3 Current VIA: Comparative Assessment

This VIA study concurs with the impact ratings of the previous VIA (Holland, 2017) (refer to Table 5-1).

From a visual impact perspective, Holland identified Alternative Route 1 as the preferred alternative as the 132 kV powerline for this route is shorter and will affect fewer sensitive visual receptors. Although Alternative Route 2 would have a higher overall visual impact than Alternative Route 1, no fatal (visual) flaws have been identified and the overall visual impacts of Alternative Route 2 (powerline and service roads) are **acceptable** if the recommended mitigation measures are implemented.

Table 5-1: Significance of visual impact (with mitigation) of Alternative Route 1 and Alternative Route 2

	Alternative	
	Alternative 1	**Alternative 2**
Construction Phase	Low (-ve)	Low (-ve)
Operations Phase	Very Low (-ve)	Low (-ve)
Decommissioning Phase	Low (-ve)	Low (-ve)

5.2 Amendment 2: Include a new location for the substation

For various reasons as indicated in Section 3.1 and discussed in detail in the BA Report, Mainstream would like to obtain EA for a new MTS location.

The following section describes the visual impacts associated with the proposed MTS substation and associated access/service roads during the construction/decommissioning and operations phases and assesses these impacts utilising CSIR's impact rating methodology (refer to Appendix A).

5.2.1 Construction and Decommissioning Phases

Visual impacts will be generated by construction activities such as vegetation stripping, earthworks (which can cause scarring) and from construction infrastructure, plant and materials on site (e.g. site camp and stockpiles). Dust generated at the site will be visually unappealing and may further detract from the visual quality of the area. Such impacts are typically confined to the immediate area surrounding the site and the construction / decommissioning period.

Construction activities at the substation site (400 m x 400 m MTS and access road) will be visible to surrounding receptors due to the intensity of construction at the substation over 16 ha (compared to, for example, the construction footprint of each of the pylons), and the proximity of the substation site to the secondary road.

Construction and decommissioning activities will have a greater impact within the foreground (< 1 km) as sensitive receptors in close proximity to these activities (e.g. users of the secondary road between the Houdenbeck farmstead and the N1, farmsteads) will be particularly exposed to these visual impacts. There are, however, very few sensitive receptors within the foreground and construction impacts will be of comparatively short duration.

The impact for the MTS is assessed to be of ***low*** significance, and with the implementation of mitigation, is reduced to ***very low*** (Table 6, Appendix A and Table 5-2).

Table 5-2: Altered sense of place and visual intrusion during substation construction / decommissioning

Aspect/Activity	**Clearing of vegetation, earthworks, resultant scarring and construction and decommissioning activities (including dust)**
Type of impact	Direct
Potential Impact	Altered sense of place and visual intrusion during substation construction / decommissioning

Aspect/Activity	Clearing of vegetation, earthworks, resultant scarring and construction and decommissioning activities (including dust)
Impact Significance (Pre-Mitigation)	Low
Mitigation Required	• Limit and phase vegetation clearance and the footprint of construction and decommissioning activities to what is absolutely essential. • Utilise existing access roads as far as possible. • Consolidate the footprint of the construction and decommissioning camp to a functional minimum. Screen the yard with materials that blend into the surrounding area. • Avoid excavation, handling and transport of materials which may generate dust under high wind conditions. • Keep construction and decommissioning sites tidy and all activities, material and machinery contained within an area that is as small as possible. • Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the Construction and Decommissioning Phases.
Impact Significance (Post-Mitigation)	Very Low

5.2.2 Operations Phase

The MTS will change the land use of an (~16 ha) area from unbuilt to built. Although the substation will be visible to very few sensitive receptors, the substation will be incongruent with the natural character of the area.

The impact for the MTS is assessed to be of ***low*** significance, and with the implementation of mitigation, is reduced to ***very low*** (Table 7, Appendix A and Table 5-3).

Table 5-3: Altered sense of place and visual intrusion from the proposed substation

Aspect/Activity	Change in character of the site
Type of impact	Direct
Potential Impact	Altered sense of place and visual intrusion from the proposed substation
Impact Significance (Pre-Mitigation)	Low
Mitigation Required	• Be sensitive towards the use of glass or material with a high reflectivity which may cause glare and increase visual impacts. • Use low-impact fencing of appropriate colour, such as diamond wire-mesh fencing which is less visually intrusive when viewed from a distance. Palisade fencing and other solid fence structures should be avoided. • Design buildings to be similar to the vernacular of the surrounding farmstead buildings. • Consider using excess excavated material to construct a low (< 1 m) vegetated berm around the substation site to screen the bulk of the substation.
Impact Significance (Post-Mitigation)	Very Low

5.3 Amendment 3: Include a 4 km 400 kV powerline section

A ~ 4 km 400 kV overhead transmission powerline is required to connect the substation to an existing Eskom powerline. This 400 kV powerline was not previously assessed in the BA.

The following section describes the visual impacts associated with the proposed 400 kV powerline and associated access/service roads during the construction/decommissioning and operations phases and

assesses these impacts utilising CSIR's impact rating methodology (refer to Appendix A).

5.3.1 Construction and Decommissioning Phases

Limited loss of sense of place is expected during installation / decommissioning of the pylons along the 400 kV powerline route since the construction footprints will only be visible from a limited number of viewpoints / receptors.

Although vegetation clearance (for pylon foundations, access/service roads) and the resultant scarring will be incongruent with the existing character of the natural areas along the route, this will be limited by the location of the construction footprints on the rolling plains and the effective screening by ridgelines and koppies.

Construction and decommissioning activities will have a greater impact within the foreground (< 1 km) as sensitive receptors in close proximity to these activities (e.g. users of the secondary road between the Houdenbeck farmstead and the N1, farmsteads) will be particularly exposed to these visual impacts. There are, however, very few sensitive receptors within the foreground and construction and decommissioning impacts will be of comparatively short duration.

The impact of the 400 kV powerline is assessed to be of ***low*** significance, and with the implementation of mitigation, is reduced to ***very low*** (Table 6, Appendix A and Table 5-4).

Table 5-4: Altered sense of place and visual intrusion during powerline construction / decommissioning

Aspect/Activity	**Earthworks, resultant scarring and construction and decommissioning activities (including clearing of vegetation and dust)**
Type of impact	Direct
Potential Impact	Altered sense of place and visual intrusion during powerline construction / decommissioning
Impact Significance (Pre-Mitigation)	Low
Mitigation Required	• Limit and phase vegetation clearance and the footprint of construction and decommissioning activities to what is absolutely essential. • Utilise existing access roads as far as possible. If new roads are required, then avoid clearing natural vegetation to facilitate access to the final pylon positions. If access across natural vegetation is required, then prune/remove large shrubs rather than clearing vegetation completely. • Avoid excavation, handling and transport of materials which may generate dust under high wind conditions. • Keep construction and decommissioning sites tidy and all activities, material and machinery contained within an area that is as small as possible. • Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the Construction and Decommissioning Phases.
Impact Significance (Post-Mitigation)	Very Low

5.3.2 Operations Phase

Although the powerline may be visible from a large area on the plains (refer to Figure 4-3), the powerline may not be noticeable to receptors located in the background (i.e. further than 5 km), although is likely to alter the sense of place of receptors located in the foreground (i.e. within 1 km of the powerline). The loss of sense of place will be particularly significant to those residents located in close proximity (i.e. within 1 km) of pylons. However, there are very few sensitive receptors located in the foreground.

The 400 kV powerline is not compatible with the natural vegetation cover. However, the compatibility of the powerline increases as the proposed powerline approaches several existing transmission lines 4 km south of the substation.

The impact of the 400 kV powerline is assessed to be of ***low*** significance with and without the implementation of mitigation (Table 7, Appendix A and Table 5-5).

Table 5-5: Altered sense of place and visual intrusion from the proposed 400 kV powerline

Aspect/Activity	Change in character of the route
Type of impact	Direct
Potential Impact	Altered sense of place and visual intrusion from the proposed 400 kV powerline
Impact Significance (Pre-Mitigation)	Low
Mitigation Required	• Locate pylons away from farmstead buildings and beyond the direct line of sight from these buildings as far as possible. • Locate pylons the maximum distance from watercourses as possible. • Install lattice structures (as the preferred pylon structure) as far as possible. • Do not illuminate pylons. • Rehabilitate areas affected by scarring and put measures in place to prevent erosion. • (In discussion with the avifauna specialist) reduce the number of bird flappers / balls along the powerline route.
Impact Significance (Post-Mitigation)	Low

5.4 Cumulative Impacts

Holland (2017) considered the following cumulative visual impacts of existing and proposed renewable energy projects (wind and solar) in a 50 km study area:

- Cumulative impact on the landscape character of the region; and
- Cumulative impact on the existing views of sensitive receptors.

A concentration of renewable energy projects will inevitably change the visual character of the area and alter the inherent sense of place. However, the study area is partially located in the designated Komsberg Renewable Energy Development Zone (selected so as to minimise impacts) and the cumulative impact(s) will be limited by the low number of visual receptors in the area.

For both Alternative Route 1 and Alternative Route 2, Holland assessed the cumulative impacts to be of *very low* significance with mitigation. Holland does note though that the cumulative impact rating

does depend on viewers' perception of renewable energy projects, as also noted in Section 4.5 of this report.

The introduction of a new MTS and a 4 km 400kV powerline route is highly unlikely to further increase the cumulative impact of the proposed EGI on the visual character and sense of place of the study area.

6 Conclusion and Findings

The following findings are pertinent:

- EAs were awarded to Mainstream for the Sutherland, Sutherland 2 and Rietrug WEFs in August 2017 (Amended EAs), and for the associated EGI projects in February 2018;
- CSIR has been appointed by Mainstream to undertake a new BA process to assess the EGI for the WEFs. Mainstream also proposes to make the following amendments to the proposed EGI:
    - **Amendment 1**: Change the preferred route alternative for the 132 kV powerline from Alternative Route 1 to Alternative Route 2;
    - **Amendment 2**: Include a new location for the MTS; and
    - **Amendment 3**: Include a 4 km 400 kV powerline section;
- **Amendment 1**: The previous visual specialist (Holland) identified Alternative Route 1 as the preferred alternative as the 132 kV powerline for this route is shorter and will affect fewer sensitive visual receptors. Although Alternative Route 2 would have a higher overall visual impact than Alternative Route 1, no fatal (visual) flaws have been identified and the overall visual impacts of Alternative Route 2 are **acceptable** if the recommended mitigation measures are implemented;
- **Amendment 2**: Construction activities at the MTS site will be visible to surrounding receptors due to the intensity of construction at the substation over 16 ha and the proximity of the substation site to the secondary road. There are, however, very few sensitive receptors within the foreground and construction impacts will be of comparatively short duration. The impact during construction/decommissioning is assessed to be of *low* significance, and with the implementation of mitigation, is reduced to *very low.*
  The MTS will change the land use of an (16 ha) area from unbuilt to built but the substation will be visible to very few sensitive receptors. The impact of the MTS during operations is assessed to be of *low* significance, and with the implementation of mitigation, is reduced to *very low.*
- **Amendment 3**: Limited loss of sense of place is expected during installation / decommissioning of the pylons along the 400 kV powerline route since the construction footprints will only be visible from a limited number of viewpoints / receptors. The impact of the 400 kV powerline during construction/decommissioning is assessed to be of *low* significance, and with the implementation of mitigation, is reduced to *very low.*
  Although the powerline may be visible from a large area on the plains, the powerline may not be noticeable to receptors located in the background, although is likely to alter the sense of place of receptors located in the foreground. However, there are very few sensitive receptors located in the foreground. The impact of the 400 kV powerline during operations is assessed to be of *low* significance with and without the implementation of mitigation.
- The introduction of a new MTS location and a 4 km 400kV powerline route is highly unlikely to further increase the cumulative impact of the proposed EGI on the visual character and sense of place of the study area.

In conclusion, SRK is of the opinion that on purely 'visual' grounds (i.e. the project's potential visual impacts), the proposed amendments as they are currently articulated should **be approved**, provided the essential mitigation measures are implemented.

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Appendix A: Impact Assessment Tables

Table 6: Impact Assessment Summary table for Visual Impacts in the Construction and Decommissioning Phases

Impact pathway	Nature of potential impact/risk	Status[3]	Extent[4]	Duration[5]	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
CONSTRUCTION AND DECOMMISSIONING PHASES															
Direct Impacts															
Earthworks, resultant scarring and construction activities (including clearing of vegetation and dust)	Altered sense of place and visual intrusion during substation construction / decommissioning	Negative	Local	Short-term	Moderate	Likely	Moderate	Low	Low	No	Yes	• Limit and phase vegetation clearance and the footprint of construction and decommissioning activities to what is absolutely essential. • Utilise existing access roads as far as possible. • Consolidate the footprint of the construction camp to a functional minimum. Screen the yard with materials that blend into the surrounding area. • Avoid excavation, handling and transport of materials which may generate dust under high wind conditions. • Keep construction and decommissioning sites tidy and all activities, material and machinery contained within an area that is as small as possible. • Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the Construction and Decommissioning Phases.	Very Low	5	High
	Altered sense of place and visual intrusion during powerline construction / decommissioning	Negative	Local	Short-term	Moderate	Likely	Moderate	Low	Low	No	Yes	• Limit and phase vegetation clearance and the footprint of construction and decommissioning activities to what is absolutely essential. • Utilise existing access roads as far as possible. If new roads are required, then avoid clearing natural vegetation to facilitate access to the final pylon positions. If access across natural vegetation is required, then prune/remove large shrubs rather than clearing vegetation completely. • Avoid excavation, handling and transport of materials which may generate dust under high wind conditions. • Keep construction and decommissioning sites tidy and all activities, material and machinery contained within an area that is as small as possible. • Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily	Very Low	5	High

[3] Status: Positive (+) ; Negative (-)
[4] Site; Local (<10 km); Regional (<100); National; International
[5] Very short-term (instantaneous); Short-term (<1yr); Medium-term (1-10 years); Long-term (project duration); Permanent (beyond project decommissioning)

Impact pathway	Nature of potential impact/risk	Status[3]	Extent[4]	Duration[5]	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
												waiting until completion of the Construction and Decommissioning Phases.			

Table 7: Impact Assessment Summary table for Visual Impacts in the Operations Phase

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided ?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
OPERATIONS PHASE															
• Direct Impacts															
Change in character of the site	Altered sense of place and visual intrusion from the proposed substation	Negative	Local	Long-term	Moderate	Likely	Moderate	Low	Low	No	Yes	• Be sensitive towards the use of glass or material with a high reflectivity which may cause glare and increase visual impacts. • Use low-impact fencing of appropriate colour, such as diamond wire-mesh fencing which is less visually intrusive when viewed from a distance. Palisade fencing and other solid fence structures should be avoided. • Design buildings to be similar to the vernacular of the surrounding farmstead buildings. • Consider using excess excavated material to construct a low (< 1 m) vegetated berm around the substation site to screen the bulk of the substation.	Very Low	5	High
	Altered sense of place and visual intrusion from the proposed powerline	Negative	Local	Long-term	Moderate	Likely	Moderate	Low	Low	No	Yes	• Locate pylons away from farmstead buildings and beyond the direct line of sight from these buildings as far as possible. • Locate pylons the maximum distance from watercourses as possible. • Install lattice structures (as the preferred pylon structure) as far as possible. • Do not illuminate pylons. • Rehabilitate areas affected by scarring and put measures in place to prevent erosion. • (In discussion with the avifauna specialist) reduce the number of bird flappers / balls along the powerline route.	Low	4	High