



SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

**Proposed Construction of a 132kV
Power Line, a Substation and
Switchyards near Postmasburg,
Northern Cape Province**
Draft Amended Basic Assessment Report


DEA Reference Number: 14/12/16/3/3/1/421 (additional reference number TBA)

NEAS Reference Number: DEA/EIA/0000907/2012 (additional reference number TBA)

Issue Date: 06 June 2012

Revision No.: 2

Project No.: 11272

Date:	06 June 2012
Document Title:	Proposed Construction of a 132kV Power Line, a Substation and Switchyards near Postmasburg, Northern Cape Province: Draft Amended Basic Assessment Report
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Revision Number:	2
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Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

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10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
11. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

PROPOSED CONSTRUCTION OF A 132KV POWER LINE, A SUBSTATION AND SWITCHYARDS NEAR POSTMASBURG, NORTHERN CAPE PROVINCE

DRAFT AMENDED BASIC ASSESSMENT REPORT

Executive Summary

SolarReserve South Africa (Pty) Ltd (hereafter referred to as SolarReserve) intends to develop a 132kV (kilovolt) overhead distribution power line, a substation and two switchyards on a portion of the remainder of the Farm 469 (Humansrus) and portion 1 of Lemoenkloof near Postmasburg, Northern Cape Province. The 132kV overhead distribution power line, substation and switchyards are required to connect the proposed Solar Photovoltaic (PV) Power Plant that will be constructed on the Humansrus site (also known as PV 2) onto the Eskom grid. As such, the proposed line will be erected from the proposed PV 2 substation to the existing 132kV overhead power line near Owendale.

It should be noted that Eskom Holdings Soc Limited (hereafter referred to as Eskom) will be owner of the 132kV power line and the switchyards. An Eskom appointed vendor will be responsible for constructing the power lines, switchyards and substation. In addition, Eskom will maintain the power line and switchyards during the operational phase. The substation will be owned by SolarReserve and it will form part of the Humansrus Solar Power Plant. As such, the proposed project will be registered with the Department of Environmental Affairs (DEA) under two separate reference numbers. The additional reference number is to be announced (TBA) once received from the DEA.

SiVEST Environmental Division has been appointed as independent environmental consultant by SolarReserve to undertake a Basic Assessment (BA) for the proposed project. SiVEST is an approved Eskom vendor and will conduct the study in collaboration with the Eskom Environmental team.

The proposed development requires environmental authorisation from the Department of Environmental Affairs (DEA). However provincial authorities have also been consulted i.e. the Northern Cape Department of Tourism, Environment and Conservation (NCDTEC). The BA for the proposed development will be conducted in terms of the 2010 EIA Regulations promulgated in terms of section 24(2) and section 24(D) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which regulations were amended and came into effect on 2 August 2010. In terms of these regulations, a Basic Assessment (BA) is required for the proposed project. All

relevant legislations and guidelines were consulted during the BA process and will be complied with at all times.

The power line will consist of a series of Steel Monopole Suspension Towers located approximately 200m apart. The height of the proposed tower type is between 16m and 22m and each tower will have a footprint of between 1.21m² and 16.81m². The exact location of the substation and towers will be determined during the final design stages of the PV Power Plant. Three alternative route alignments have been investigated in this BA for the proposed 132kV power line that runs from the proposed substation to the existing power line near Owendale. These are as follows:

- Option 1A – approximately 8.5km (green)
- Option 1B – approximately 7.7km (blue)
- Option 1C – approximately 4.9km (purple)

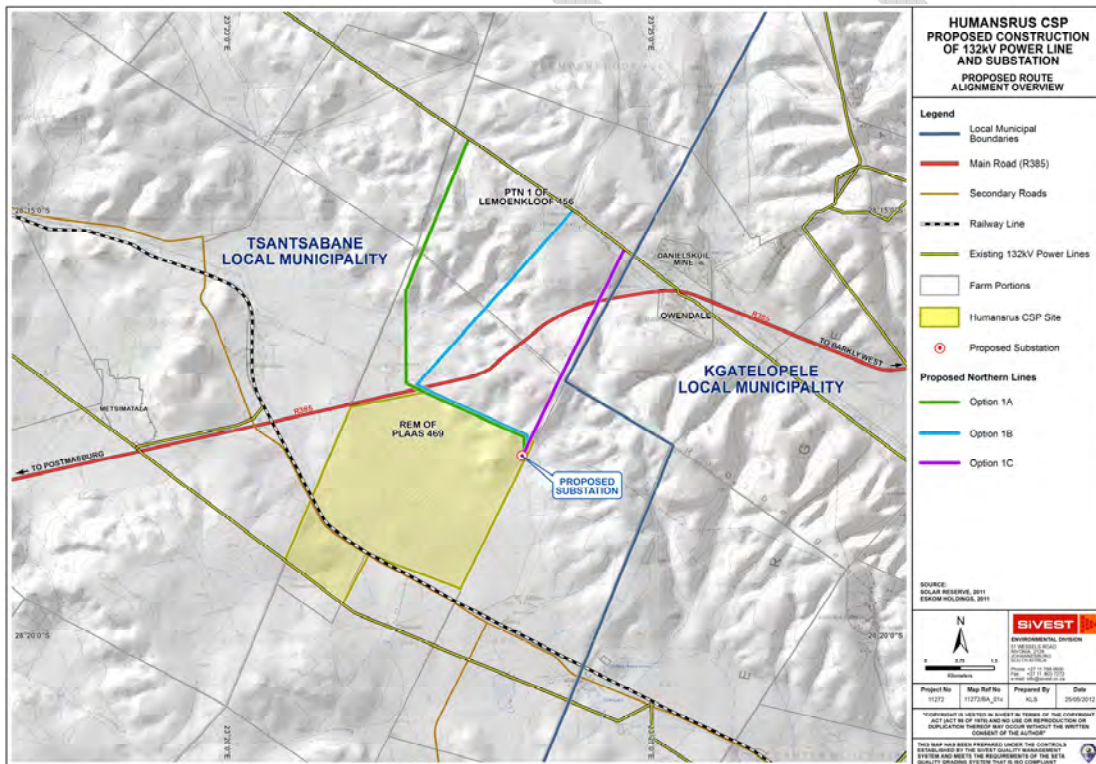


Figure i: Route Overview

The site proposed for the power line and substation is characterised by mostly vacant natural veld, which is used as grazing land for livestock. The topography is generally flat in the southern parts of the site and becomes more undulating and hilly to the north. The R385 bisects the site and is the main arterial route providing access to it.

Several specialist studies were conducted during the BA to identify the issues associated with the proposed development. These include:

- Biodiversity (fauna and flora)
- Surface water
- Agricultural potential and soil
- Heritage
- Visual
- Social

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Table i: Summary of findings

Environmental Parameter	Summary of major findings	Recommendations
Biodiversity	<ul style="list-style-type: none"> ▪ The impact of the proposed development during construction will be limited to the tower footprints and access roads. ▪ Operation phase impacts are mostly related to birds, as they may collide with the power lines or get electrocuted when perching on the lines. ▪ The impacts of the proposed power line and substation can be properly addressed with suitable mitigation measures due to the relatively small scale of the development. 	<ul style="list-style-type: none"> ▪ A formal monitoring and reporting strategy/protocol should be developed for monitoring the impact on the vegetation and biodiversity in general in the area during construction. ▪ If Red Data species are located during construction, the relevant permits must be applied for from the relevant authorities. ▪ The precautionary principle should be applied during the construction and care taken to implement the recommended mitigation measures.
Surface Water	<ul style="list-style-type: none"> ▪ No surface water resources were identified in the vicinity or on the location of the proposed switchyards and substation yard as well as the proposed access road. ▪ Although no wetlands were identified, numerous drainage lines traverse the proposed alternative power line routes. ▪ It is anticipated that all the drainage lines will be able to be spanned by the proposed power line routes, even though the 100m buffer zone may not be able to be spanned (particular where they overlap). 	<ul style="list-style-type: none"> ▪ The mitigation measures supplied, must be implemented in order to mitigate any potential impacts that may be caused by the proposed development should construction activities need to take place in the identified watercourses and the associated buffer zones.
Agricultural potential and soils	<ul style="list-style-type: none"> ▪ The agricultural potential for majority of the study area is classified as being low for crop production and moderately low for grazing, due to the restrictive climatic characteristics and soil depth limitations of the site. ▪ No centre pivots, irrigation schemes or active agricultural fields will be 	<ul style="list-style-type: none"> ▪ Clearing activities should be kept to a minimum. ▪ In the unlikely event that heavy rains are expected activities should be put on hold to reduce the risk of erosion. ▪ If additional earthworks are required, any steep or large embankments that are expected to be exposed during

Environmental Parameter	Summary of major findings	Recommendations
	<p>influenced by the proposed development, and as such, there are no problematic or fatal flaw areas for the proposed project.</p> <ul style="list-style-type: none"> ▪ The anticipated impacts from the proposed developments will have negligible negative effects and will require little to no mitigation. 	<p>the 'rainy' months should either be armoured with fascine like structures.</p> <ul style="list-style-type: none"> ▪ If earth works are required then storm water control and wind screening should be undertaken to prevent soil loss from the site.
Heritage	<ul style="list-style-type: none"> ▪ The study area and surrounding area has a history of Stone Age and Iron Age occupation and is rich in heritage resources. ▪ However, only one (1) heritage site consisting of a small informal cemetery with four (4) graves was identified on the site within option 1a. 	<ul style="list-style-type: none"> ▪ If route alignment option 1a is selected, it will need to be adjusted so as to avoid the informal cemetery on the site and the site will need to be demarcated with at least a 10 meter buffer. ▪ In the event that the sites cannot be excluded from the alignment and pylon placement a grave relocation process needs to be implemented. ▪ Option 1c or 1b should be selected as the alignment for the proposed 132kV power line. ▪ A walk down must be undertaken by the heritage specialist prior to finalising the tower positions and commencing with construction.
Visual	<ul style="list-style-type: none"> ▪ The proposed power lines would not be responsible for significant impacts on any static receptor location. ▪ Alternative 1c is associated with the lowest degree of visual impact, as it is located away from all the static receptor locations, and most of its length is not visible from the R385 as it would be shielded by the hilly topography. ▪ The proposed substation is not likely to be associated with any significant visual impacts on its own, as it is likely 	<ul style="list-style-type: none"> ▪ Option 1c should be selected as the alignment for the proposed 132kV power line.

Environmental Parameter	Summary of major findings	Recommendations
	to form part of the cluster of infrastructure associated with the solar power plants.	
Social	<ul style="list-style-type: none"> ▪ No structures or socio-economically important land uses were found within the potential servitude of any of the distribution line route options. ▪ Overall it is foreseen that this project will not significantly impact on the local socio-economic environment. 	<ul style="list-style-type: none"> ▪ Ensure an open dialogue prior to, and during, construction. ▪ Local contractors and workers should be employed as far as possible. ▪ The location of a construction village (should it be used) be investigated in depth as doing so may serve as a good mitigation measure.

An impact assessment was conducted to ascertain the level of each identified impact, as well as mitigation measures which may be required. The potential positive and negative impacts associated within these studies have been evaluated and rated accordingly. The results of the specialist studies have indicated that no fatal flaws exist as a result of the proposed 132kV distribution power line, substation and switchyards.

Based on the findings of the specialist studies, **Option 1c** was chosen as the preferred route for the 132kV power line required to connect the substation with the existing power line to the north. It is the opinion of the EAP that the proposed project should be allowed to proceed provided that the recommended mitigation measures are implemented, and provided the following conditions are adhered to:

- All mitigation measures recommended by the various specialist should be strictly implemented.
- Final EMPr should be approved by DEA prior to construction.

SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

PROPOSED CONSTRUCTION OF A 132KV POWER LINE, A SUBSTATION AND SWITCHYARDS NEAR POSTMASBURG, NORTHERN CAPE PROVINCE

DRAFT AMENDED BASIC ASSESSMENT REPORT

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prepared by: SiVEST

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Glossary of terms

Biodiversity: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

Basic Assessment: The process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

Change process: A change that takes place within the receiving environment due to direct or indirect intervention (cf. Vanclay, 2002).

Demographical processes: A change processes which refer to the composition and structure of the local community.

Economic processes: A change process which refer to the movement of money between industries and between industries and consumers.

Environmental Management Programme: A legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project.

Geographical processes: A change processes that affect the land uses of the local area.

Institution and Legal processes: A change process which refer to the processes that affect service delivery to the local area.

Red Data species: All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

Riparian: The area of land adjacent to a stream or river that is influence by stream induced or related processes.

Socio-cultural processes: A change process which refer to the processes that affect the local culture, i.e. the way in which the local community live (however, sometimes different cultural groups occupy the same geographical area and these groups are seldom homogenous).

List of Abbreviations

ATNS	Air Traffic Navigation Services
BA	Basic Assessment
BAR	Basic Assessment Report
C&RR	Comments and Response Report
CSP	Concentrating Solar Power
DAFF	Department of Agriculture, Forestry and Fisheries
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Fields
EMPr	Environmental Management Programme
EWT	Endangered Wildlife Trust
GIS	Geographic Information System
GN	Government Notice
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
kV	Kilovolt
NEMA	National Environmental Management Act, 1998 (Act No.107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFA	National Forests Act, 1998 (Act No. 84 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PPP	Public Participation Process
PV	Photovoltaic
SACAA	SA Civil Aviation Authority
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency
SDF	Spatial Development Framework
SG	Surveyor General
SOC	State Owned Company

TBA To be announced
VIA Visual Impact Assessment
WESSA Wildlife and Environmental Society of South Africa

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SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

PROPOSED CONSTRUCTION OF A 132KV POWER LINE, A SUBSTATION AND SWITCHYARDS NEAR POSTMASBURG, NORTHERN CAPE PROVINCE

DRAFT AMENDED BASIC ASSESSMENT REPORT

INTRODUCTION

SolarReserve South Africa (Pty) Ltd (hereafter referred to as SolarReserve) has appointed SiVEST to undertake a Basic Assessment (BA) process for the proposed construction of a 132kV (kilovolt) power line, a substation and two switchyards near Postmasburg in the Northern Cape. Eskom Holdings Soc Limited (hereafter referred to as Eskom) will be the owner of the 132kV power line and the switchyards, which will be constructed and maintained according to their vendor and policies. The substation will be owned by SolarReserve and it will form part of the Solar Photovoltaic (PV) Power Plant that will be constructed on the Humansrus site (also known as PV 2). The 132kV overhead distribution power line is proposed to run from the proposed PV 2 substation and link onto the National Grid via the existing Eskom 132kV power line running east-west near Owendale.

Although the Humansrus PV Power Plant have not been constructed as yet, they have been granted an Environmental Authorisation. This proposed project therefore forms part of the country's strategies to meet future energy consumption requirements through the use of renewable energy as it will feed energy from the proposed PV Power Plant into the national grid.

1 Project Description

The proposed project consists of the following main activities:

- Construction of 1 x substation in the vicinity of the proposed Humansrus PV Power Plant.
- Construction of 2 x switchyards – one (1) directly adjacent to the proposed new substation and one (1) where the proposed power line will connect with the existing 132kV power line near Owendale.
- Construction of 1 x 132kV overhead power line from the new proposed substation to the existing 132kV power line near Owendale.
- Construction of an access road to the new proposed substation.

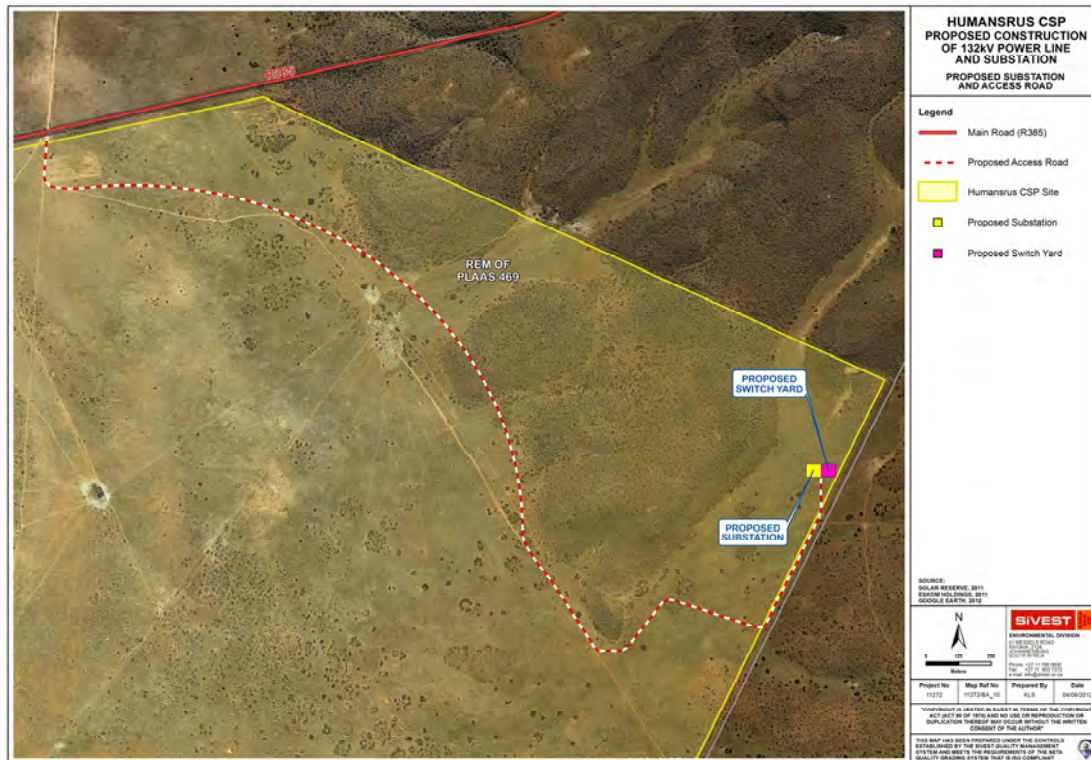


Figure 1: Details of the substation, switchyard and new proposed access road

The power line will consist of a series of towers located approximately 200m apart, depending on the terrain and soil conditions. It is proposed that the Steel Monopole Suspension tower type (e.g. ESKOM D-DT 7611 & D-DT 7612) will be used for the proposed power line. This tower is between 16m and 22m in height and each tower will have a footprint of between 1.21m² and 16.81m². A diagram of the proposed tower is included in Figure 2 below.

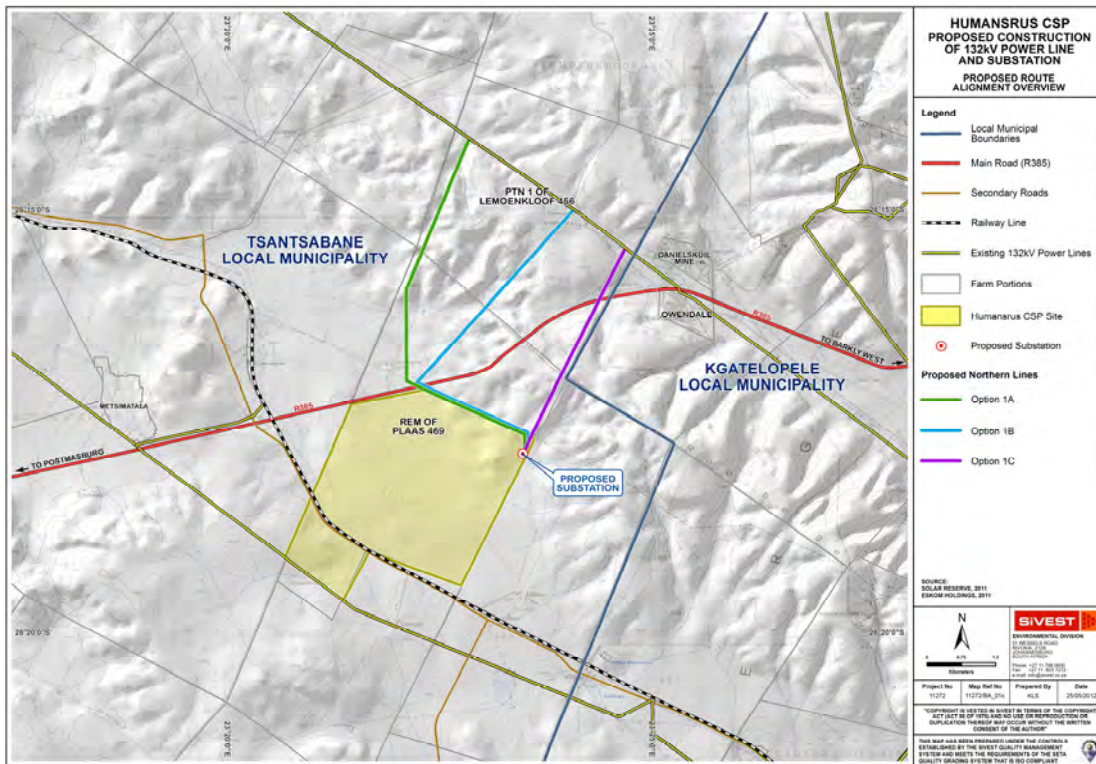


Figure 3: Route Overview

A 31m wide servitude is required for the proposed 132kV distribution power line.

2 Brief Description of the Receiving Environment

The proposed site falls over two portions of land, which include the remainder of the Farm 469 (Humansrus) and portion 1 of Farm Lemoenkloof, both of which are located within the Northern Cape Province, approximately 25km east of Postmasburg. Both the landowners have been notified of the proposed project and will be consultant throughout the BA process.

The site is situated within the Tsantsabane Local Municipality, which forms part of the Siyanda District Municipality. The Kgatelopele Local Municipality is located directly to the east of the proposed development, adjacent to Route Option 1c (Figure 4).

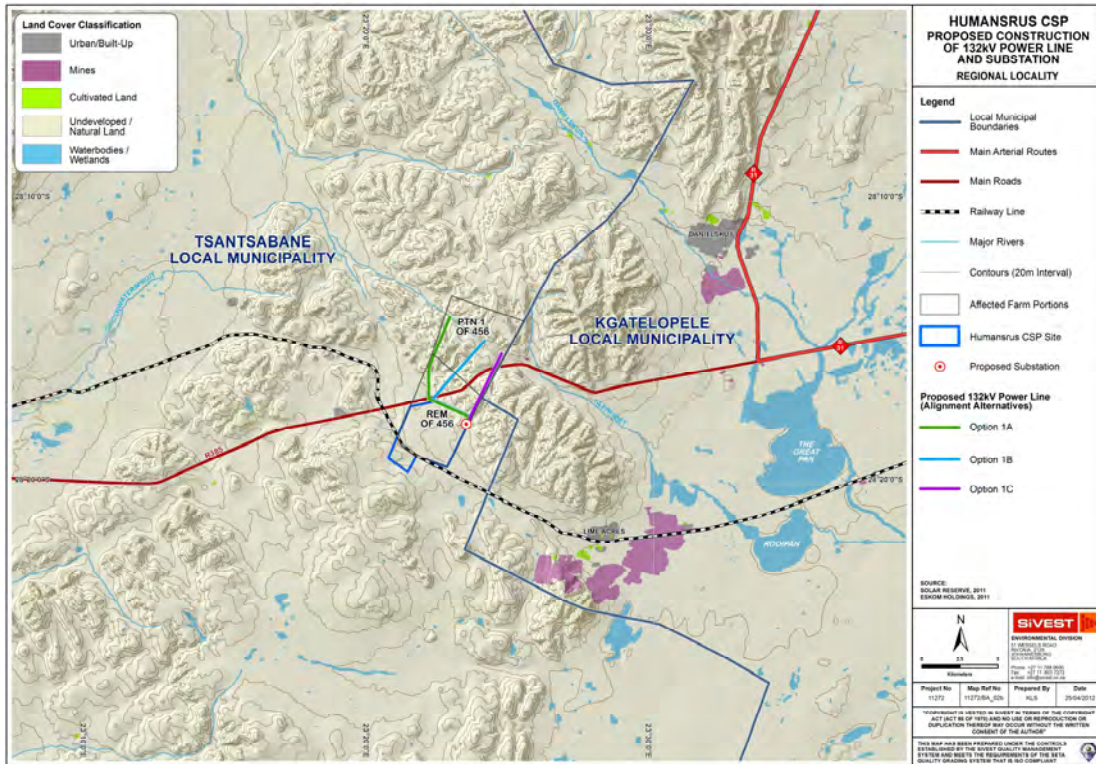


Figure 4: Regional Locality Map

The largest built-up areas in close proximity to the proposed development site are Postmasburg, and the mining villages of Danielskuil and Lime Acres; which are accessed from the N14 via the R325, R31 and R385, respectively. The R385 bisects the site just north of the proposed substation site and is the main arterial route which provides access to the site.

The land use in the surrounding area is characterised by mostly vacant natural veld, which is used as grazing land for livestock. The farm properties across the area are relatively large and this can be attributed to the arid climate, which has led to low stocking densities. The area thus, has a very low density of rural settlement, with only a handful of scattered farmsteads occurring in the immediate vicinity of the proposed development. The only exception to this trend is the small mining-related cluster of housing at Owendale, as well as a small concentration of rural houses in the vicinity of the Groenwater Railway Siding to the west of the proposed power line. Livestock rearing (of cattle) as well as game farming is the predominant rural land uses in the wider area.

In addition to the proposed PV plant from where the power line would run, a CSP (concentrating solar power) plant is also being proposed on the Humansrus site. The CSP and PV Power Plants will alter the current land use in the surrounding area.

The topography in the greater study area consists mostly of flat plains, which is also evident in the southern parts of the study area. In the northern parts of the study area, the terrain becomes

more undulating and is characterised by rolling hills with moderate slopes. This area which will be traversed by the proposed power line includes the north-western end of the Rooiberg hills, which forms part of a much wider area of hilly terrain extending to the north, north-east (Asbesberg Hills) and to the south (the Asberg Hills).

The natural vegetation comprises of a mix of low scrub vegetation due to the aridity of the area that occurs on the flats, with the ridges and hillsides being characterised by a much bushier thornveld-type vegetation of up to 2-3m in height. In certain areas, man has had an impact on the natural vegetation, especially around farmsteads, where over many years tall trees and other typical garden vegetation have been established.

3 Expertise of the Environmental Assessment Practitioner

Table 1: Environmental consultants

Name and Organisation	Role
Kelly Tucker, SiVEST	Project Leader / Senior Environmental Consultant
Andrea Gibb, SiVEST	Environmental Consultant
Nicolene Venter, Imaginative Africa	Senior Public Participation Consultant
Mabel Qinisile, SiVEST	Public Participation Assistant
Liesl Koch, SiVEST	Biodiversity (Flora and Fauna)
Paul da Cruz, SiVEST	Surface water, Visual Impact
Shaun Taylor, SiVEST	Surface water
Kurt Barichievy, SiVEST	Agricultural Potential & Soils
Wouter Fourie, PGS	Heritage
Nonka Byker, MasterQ Research	Social
Sean Smith, MasterQ Research	
Kerry Schwartz, SiVEST	GIS and Mapping

Please refer to attached CV's for more information (See Appendix G1).

4 Authority Consultation

The Department of Environmental Affairs (DEA) is the competent authority on this application.

The following consultation took place with the DEA:

- An application was submitted to DEA on 14 December 2011. The application was acknowledged on 17 January 2012 and the following reference numbers were allocated for the project.
 - DEA: 14/12/16/3/3/1/421
 - NEAS: DEA/EIA/0000907/2012

- On 29 May 2012 amended applications forms were submitted to the DEA in order to divide the project according the applicant for the various components. One application form was submitted in Eskom's name for the proposed 132kV power line and switchyards, and one application form in SolarReserve's name for the proposed substation. The new reference numbers will be announced once allocated by the DEA.

All authority consultation is included within Appendix G2.

5 Basic Assessment Report Structure

This Draft Basic Assessment Report (DBAR) is structured as follows:

- **Section A** describes the activity and technical project components, including the proposed alternatives, location and physical size of the activity. This section also provides an activity motivation by describing the need and desirability for the proposed project. Section A expands on the legal ramifications applicable to the project and describes relevant development strategies and guidelines. Finally the section explains the infrastructural requirements of the proposed project such as waste, effluent, emission water use and energy efficiency.
- **Section B** provides a description of the site and region in which the proposed development is intended to be located. Although the chapter provides a broad overview of the region, it is also specific to the application.
- **Section C** describes the Public Participation Process (PPP) undertaken during the Basic Assessment and tables issues and concerns raised by Interested and Affected Parties (I&APs).
- **Section D** identifies potential issues associated with the proposed project by outlining the impacts that may result from the planning, design, construction, operational, decommissioning and closure phases. Section D also provides a description of the mitigation and management measures for each potential impact. The section concludes with an Environmental Impact Statement which summarises the impacts that the proposed development may have on the environment.
- **Section E** outlines the recommendations of the Environmental Assessment Practitioner (EAP).

6 Assumptions, Uncertainties and Gaps in Knowledge

The following assumptions and limitations have been taken into account when compiling this DBAR:

- It is assumed that all technical information provided by SolarReserve is technically acceptable and accurate.
- This report was submitted to Eskom for comment and various meetings were held with them. It is assumed that all technical information provided by Eskom at these meetings is technically acceptable, accurate and unbiased.
- The scope of the study is limited to assessing the environmental impacts associated with the proposed development of a 132kV power line, substation and infrastructure associated with these activities such as a new access road and switchyard.
- The project is still in the planning stages and therefore some of the specific details technical details are not available. Should these become available during the BA process, they will be included in the report before submission to the DEA.
- It is assumed that the information provided by the various specialists is unbiased and accurate.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?

YES /

If YES, please complete the form entitled "Details of specialist and declaration of interest" for appointment of a specialist for each specialist thus appointed:
Any specialist reports must be contained in Appendix D.

A Declaration of Interest for each specialist is included in Appendix G6 and all specialist reports are included in Appendix D.

1 Activity Description

Describe the activity, which is being applied for, in detail¹:

Project Description

SolarReserve South Africa (Pty) Ltd (hereafter referred to as SolarReserve) intend to develop a 132kV (kilovolt) power line, a substation and two switchyards on a portion of the remainder of the Farm 469 (Humansrus) and portion 1 of Lemoenkloof near Postmasburg, Northern Cape Province. The 132kV overhead distribution power line is to run from the proposed Solar Photovoltaic (PV) Power Plant that will be constructed on the Humansrus site (also known as PV 2) to the existing 132kV overhead power line near Owendale.

It should be noted that Eskom Holdings Soc Limited will be owner of the 132kV power line and the switchyards. An Eskom appointed vendor will be responsible for constructing the power line, switchyards and substation. In addition, Eskom will maintain the power line and switchyards during the operational phase. The substation will be owned by SolarReserve and it will form part of the Humansrus PV Power Plant.

The proposed project consists of the following main activities:

- Construction of 1 x substation in the vicinity of the proposed Humansrus PV Power Plant.
- Construction of 2 x switchyards – one (1) directly adjacent to the proposed new substation and one (1) where the proposed power line will connect with the existing 132kV power line near Owendale.

¹ Please note that this description should not be a verbatim repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description.

- Construction of 1 x 132kV overhead power line from the new proposed substation to the existing 132kV power line near Owendale.
- Construction of an access road to the new proposed substation.

The location of the proposed power line (and alternatives), substation site, switchyards and access road are included in Appendix A.

The power line will consist of a series of towers located approximately 200m apart, depending on the terrain and soil conditions. It is proposed that the Steel Monopole Suspension tower type (e.g. ESKOM D-DT 7611 & D-DT 7612) will be used for the proposed power line. This tower is between 16m and 22m in height and each tower will have a footprint of between 1.21m² and 16.81m². A diagram of the proposed tower is included in Appendix C.

Three (3) alignment alternatives are proposed for the 132kV distribution power line that runs from the proposed substation to the existing power line near Owendale. These are as follows:

- Option 1A – approximately 8.5km (green)
- Option 1B – approximately 7.7km (blue)
- Option 1C – approximately 4.9km (purple)

A 31m wide servitude is required for the proposed 132kV distribution power line.

Relevant Listed Activities

In terms of the Environmental Impact Assessment (EIA) Regulations 2010, Government Notice (GN) No. R543 promulgated in terms of Sections 24(2) and 24D of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, the following listed activities pertain to the development.

Government Notice No. R544 - Listing Notice 1 of 2010		
10	<i>The construction of facilities or infrastructure for the transmission and distribution of electricity –</i> (i) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts	SolarReserve is proposing to develop 132 kilovolt power line, which is located outside of an urban area.
11	The construction of: (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a	In the unlikely event that several towers were to be placed within 32 metres of a wetland / watercourse this activity would be triggered.

	watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	
22	The construction of a road, outside urban areas, <i>(i) with a reserve wider than 13,5 meters or,</i> <i>(ii) where no reserve exists where the road is wider than 8 metres, or</i> <i>(iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.</i>	SolarReserve is proposing to construct a new access road from the R385 to the new proposed substation.
23	<i>The transformation of undeveloped, vacant or derelict land to –</i> <i>(ii) residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares; - except where such transformation takes place for linear activities.</i>	The site for the new proposed substation and switchyards is located outside of an urban area on undeveloped vacant land and it may cover an area bigger than 1 hectare.
24	The transformation of land bigger than 1000 square metres in size , to residential, retail , commercial, industrial or institutional use, where, at the time of the coming into effect of this schedule such land was zoned open space, conservation or had an equivalent zoning.	The cumulative area of the land that will be transformed, due to the proposed substation, switchyards and tower structures will be greater than 1000 square metres in size – some of which may be zoned open space, conservation or have an equivalent zoning.

2 Feasible and Reasonable Alternatives

“**alternatives**”, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;

- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

Describe alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Paragraphs 3 – 13 below should be completed for each alternative.

The assessment of alternatives is a legal requirement for any environmental assessment. As stated above, three feasible and reasonable route alignment alternatives will be assessed in this BA for the 132kV distribution power line that runs from the proposed substation to the existing power line near Owendale. These are as follows:

- Option 1A – approximately 8.5km (green)
- Option 1B – approximately 7.7km (blue)
- Option 1C – approximately 4.9km (purple)

For a summary of the alternative assessment, refer to Section 3: Environmental Impact Statement.

3 Activity Position

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

List alternative sites, if applicable.

Latitude (S):

Longitude (E):

Substation Alternatives:

Alternative S1² (only site alternative)

28	17.828'	23	23.413'
0	'	0	'
0	'	0	'

Alternative S2 (if any)

Alternative S3 (if any)

In the case of linear activities:

Three (3) route alignment alternatives were assessed for the 132kV distribution power line that runs from the proposed substation to the existing power line near Owendale. These are as follows:

- Option 1A – approximately 8.5km (green)
- Option 1B – approximately 7.7km (blue)
- Option 1C – approximately 4.9km (purple)

Please refer to Appendix A for the Route Overview Map.

Power Line Alignment Alternatives:

Latitude (S):

Longitude (E):

Alternative S1 (preferred) – **Option 1c**

- Starting point of the activity (Proposed Substation)
- Middle/Additional point of the activity
- End point of the activity (Existing Power Line)

28	17.828'	23	23.413'
28	16.351'	23	24.145'
28	15.384'	23	24.629'

Alternative S2 – **Option 1b**

- Starting point of the activity (Proposed Substation)
- Middle/Additional point of the activity
- End point of the activity (Existing Power Line)

28	17.828'	23	23.413'
28	16.578'	23	22.524'
28	14.929'	23	24.024'

Alternative S3 – **Option 1a**

² “Alternative S..” refer to site alternatives.

- Starting point of the activity
(Proposed Substation)
- Middle/Additional point of the activity
- End point of the activity
(Existing Power Line)

28	17.828'	23	23.413'
28	16.326'	23	22.050'
28	14.089'	23	22.791'

Access Road Alternatives:

Latitude (S):

Longitude (E):

Alternative S1 (only route alternative)

- Starting point of the activity
(Proposed Substation Site)
- Middle/Additional point of the activity
- End point of the activity
(R385)

28	17.828'	23	23.413'
28	17.752'	23	22.777'
28	17.130'	23	21.825'

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

Please refer to Appendix G5 for the coordinates of the power line alternatives and access road taken every 250 meters along each alignment.

4 Physical size of the activity

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Substation Alternatives (Including Switchyard):

Size of the activity:

- Alternative A1³ (only site alternative)
- Alternative A2 (if any)
- Alternative A3 (if any)

Approximately 5 000m ²
m ²
m ²

or, for linear activities:

Length of the activity:

Power line Alignment Alternatives:

Alternative A1 (preferred) – **Option 1c**

Approximately 8.5km

³ "Alternative A.." refer to activity, process, technology or other alternatives.

Alternative A2 – **Option 1b**
 Alternative A3 – **Option 1a**

Approximately 7.7km
Approximately 4.9km

Length of the activity:

Access Road Alternatives:

Alternative A1 (only route alternative)
 Alternative A2 (if any)
 Alternative A3 (if any)

Approximately 4.4km
m
m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Substation Alternatives:

Alternative A1 (only activity alternative)
 Alternative A2 (if any)
 Alternative A3 (if any)

Size of the site / servitude:

Approximately 5 000m ²
m ²
m ²

or, for linear activities:

Power line Alignment Alternatives:

Alternative A1 (preferred) – **Option 1c**
 Alternative A2 – **Option 1b**
 Alternative A3 – **Option 1a**

Size of the site / servitude:

31m wide permanent servitude
31m wide permanent servitude
31m wide permanent servitude

Access Road Alternatives:

Alternative A1 (only route alternative)
 Alternative A2 (if any)
 Alternative A3 (if any)

Size of the site / servitude:

Approximately 6m wide
m
m

5 Site Access

Does ready access to the site exist?

If NO, what is the distance over which a new access road will be built

NO ✓
Approximately 4.4km

Describe the type of access road planned:

It is proposed that a road will be constructed to provide access from the R385 to the new substation site. The road was routed to avoid the drainage lines and ridges on the site. In addition, the access road was routed to avoid the CSP development area and associated infrastructure, as proposed on the Humansrus site. The access road will be designed and constructed to sustain the vehicle loads associated with the substation site. The access road will be approximately 4.4km in length and 6m wide, and will provide access to the substation site off the R385. A map indicating the position of the access road is included in Appendix A. Existing access roads will be used to access the servitude where possible otherwise two lane tracks will be utilised where required.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

6 Site or Route Plan

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

- 6.1 the scale of the plan which must be at least a scale of 1:500;
- 6.2 the property boundaries and numbers of all the properties within 50 metres of the site;
- 6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- 6.4 the exact position of each element of the application as well as any other structures on the site;
- 6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 6.6 all trees and shrubs taller than 1.8 metres;
- 6.7 walls and fencing including details of the height and construction material;
- 6.8 servitudes indicating the purpose of the servitude;
- 6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto): rivers; the 1:100 year flood line (where available or where it is required by DWA); ridges; cultural and historical features; areas with indigenous vegetation (even if it is degraded or invested with alien species);
- 6.10 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
- 6.11 the positions from where photographs of the site were taken.

Site plans for the proposed substation site, switchyard and access road, as well as a Route Over Map indicating the alternative route alignments are included in Appendix A.

7 Site Photographs

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this form. It must be supplemented with additional photographs of relevant features on the site, if applicable.

Site photographs of the proposed site for the substation and switchyards, as well as photos taken along all the proposed alternative route alignments for the 132kV distribution power line are included in Appendix B. Key features of the site are depicted in the site photographs.

8 Facility Illustrations

A detailed illustration of the activity must be provided at a scale of 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

A schematic drawing of the proposed tower type is included in Appendix C.

9 Activity Motivation

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?
 What is the expected yearly income that will be generated by or as a result of the activity?
 Will the activity contribute to service infrastructure?
 Is the activity a public amenity?
 How many new employment opportunities will be created in the development phase of the activity?
 What is the expected value of the employment opportunities during the development phase?
 What percentage of this will accrue to previously disadvantaged individuals?
 How many permanent new employment opportunities will be created during the operational phase of the activity?

Unknown	
Unknown	
YES ✓	
	NO ✓
18-30 people	
Unknown	
80% local labour	
None	

What is the expected current value of the employment opportunities during the first 10 years?

Unknown

What percentage of this will accrue to previously disadvantaged individuals?

Unknown

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

NEED:			
1.	Was the relevant provincial planning department involved in the application?		NO ✓
2.	Does the proposed land use fall within the relevant provincial planning framework?		NO ✓
3.	<p>If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation:</p> <p>Explanation for Item 1 and 2: The proposed project forms part of the country's strategies to meet future energy consumption requirements through the use of renewable energy. The 132kV power line, substation and switchyards are required to feed the power supplied by the proposed Humansrus PV Power Plant into the National Grid once constructed.</p> <p>This is significant, as South Africa is one of the largest emitter's of greenhouse gases (GHG) in Africa and one of the most carbon emission-intensive countries in the world. Despite the worldwide concern regarding GHG emissions and climate change, South Africa continues to rely heavily on coal as its primary source of energy, while most of the countries renewable energy resources remain largely untapped (DME, 2003).</p> <p>Coupled with this, is the growing demand for electricity in South Africa. As the demand for electricity grows, so too the awareness of environmental impacts, climate change and the need for sustainable development. There is therefore an increasing need to establish a new generation capacity in South Africa within the next several years. As one of its strategies to meet future energy consumption requirements, the country is opting for the use of renewable energy technologies, which is fast becoming an important energy option for South Africa.</p> <p>According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This factor fueled by increasing economic growth and social development within Southern Africa, is placing increasing pressure on South Africa's existing power generation capacity. The need to upgrade electrical distribution</p>		

	infrastructure, is also critical to ensure improved electricity supply. In this way, the proposed development will help meet the increasing demand for electricity by feeding energy into the grid and providing additional distribution infrastructure.
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DESIRABILITY:			
1.	Does the proposed land use / development fit the surrounding area?		NO ✓
2.	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	YES ✓	
3.	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	YES ✓	
4.	<p>If the answer to any of the questions 1-3 was NO, please provide further motivation / explanation:</p> <p>Explanation for Item 1: The surrounding area is characterised by mostly vacant natural veld, which is used as grazing land for livestock. Although the proposed development does not fit the surrounding area, both CSP and PV Power Plants are proposed to be established just to the south of the proposed substation, which will alter the current land use in the surrounding area.</p> <p>Validation to Item 2: The proposed development is situated within the Tsantsabane Local Municipality which forms part of the Siyanda District Municipality. The Integrated development Plans (IDPs) for the above mentioned municipalities have identified electricity as a service delivery need and prioritise the need to provide universal access to this service. The Tsantsabane Local Municipality identifies insufficient provision of electricity as a priority issue that needs to be resolved in order to meet their objective of providing electricity to all residents in Tsantsabane by 2020 (Tsantsabane Local Municipality IDP, 2010/2011). In the Siyanda District Municipality insufficient electricity infrastructural development is regarded as a priority issue (Siyanda District Municipality IDP, 2011/2012). In this way the proposed development is aligned with the municipal objectives and priorities for service delivery and infrastructural development in the area.</p>		
5.	Will the proposed land use / development impact on the sense of place?	YES ✓	
6.	Will the proposed land use / development set a precedent?		NO ✓
7.	Will any person's rights be affected by the proposed land use / development?	YES ✓	
8.	Will the proposed land use / development compromise the "urban edge"?		NO ✓
9.	<p>If the answer to any of the question 5-8 was YES, please provide further motivation / explanation.</p> <p>Explanation for Item 5: Distribution power lines consist of a series of very tall towers, which will typically be visible for great distances and may alter the visual character</p>		

	<p>and sense of place, particularly when placed in natural surroundings where there are few anthropogenic influences present. The visual character and sense of place in the study area is characteristic of a rural landscape where little transformation is present. As indicated in the visual impact assessment (Appendix D5), mining activities in the area have, however altered the natural character of the area to some extent. Although the impact of the power line on the sense of place cannot be mitigated, the visual impact will only be experienced where receptors are present in the study area. In this regard, very few potentially sensitive receptors were identified in the study area. The CSP and PV Power Plants, which are proposed to be established just to the south of the proposed substation site will also transform the visual environment and reduce the impact of the development on the sense of place.</p>
	<p>Explanation for Item 7: The proposed development will impact on individuals where a proposed tower structure is to be constructed on the land on which they are residing. The power line routes will avoid dwellings and agricultural land.</p>

BENEFITS:		
1.	Will the land use / development have any benefits for society in general?	YES ✓
2.	<p>Explain:</p> <p>Explanation for Item 1: Electricity provision in South Africa is a critical issue. It is impossible to create an economically sound country without a secure and reliable energy source. As mentioned above, the proposed project forms part of the country's strategies to meet future energy consumption requirements by feeding energy into the national grid. The increased energy will encourage economic growth and may also promote residential and urban development, which in turn may provide job opportunities in various communities.</p>	
3.	Will the land use / development have any benefits for the local communities where it will be located?	YES ✓
4.	<p>Explain:</p> <p>Explanation for Item 3: The proposed development could improve the lives of the local communities by assisting the Local Government in providing electricity to them.</p>	

10 Applicable Legislation, Policies and/or Guidelines

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline: **Administering authority:** **Date:**

Legislation

SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

prepared by: SiVEST

Postmasburg a Power Line, Substation and Switchyards - Draft Amended Basic Assessment Report

Revision No. 2

6 June 2012

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National Environmental Management Act, 1998 (Act No. 107 of 1998)	Department of Environmental Affairs (DEA)	1998
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	South African Heritage Resources Authority (SAHRA)	1999
National Water Act, 1998 (Act No. 36 of 1998)	Department of Water Affairs (DWA)	1998
National Environmental Management: Biodiversity, 2004 (Act No. 10 of 2004)	Department of Environmental Affairs (DEA) and South African National Biodiversity Institute (SANBI)	2004
National Forests Act, 1998 (Act No. 84 of 1998)	Department of Agriculture, Forestry and Fisheries (DAFF)	1998
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	Department of Agriculture, Forestry and Fisheries (DAFF)	1983
National Road Traffic Act, 1996 (Act No. 93 of 1996)	South African National Roads Agency Limited (SANRAL)	1996
Regulations		
EIA Regulations 2010, Government Notice (GN) No. R543 - 546	Department of Environmental Affairs (DEA)	2010
Guidelines		
Protected Species – Provincial Legislation	Northern Cape Department of Tourism, Environment and Conservation (NCDTEC)	
Tsantsabane Local Municipality Integrated Development Plan (IDP)	Tsantsabane Local Municipality	2010/2011
Siyanda District Municipality IDP	Siyanda District Municipality	2011/2012
Integrated strategic Electricity planning (ISEP) 2005	Eskom	2005

Relevance to the BA for the proposed 132kV power line and substation

- **National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended**

The National Environmental Management Act (Act No. 107 of 1998) was promulgated in 1998 but has since been amended on several occasions from this date. This Act replaces parts of the Environment Conservation Act (Act No 73 of 1989) with exception to certain parts pertaining to Integrated Environmental Management. The act intends to provide for:

- co-operative environmental governance by establishing principles for decision-making on matters affecting the environment;
- institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state;

- to provide for the prohibition, restriction or control of activities which are likely to have a detrimental effect on the environment;
- and to provide for matters connected therewith.

Activities that may significantly affect the environment must be considered, investigated and assessed prior to implementation.

- **NEMA EIA 2010 Regulations**

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an environmental authorisation, the result being that NEMA began now governing the EIA process with the said promulgation of the EIA Regulations in April 2006 (Government Gazette No. 28753 of 21 April 2006). These regulations have subsequently been replaced by the NEMA EIA 2010 Regulations listed in Government Gazette No. 33306 of 18 June 2010 (GN543, 544, 545 and 546 of 18 June 2010, as amended). The NEMA EIA 2010 Regulations are contained in four Government Notices and came into effect on 2 August 2010, as amended.

Apart from other matters regulating the EIA process and related matters, Government Notice (GN) No. R.543 sets out two distinct authorisation processes. Depending on the nature of listed activity that is proposed to be undertaken, either a so-called “basic assessment” process or a so-called “scoping and EIA” process is apply for an environmental authorisation in terms of NEMA. GN No. R.544 lists activities that require a Basic Assessment (BA), GN No. R.545 lists activities that require scoping and an Environmental Impact Assessment (EIA) and GN No. R.546 lists activities that only require an environmental authorisation, through a basic assessment process, if the activity is undertaken in a specific geographical area indicated in the listing notice.

In terms of the EIA 2010 Regulations, a full basic assessment is required for this proposed project.

- **National Heritage Resources Act, 1999 (Act No. 25 of 1999)**

The protection and management of South Africa’s heritage resources is primarily regulated by the National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA). The law ensures community participation in the protection of national heritage resources and involves all three levels of government (national, provincial and local) in the management of the country’s national heritage. The South African Heritage Resources Agency (SAHRA) is the enforcing authority for the NHRA.

In terms of the Act, various forms of heritage resources (such as graves, certain trees, archaeological artefacts, fossil beds etc.), are afforded protection and a permit may be required to destroy, damage, excavate, alter, etc. protected heritage resources).

Furthermore, in terms of section 38 of the NHRA, the responsible heritage resources authority

can call for a Heritage Impact Assessment (HIA) where certain categories of development are proposed. The activities identified in section 38 of the NHRA that apply to this proposed nuclear integration include:

- Section 38 (1) (a): The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- Section 38 (1) (c): any development or other activity which will change the character of a site-
 - (i) exceeding 5 000 m² in extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or
 - (iii) involving three or more erven or subdivisions thereof which have been consolidated within the past five years; and
- Section 38 (1) (d): The rezoning of a site exceeding 10 000 m² in extent.

The provisions of section 38 do not apply to a development as described if an evaluation of the impact of such development on heritage resources is required in terms of (among other legislation), NEMA. This is subject to the proviso that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of section 38(3) and that any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.

A heritage assessment has been conducted to explore how the proposed development may impact on heritage resources as protected by the Act.

▪ **National Water Act, 1998 (Act 36 of 1998)**

The National Water Act 1998 (Act 36 of 1998 (NWA) provides a framework to protect the water resources of South Africa.

In the context of the proposed project and any potential impact on water resources, there are two aspects of the NWA which are of key importance. The first is the mechanism for authorising various water uses (as detailed in section 21 of the NWA). If any water uses are to be undertaken as part of the project they will need to be authorised in accordance with one of the mechanisms created under the NWA, which include Schedule 1 water uses, generally authorised water uses and licensing of water uses.

In terms of section 19 of the NWA; "An owner of land, a person in control of land or a person who occupies or uses the land on which any activity or process is or was performed or undertaken; or any other situation exists, which causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring,

continuing or recurring". These measures may include (*inter alia*):

- o Measures to cease, modify, or control any act or process causing the pollution;
- o Compliance with any prescribed waste standard or management practice;
- o Containment or prevention of the movement of pollutants;
- o Remediation of the effects of the pollution; and
- o Remediation of the effects of any disturbance to the bed and banks of a watercourse.

▪ **National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)**

The overarching aim of the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA), within the framework of NEMA, is to provide for:

- o The management and conservation of biological diversity within South Africa, and of the components of such biological diversity;
- o The use of indigenous biological resources in a sustainable manner; and
- o The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

The South African National Biodiversity Institute (SANBI) was established by the NEMBA, its purpose being (*inter alia*) to report on the status of the country's biodiversity and the conservation status of all listed threatened or protected species and ecosystems.

NEMBA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a "restricted activity" involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7. Lists of critically endangered, endangered, vulnerable and protected species have been published and a permit system for listed species has been established.

It is also appropriate to undertake a Faunal and Botanical Impact Assessment where proposed developments, in an area that is considered ecologically sensitive, require an environmental authorisation in terms of NEMA, with such Assessment taking place during the basic assessment or EIA. These two studies have been undertaken during this basic assessment.

The NEMBA is relevant to the proposed project as the construction of power lines and other associated infrastructure (such as power lines and the substations) may impact negatively on biodiversity. The project proponent is therefore required to take appropriate reasonable measures to limit the impacts on biodiversity, to obtain permits if required and to also invite SANBI to provide commentary on any documentation resulting from the proposed development.

▪ **National Forests Act, 1998 (Act No. 84 of 1998) (NFA)**

The National Forest Act, 1998 (Act 84 of 1998) (NFA) was enacted to:

- Promote the sustainable management and development of forests for the benefit of all;
- Provide special measures for the promotion of certain forests and trees;
- Promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes;
- Promote greater participation in all aspects of forests and the forest products industry by persons disadvantaged by unfair discrimination.

The NFA enforces the necessity for a license to be obtained prior to destroying any indigenous tree in a natural forest and, subject to certain exemptions, cutting, disturbing, damaging, destroying or removing any protected tree. The list of protected trees is currently contained in GN 34595 Notice Number 734 of the 16 September 2011. Licenses are issued by the Minister and are subject to periods and conditions as may be stipulated.

The NFA is relevant to this proposed project as it may result in the disturbance or damage to a protected tree. The DAFF will be consulted and provided with the opportunity comment on this BA.

▪ **Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)**

The Conservation of Agricultural Resources Act (CARA) and the Regulations promulgated under that Act are designed to protect natural agricultural resources and to promote inter alia water sources and vegetation in South Africa.

The primary objective of the Act is to conserve natural agricultural resources by:

- maintaining the production potential of land;
- combating and preventing erosion and weakening or destruction of the water resources;
- protecting vegetation; and
- combating weeds and invaders plants.

The ambit of the CARA is however limited, as land situated within the ambit of an “urban area”⁴

⁴ “Urban area” is defined to include any land which is under the control of a local authority (subject to certain exclusions) and land which is subdivided into erven or lots.

does not fall within the ambit of the CARA, except in so far as the Act relates to weeds and invader plants. The CARA is relevant to the proposed project as the construction of power lines may impact on agricultural resources and vegetation on the site. The CARA prohibits the spreading of weeds and prescribes control measures that need to be complied with in order to achieve this. As such, measures will need to be taken to protect agricultural resources and prevent weeds and exotic plants from invading the site as a result of the proposed development.

An agricultural potential assessment has been conducted to explore how the proposed development may impact on the agricultural production potential of the proposed site.

- **National Road Traffic Act, 1996 (No. 93 of 1996), as amended**

The National Road Traffic Act (NRTA) No. 93 of 1996 provides for all road traffic matters and is applied uniformly throughout South Africa. It also stipulates requirements regarding fitness of drivers and vehicles as well as making provision for the transportation of dangerous goods.

All the requirements stipulated in the NRTA will need to be complied with during the construction and operational phases of the proposed power line.

- **Protected Species – Provincial Legislation**

There is protection afforded to certain animal and plant species within the various provinces of the country. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation.

- **Integrated Development Plans**

An Integrated Development Plan (IDP) is defined in the Local Government: Municipal Systems Act, 2000 (Act 32 of 2000), as an inclusive and strategic plan that:

- Links, integrates and co-ordinates plans and takes into account proposals for the development of the municipality;
- Aligns the resources and capacity of the municipality with the implementation of the plan
- Forms the policy framework on which annual budgets must be based; and,
- Is compatible with national and provincial development plans and planning requirements binding on the municipality in terms of legislation.

Each municipality is required to produce an IDP which would address pertinent issues relevant to their municipality. However, common concerns include municipal transformation and

development, and service delivery and infrastructural development. With regards to the latter, electricity, amongst other municipal services, is highlighted as a priority issue warranting attention, in particular the provision of access to electricity to affected communities and the improvement of the electricity infrastructure (mini-sub, cables).

Thus the proposed 132kV power line, substation and switchyards project is aligned with the goals of the municipal IDPs in the study area.

- **Integrated strategic Electricity planning (ISEP), 2005**

Eskom's Integrated Strategic Electricity Planning (ISEP) process is intended to provide strategic projections of supply-side and demand-side options to be implemented to meet long-term load forecasts. It provides the framework for Eskom to investigate a wide range of new supply-side and demand-side technologies with a view to optimising investments and returns.

11 Waste, Effluent, Emission and Noise Management

11(a) Solid Waste Management

Will the activity produce solid construction waste during the construction/initiation phase?

YES /	<input type="checkbox"/>
Unknown	<input type="checkbox"/>

If yes, what estimated quantity will be produced per month?

How will the construction solid waste be disposed of (describe)?

All solid waste collected shall be disposed of at registered/licensed landfill site. Skip waste containers and waste collection bins will be maintained on site and the contractor will arrange for them to be collected regularly and transported to the landfill site.

Under no circumstances will waste be burned or buried on site.

Hazardous materials and contaminants will be stored carefully to prevent contamination until being disposed of at a licensed landfill site.

Where will the construction solid waste be disposed of (describe)?

All solid waste will be disposed of at a licensed/registered landfill site. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management.

Will the activity produce solid waste during its operational phase?

YES /	<input type="checkbox"/>
Unknown	<input type="checkbox"/>

If yes, what estimated quantity will be produced per month?

Solid waste produced during the operational phase is associated with equipment failure and maintenance and therefore the amount cannot be estimated.

How will the solid waste be disposed of (describe)?

All solid waste will be collected and disposed of. Waste separation and recycling will take place where possible.

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

The waste will be disposed of at nearby registered landfill sites.

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?

YES ✓

All hazardous components will be discarded at a licensed hazardous waste disposal facility. The waste produced will fall under that stipulated in the waste management listing activities, and therefore it is not anticipated that this application will need to be changed to an application for scoping and EIA.

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?

NO ✓

If yes, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

NO ✓

If yes, what estimated quantity will be produced per month?

m³

Will the activity produce any effluent that will be treated and/or disposed of on site?

NO ✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?

	NO ✓
--	-------------

If yes, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:	Cell:		
E-mail:	Fax:		

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Waste water will not be generated.

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?

	NO ✓
YES	NO

If yes, is it controlled by any legislation of any sphere of government?

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

--

11(d) Generation of noise

Will the activity generate noise?

YES ✓	
	NO ✓

If yes, is it controlled by any legislation of any sphere of government?

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the noise in terms of type and level:

--

Noise will be generated during the construction phase. This impact is transient and is unlikely to be heard by many noise receptors due to the limited human habitation in the area. The impact of the project on noise does therefore not warrant a specialist noise impact assessment.

During the operational phase the power line will generate a low hissing noise, known as corona. This noise will vary depending on the weather conditions and in dry conditions; the noise level will be comparative with the usual ambient noise level in the environment.

12 Water Use

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

Municipal ✓	water board	groundwater	river, dam or lake	stream,	other	the activity will not use water
----------------	-------------	-------------	--------------------	---------	-------	---------------------------------

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate

the volume that will be extracted per month:

Unknown
NO ✓

Does the activity require a water use permit from the Department of Water Affairs?

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

13 Energy Efficiency

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

The substation is designed to make use of minimal energy during operations as the station is just meant to step down the voltage and not consume power.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

The 132kV overhead distribution power line is required to connect the proposed Humansrus PV Power Plants into the National Grid once constructed. Therefore, it forms part of the country's strategies to meet future energy consumption requirements through the use of renewable energy.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No. (e.g. A): [REDACTED]

1. Paragraphs 1 - 6 below must be completed for each alternative.

2. Has a specialist been consulted to assist with the completion of this section?

YES ✓ [REDACTED]

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:

All specialist reports must be contained in Appendix D.

A Declaration of Interest for each specialist is included in Appendix G6 and all specialist reports are included in Appendix D.

Property description/physical address:

The proposed development site falls over the following two properties:

- Portion 1 of Farm Lemoenkloof 456
- Remainder of Farm 469

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning: Unknown

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to , to this application.

Is a change of land-use or a consent use application required?

[REDACTED] NO ✓

Must a building plan be submitted to the local authority?

[REDACTED] NO ✓

Locality map:

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map). The map must indicate the following:

- an indication of the project site position as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

An A3 Locality Map is included in Appendix A.

1 Gradient of the Site

Indicate the general gradient of the site.

Substation Site

Alternative S1 (only site alternative)

Flat ✓	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------------------	-------------	-------------	-------------	--------------	-------------	---------------------

Power Line

Alternative S1 (preferred) – **Option1c**

Flat	1:50 – 1:20 ✓	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------	-------------------------	-------------	-------------	--------------	-------------	---------------------

Alternative S2 – **Option 1b**

Flat	1:50 – 1:20 ✓	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------	-------------------------	-------------	-------------	--------------	-------------	---------------------

Alternative S3 – **Option 1a**

Flat	1:50 – 1:20 ✓	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------	-------------------------	-------------	-------------	--------------	-------------	------------------

Access Road

Alternative S1 (only route alternative)

Flat ✓	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------------------	-------------	-------------	-------------	--------------	-------------	------------------

All the proposed route alternatives (option 1a, 1b and 1c) follow a topographical similar landscape as they run in relatively close proximity to one another. Most of the study area is relatively flat to gently undulating, particularly in the southern parts of the site. In the northern parts of the site, the terrain becomes more undulating and is characterised by rolling hills with moderate slopes (Figure 5 and Figure 6). An A3 Slope Classification Map and Topography Map are included in Appendix G4.

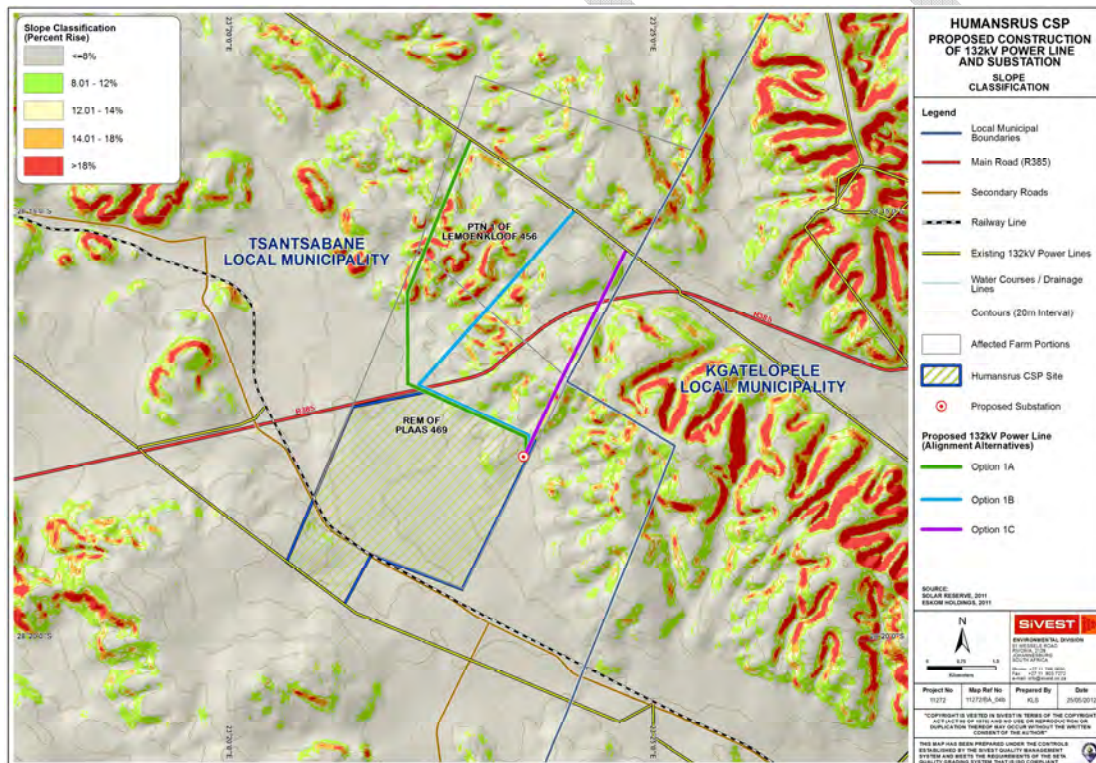


Figure 5: Slope Classification Map

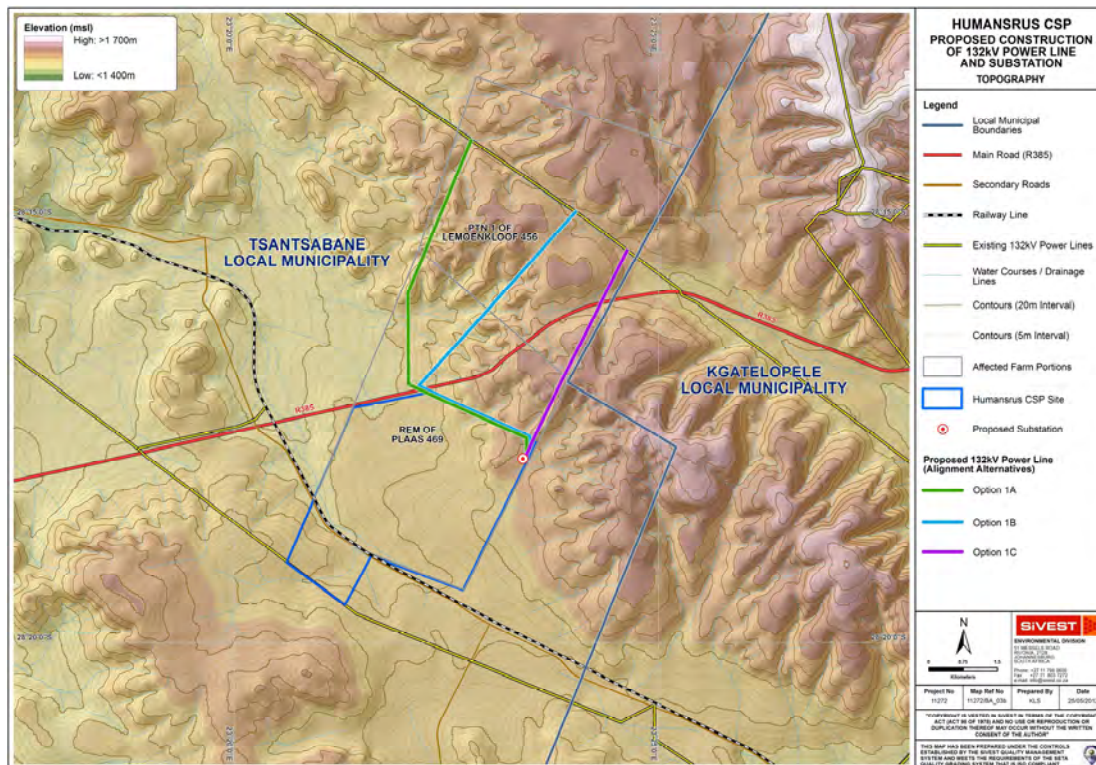


Figure 6: Topography Map

2 Location in Landscape

Indicate the landform(s) that best describes the site:

<u>Substation Site</u>	<u>Power Line</u>	<u>Access Road</u>
2.1 Ridgeline	2.1 Ridgeline	2.1 Ridgeline
2.2 Plateau	2.2 Plateau	2.2 Plateau
2.3 Side slope of hill/mountain	2.3 Side slope of hill/mountain	2.3 Side slope of hill/mountain
2.4 Closed valley	2.4 Closed valley	2.4 Closed valley
2.5 Open valley	2.5 Open valley	2.5 Open valley
2.6 Plain	2.6 Plain	2.6 Plain
2.7 Undulating plain / low hills	2.7 Undulating plain / low hills	2.7 Undulating plain / low hills
2.8 Dune	2.8 Dune	2.8 Dune
2.9 Seafront	2.9 Seafront	2.9 Seafront

3 Groundwater, Soil and Geological Stability of the Site

Is the site(s) located on any of the following (tick the appropriate boxes)?

Substation Site

Alternative S1:

Shallow water table (less than 1.5m deep)	<input type="checkbox"/>	NO ✓
Dolomite, sinkhole or doline areas	<input type="checkbox"/>	NO ✓
Seasonally wet soils (often close to water bodies)	<input type="checkbox"/>	NO ✓
Unstable rocky slopes or steep slopes with loose soil	<input type="checkbox"/>	NO ✓
Dispersive soils (soils that dissolve in water)	<input type="checkbox"/>	NO ✓
Soils with high clay content (clay fraction more than 40%)	<input type="checkbox"/>	NO ✓
Any other unstable soil or geological feature	<input type="checkbox"/>	NO ✓
An area sensitive to erosion	<input type="checkbox"/>	NO ✓

Power Line

	Option 1A	Option 1B	Option 1C
Shallow water table (less than 1.5m deep)	NO ✓	NO ✓	NO ✓
Dolomite, sinkhole or doline areas	NO ✓	NO ✓	NO ✓
Seasonally wet soils (often close to water bodies)	NO ✓	NO ✓	NO ✓
Unstable rocky slopes or steep slopes with loose soil	NO ✓	NO ✓	NO ✓
Dispersive soils (soils that dissolve in water)	NO ✓	NO ✓	NO ✓
Soils with high clay content (clay fraction more than 40%)	NO ✓	NO ✓	NO ✓
Any other unstable soil or geological feature	NO ✓	NO ✓	NO ✓
An area sensitive to erosion	YES ✓	YES ✓	YES ✓

Access Road

Alternative S1:	
Shallow water table (less than 1.5m deep)	NO ✓
Dolomite, sinkhole or doline areas	NO ✓
Seasonally wet soils (often close to water bodies)	NO ✓
Unstable rocky slopes or steep slopes with loose soil	NO ✓
Dispersive soils (soils that dissolve in water)	NO ✓
Soils with high clay content (clay fraction more than 40%)	NO ✓
Any other unstable soil or geological feature	NO ✓
An area sensitive to erosion	NO ✓

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4 Groundcover

Indicate the types of groundcover present on the site:

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Substation Site

Natural veld - good condition^E	Natural veld with scattered aliens ^E	Natural veld with heavy alien infestation ^E	Veld dominated by alien species ^E	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

Power Line

Natural veld - good condition^E	Natural veld with scattered aliens ^E	Natural veld with heavy alien infestation ^E	Veld dominated by alien species ^E	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

Access Road

Natural veld - good condition^E	Natural veld with scattered aliens ^E	Natural veld with heavy alien infestation ^E	Veld dominated by alien species ^E	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

If any of the boxes marked with an “^E” is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn’t have the necessary expertise.

5 Land use Character of Surrounding Area

Indicate land uses and/or prominent features that currently occurs within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

Substation Site	Power Line	Access Road
5.1 Natural area	5.1 Natural area	5.1 Natural area
5.2 Low density residential	5.2 Low density residential	5.2 Low density residential
5.3 Medium density residential	5.3 Medium density residential	5.3 Medium density residential
5.4 High density residential	5.4 High density residential	5.4 High density residential
5.5 Informal residential ^A	5.5 Informal residential ^A	5.5 Informal residential ^A
5.6 Retail commercial & warehousing	5.6 Retail commercial & warehousing	5.6 Retail commercial & warehousing
5.7 Light industrial	5.7 Light industrial	5.7 Light industrial
5.8 Medium industrial ^{AN}	5.8 Medium industrial ^{AN}	5.8 Medium industrial ^{AN}
5.9 Heavy industrial ^{AN}	5.9 Heavy industrial ^{AN}	5.9 Heavy industrial ^{AN}
5.10 Power station	5.10 Power station	5.10 Power station
5.11 Office/consulting room	5.11 Office/consulting room	5.11 Office/consulting room
5.12 Military or police base/station/compound	5.12 Military or police base/station/compound	5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam ^A	5.13 Spoil heap or slimes dam ^A	5.13 Spoil heap or slimes dam ^A
5.14 Quarry, sand or borrow pit	5.14 Quarry, sand or borrow pit	5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir	5.15 Dam or reservoir	5.14 Quarry, sand or borrow pit
5.16 Hospital/medical centre	5.16 Hospital/medical centre	5.16 Hospital/medical centre
5.17 School	5.17 School	5.17 School
5.18 Tertiary education facility	5.18 Tertiary education facility	5.18 Tertiary education facility
5.19 Church	5.19 Church	5.19 Church
5.20 Old age home	5.20 Old age home	5.20 Old age home
5.21 Sewage treatment plant ^A	5.21 Sewage treatment plant ^A	5.21 Sewage treatment plant ^A
5.22 Train station or shunting yard ^N	5.22 Train station or shunting yard ^N	5.22 Train station or shunting yard ^N
5.23 Railway line ^N	5.23 Railway line ^N	5.23 Railway line ^N
5.24 Major road (4 lanes or more) ^N	5.24 Major road (4 lanes or more) ^N	5.24 Major road (4 lanes or more) ^N
5.25 Airport ^N	5.25 Airport ^N	5.25 Airport ^N
5.26 Harbour	5.26 Harbour	5.26 Harbour
5.27 Sport facilities	5.27 Sport facilities	5.27 Sport facilities
5.28 Golf course	5.28 Golf course	5.28 Golf course
5.29 Polo fields	5.29 Polo fields	5.29 Polo fields
5.30 Filling station ^H	5.30 Filling station ^H	5.30 Filling station ^H
5.31 Landfill or waste treatment site	5.31 Landfill or waste treatment site	5.31 Landfill or waste treatment site
5.32 Plantation	5.32 Plantation	5.32 Plantation

SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

prepared by: SiVEST

Postmasburg a Power Line, Substation and Switchyards - Draft Amended Basic Assessment Report

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<p>5.32 Plantation</p> <p>5.33 Agriculture</p> <p>5.34 River, stream or wetland</p> <p>5.35 Nature conservation area</p> <p>5.36 Mountain, koppie or ridge</p> <p>5.37 Museum</p> <p>5.38 Historical building</p> <p>5.39 Protected Area</p> <p>5.40 Graveyard</p> <p>5.41 Archaeological site</p> <p>5.42 Other land uses (describe)</p>	<p>5.33 Agriculture</p> <p>5.34 River, stream or wetland</p> <p>5.35 Nature conservation area</p> <p>5.36 Mountain, koppie or ridge</p> <p>5.37 Museum</p> <p>5.38 Historical building</p> <p>5.39 Protected Area</p> <p>5.40 Graveyard</p> <p>5.41 Archaeological site</p> <p>5.42 Other land uses (describe)</p>	<p>5.31 Landfill or waste treatment site</p> <p>5.32 Plantation</p> <p>5.33 Agriculture</p> <p>5.34 River, stream or wetland</p> <p>5.35 Nature conservation area</p> <p>5.36 Mountain, koppie or ridge</p> <p>5.37 Museum</p> <p>5.38 Historical building</p> <p>5.39 Protected Area</p> <p>5.40 Graveyard</p> <p>5.41 Archaeological site</p> <p>5.42 Other land uses (describe)</p>
---	--	--

If any of the boxes marked with an "N" are ticked, how will this impact / be impacted upon by the proposed activity?

- **Other land uses** – CSP and PV Solar Energy Power Plants are proposed to be established just to the south of the proposed substation on the Humansrus site, which will alter the current land use in the surrounding area.

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity?

If YES, specify and explain:

If YES, specify:

If any of the boxes marked with an "Hn" are ticked, how will this impact / be impacted upon by the proposed activity.

If YES, specify and explain:

If YES, specify:

All of the proposed route alignments traverse similar land uses as they run in relatively close proximity. The area is characterised by mostly vacant natural veld, which is used as grazing land for livestock. An A3 Land Use Map is included in Appendix G4.

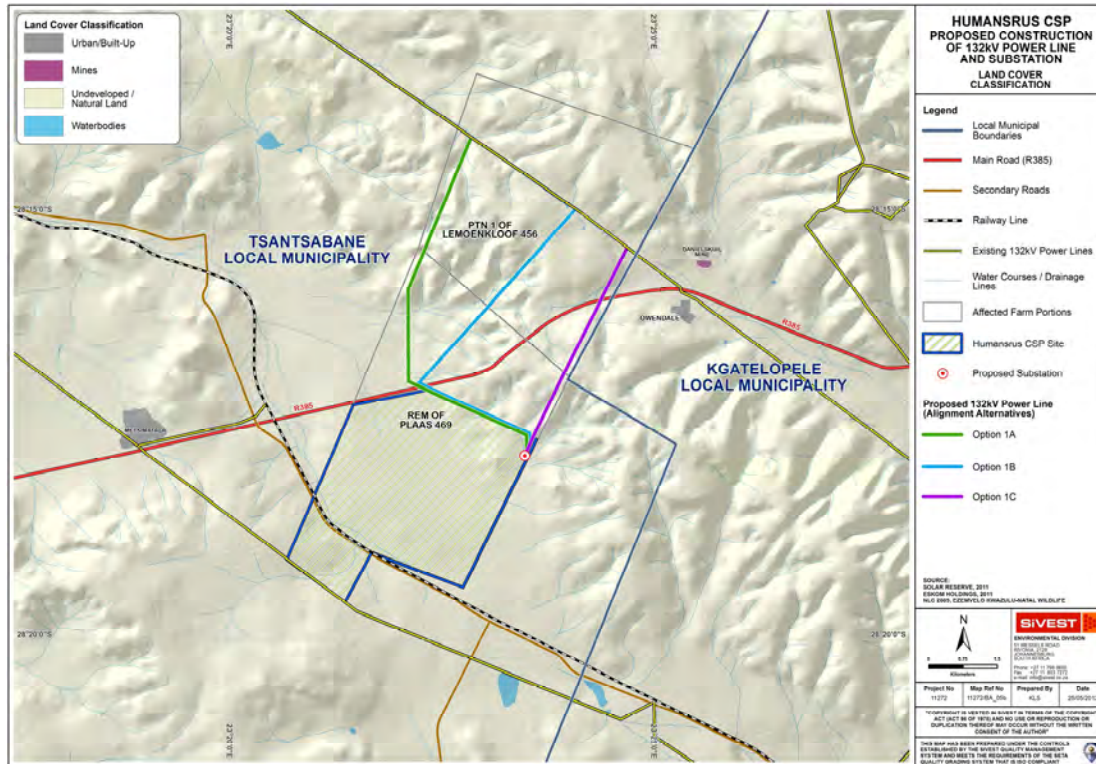


Figure 7: Land Cover Map

6 Cultural/Historical Features

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or palaeontological sites, on or close (within 20m) to the site?

YES /	
Uncertain	

If YES, explain:

A Heritage Impact Assessment was undertaken by PGS in order to assess the impact of the proposed project on heritage resources in the study area. The assessment only identified one (1) heritage site consisting of a small informal cemetery with four (4) graves. The site receives a provisional heritage significance Grading of 3B and it falls in the alignment option 1a.

If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist:

The evaluation of the study area and surrounds showed that the area is rich in heritage resources spanning from the archaeological to historical timeframe. The area between Postmasburg and Daniëlskuil generally referred to as the Ghaap plato has a rich history of occupation from the Stone Age with hunter gatherers to the Thlaping and Thlaro during the Iron Age period. The 1800's saw the rise of the Griqua people in the area and their loss of sovereignty after 1880 to Cape rule.

The assessment revealed that route option 1a will traverse a small informal cemetery and therefore it was recommended that if option 1a is to be constructed it should be adjusted to accommodate the cemetery and that the cemetery be fenced with a 10 meter buffer.

The Heritage Impact Assessment is included in Appendix D5.

Will any building or structure older than 60 years be affected in any way?

NO ✓
Uncertain

Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

Uncertain ✓

A permit in terms of section 34 of the National Heritage Resources Act 1999 (Act 25 of 1999) will be obtained, if any archaeological resources, such as built structures older than 60 years, sites of cultural significance associated with oral histories, burial grounds or graves and cultural landscapes, are discovered during the construction phase of the project and which will be damaged, destroyed, altered, or disturbed as a result of the project. It is stipulated in the EMPr that a heritage walk down be undertaken prior to construction, in order to determine if a permit in terms of the National Heritage Resources Act, 1999 is required.

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

SECTION C: PUBLIC PARTICIPATION

A Public Participation Report has been compiled, outlining the detailed public participation process undertaken as part of this basic assessment. The Public Participation Report is included in Appendix E.

1 Advertisement

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

- (a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application;
- (b) giving written notice to—
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority;
- (c) placing an advertisement in—
 - (i) one local newspaper; or
 - (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
- (d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and
- (e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
 - (i) illiteracy;

- (ii) disability; or
- (iii) any other disadvantage.

Proof of the Site Notices erected at the application site are included in Appendix E1. Proof of the BA process notices distributed at public places public venues in the residential communities within the study area, are included in Appendix E2. Proof of the newspaper advertisements are included in Appendix E3

2 Content of Advertisements and Notices

A notice board, advertisement or notices must:

- (a) indicate the details of the application which is subjected to public participation; and
- (b) state—
 - (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
 - (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
 - (iii) the nature and location of the activity to which the application relates;
 - (iv) where further information on the application or activity can be obtained; and the manner in which and the person to whom representations in respect of the application may be made.

3 Placement of Advertisements and Notices

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any Gazette that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

4 Determination of Appropriate Measures

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as

Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

5 Comments and Response Report

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under Appendix E.

The Comments and Response Report (C&RR) is included in Appendix E5.

6 Authority Participation

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report or scoping report, whichever is applicable.

A database of all organs of state / authorities consulted during the BA process is included in Appendix E7.

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input.

List of authorities informed:

National / Provincial Authorities:

- Department of Water Affairs (DWA)
- Department of Agriculture, Forestry and Fisheries (DAFF)
- Department of Environment & Nature Conservation
- South African Heritage Resource Authority (SAHRA)
- Northern Cape Department of Agriculture, Land Reform and Rural Development
- Northern Cape Department of Forestry
- Northern Cape Department of Agriculture and Land Reform
- Northern Cape Department of Economic Development
- Northern Cape Department of Transport, Roads and Public Works

Local Authorities:

- Tsantsabane Local Municipality
- Kgatelopele Local Municipality
- Siyanda District Municipality

Parastatals / Organs of State

- Air Traffic Navigation Services (ATNS)
- SA Civil Aviation Authority (SACAA)
- South African National Roads Agency (SANRAL)
- TRANSNET Freight Rail
- Telkom South Africa

NGO's / Other Entities

- Birdlife South Africa
- Council for Geosciences
- Wildlife and Environmental Society of South Africa (WESSA)

List of authorities from whom comments have been received:

- Uvesh Gopichund – ATNS
- Mashudu Ranwedzi – DWA
- HJ Buys - DAFF
- Suzanne Erasmus - WESSA
- Ian Scholtz – TRANSNET Freight Rail
- Rene de Kock – SANRAL
- J Riddles – Northern Cape Provincial Government
- Katie Smuts – SAHRA
- Koos Pretorius - SACAA

Detail of correspondence received from Authorities / Organs of State are included in Appendix E5 and proof thereof in Appendix E4.

7 Consultation with Other Stakeholders

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the competent authority.

Proof of any such agreement must be provided, where applicable.

Has any comment been received from stakeholders?

YES ✓

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

The following comments were received:

- Requested that the SACAA be informed of the proposed development as the ultimate approval regarding this proposal will rest with them. ATNS will await further instruction from the SACAA as they are the custodians of aviation (ATNS – March 2012).
- Requested for a hard copy of the DBAR to be sent to the department when it is available (DWA – March 2012)
- Confirmed that the application has been captured in our electronic AgriLand tracking and management system (DAFF – March 2012).
- Requested that no hardcopies or discs be posted to them, unless specifically requested as they have no one on their committee to handle the conservation portfolio (WESSA – March 2012)
- Requested for more information about the proposed project and to be registered as an I&AP (Mr Hadley J Jonas – February 2012).
- Questioned if the development falls within the Lower Orange or Lower Vaal water management area (DWA – April 2012)
- Noted that their main concerns would be how access to the site will be obtained and the stormwater runoff caused by the development (TRANSNET – April 2012).
- Noted that the DBAR was sent to the Environmental Quality Management directorate to provide comment (April 2012).
- Noted that SANRAL has no objection as the project does not affect a national road (SANRAL – May 2012).
- Noted that the SACAA has no objection to the development (SACAA – May 2012).

Full detail of the correspondence received is included in Appendix E5 and proof thereof in Appendix E4.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

In line with the EIA Regulations this impact assessment takes into account the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning (if required)

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

▪ Rating System Used To Classify Impacts

The rating system applied to the potential impact on the receiving environment includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. Table 2 below outlines the criteria used for assessing the significance of each issue (including an allocated point system).

Table 2: Rating System

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	International and National	Will affect the entire country
2	Province/region	Will affect the entire province or region
3	Local/district	Will affect the local area or district
4	Site	The impact will only affect the site
PROBABILITY		

This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Irreversible	The impact is irreversible and no mitigation measures exist.
2	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
3	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
4	Completely reversible	The impact is reversible with implementation of minor mitigation measures
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).

2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY / MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.

4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
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SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

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

Points	Impact Rating	Significance	Description
6 to 28	Negative	Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive	Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative	Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive	Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative	High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive	High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative	Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".

74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.
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1 Issues Raised by Interested and Affected Parties

List the main issues raised by interested and affected parties.

I&AP / Stakeholder	Date Received	Summary of Comments
Uvesh Gopichund Air Traffic Management Specialist: ATNS	02 March 2012	Requested that the SACAA be informed of the proposed development as the ultimate approval regarding this proposal will rest with them. Noted that ATNS has not conducted an evaluation with regard to the Solar Power Plant at Humansrus near Postmasburg, and the SACAA should be informed of the solar power plant as well.

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report as Appendix E):

Responses from the practitioner to all the issues and comments raised are contained in the Comments and Response Report which is included in Appendix E5.

2 Impacts that may result from the Planning and Design, Construction, Operational, Decommissioning and Closure Phases as well as Proposed Management of Identified Impacts and Proposed Mitigation Measures

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

The environmental impacts that may result from the proposed 132kV distribution power line, substation, switchyards and access road are summarised below according to each environmental aspect. The impact of the proposed development on the biophysical and social environment are indicated as well as the constraints that the environment will impose on the development.

2(a) Biodiversity

A Biodiversity Impact Assessment was conducted by SiVEST and is included in Appendix D1.

The following habitat types have been identified within the study area:

- Open Plains - characterised by the presence of several grass species and small shrubs, which have been heavily grazed by horse species.
- Mountain Bushveld - characterised by rolling hills with gentle to moderate slopes (concentrated on Lemoenkloof Farm).

The farm Humansrus is actively used for agricultural practices. Evidence of historical cultivation is evident. Several horses were observed on the farm. These have all contributed to the transformation of the area from its natural state. The area cannot however be considered to be severely transformed as natural areas do still remain. The farm Lemoenkloof is a game farm and does not have any major activities other than this occurring. The area is thus in a fairly untransformed state.

▪ Flora in the Study Area

In terms of GN 1187 published under the National Environmental Management: Biodiversity Act on the 23rd of February 2007 none of the species documented within the study area are considered to be protected in terms of this legislation.

Protected tree species have been documented for the study area. These include *Acacia haematoxylon*, *Acacia erioloba* and *Boscia albitrunca*. None of these species were noted during the field investigation.

No Red Data plants are known to occur in the study area, or the immediate surrounds. These species may however still need to be documented and care needs to occur should these be discovered during construction.

No exotic species were noted on the site during the field investigation.

The vegetation types in the study area are described as Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld (Mucina, *et al*, 2006).

▪ Fauna in the Study Area

The study area is relatively uniform in nature and no definite sensitive areas have been identified from a biodiversity perspective.

Construction Phase Impacts

The potential impacts of the proposed development mainly related to loss of habitat for red data and general species; potential loss of species richness, edge effect and erosion. The impact of the proposed development will be limited to the tower footprints and access roads. Surrounding vegetation will remain intact and will not be impacted upon. As such the impact is localised and if the mitigation measures are implemented, the overall impact can be reduced.

During the construction phase the following impacts are predicted in terms of each of the biodiversity groupings.

- Flora

A number of potential impacts could be associated with the proposed power line. The clearing for the power line towers and associated infrastructure is likely to result in loss of vegetation and more importantly natural vegetation. This can also result in habitat fragmentation due to loss of ecological linkages which may be present across the site. The clearing of vegetation could also result in the introduction of exotic species into the study area.

The impacts associated with the floral environment relate to the removal of vegetation and associated loss of habitat for endemic and Red Data species, particularly those which have been highlighted above. This could result in loss of species richness and increase the edge effect. The edge effect implies an increase of alien species into the area thus affecting the local species.

It is thus critical that the sensitive areas identified above are avoided during construction.

The construction of the power line does not result in clearing of all vegetation i.e. a large amount of vegetation will remain between the towers.

It is important that all the mitigation measures are implemented to reduce vegetation clearing and ensure no go areas are avoided.

- Mammals

The proposed power line and substation could potentially result in the destruction of the habitat available for these species. The impact of the power line is likely to be higher during construction as displacement will occur as a result of foundations and road construction.

- Reptiles

The proposed wind farm could potentially result in habitat destruction for reptile species.

- Amphibians

No major water bodies are to be affected by the proposed project therefore potential impacts on amphibians is expected to be low as the density of this faunal grouping is expected to be low within the study area.

- Avifauna

Birds are the faunal grouping which is most at risk from the proposed development. Several impacts are possible which could affect bird populations within the study area.

The construction phase is likely to result in some habitat loss for bird species occupying the site, particularly smaller species which were noted on site. However due to the site not being completely cleared these species are likely to remain to some extent. The surrounding area however provides sufficient habitat for these species to move into and the development would not be to the detriment of these species.

At a cumulative level some portion of the local population of each species would be lost. The surrounding habitat (if similar in composition) would already be supporting the same species most likely at a maximum carrying capacity and the displaced individuals would therefore have difficulty finding 'vacant territories' particularly given the arid environment in which the development is taking place.

The impacts of the proposed development on biodiversity during the construction phase, both before and after mitigation measures, are provided in Table 3 and Table 4 below.

Table 3: Rating of impacts related to loss of habitat for red data / general species during construction

LOSS OF HABITAT	
Environmental Parameter	Biodiversity
Issue/Impact/Environmental Effect/Nature	Loss of habitat for red data / general species
<i>Extent</i>	The impact is only expected to affect the site.
<i>Probability</i>	The impact may occur (Between a 25% to 50% chance of occurrence).
<i>Reversibility</i>	The impact is partly reversible but more intense mitigation measures are required.
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources

LOSS OF HABITAT		
<i>Duration</i>	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years)	
<i>Cumulative effect</i>	The impact would result in minor cumulative effects	
<i>Intensity/magnitude</i>	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	
<i>Significance Rating</i>	<p>Prior to mitigation measures: There will be a negative Low impact i.e. the anticipated impact will have negligible negative effects however mitigation measures must be implemented.</p> <p>After mitigation measures: After mitigation measures, the negative low impact persists.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-26 (low negative)	-6 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ Maintain footprint strictly during construction ▪ Appoint Environmental Control Officer (ECO) for the duration of construction. ▪ Conduct construction walk down prior to construction to conduct a search and rescue exercise. ▪ Existing indigenous vegetation must be retained where possible. ▪ Remove and relocate any plants of botanical or ecological significance (these must be indicated by the ECO) ▪ Vegetation to be removed as it becomes necessary ▪ No vegetation to be used for firewood. 	

LOSS OF HABITAT	
	<ul style="list-style-type: none"> ▪ Demarcation of sensitive areas prior to construction activities starting.' ▪ Fitment of bird diverters onto power line.

Table 4: Rating of impacts related to edge effect during construction

EDGE EFFECT	
Environmental Parameter	Biodiversity
Issue/Impact/Environmental Effect/Nature	Edge effect
<i>Extent</i>	The impact is only expected to affect the site.
<i>Probability</i>	Impact will certainly occur (Greater than a 75% chance of occurrence).
<i>Reversibility</i>	The impact is partly reversible but more intense mitigation measures are required.
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources
<i>Duration</i>	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years)
<i>Cumulative effect</i>	The impact would result in minor cumulative effects
<i>Intensity/magnitude</i>	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
<i>Significance Rating</i>	<p>Prior to mitigation measures:</p> <p>There will be a negative medium impact i.e. the anticipated impact will have moderate negative effects and will require moderate mitigation measures</p> <p>After mitigation measures:</p> <p>After mitigation measures, a negative low impact will be achieved.</p>

EDGE EFFECT		
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	2
Reversibility	2	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-30 (medium negative)	-7 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ The contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. ▪ The spread of exotic species occurring throughout the site should be controlled. Emergence of alien invasive species must be avoided. ▪ All exotic vegetation must be removed from the site (if present). 	

Operational and Maintenance Phase Impacts

The following impacts are likely to occur during the operational phase of the project:

- Collisions

Collisions pertaining to electrical infrastructure are a major concern with regards to birds. The risk of colliding with the overhead power line is an associated risk. Birds often do not visualise the power lines, particularly the earth wire and hence collide with them resulting in their death. Larger species are particularly at risk such as the Kori Bustard, Blue Crane etc. This impact is however easily mitigated.

- Electrocution

Birds get electrocuted on power lines when a bird perches on electrical structure and causes an electrical short circuit by bridging the gap between live components and/or live and earthed components (van Rooyen 2004). Given the flat landscape, birds often use power lines as vantage points as has been noted on the site. Suitable mitigation measures can however be implemented to reduce this impact and discourage perching on the power lines.

- Bird impacts on electrical infrastructure

Birds can also affect the functioning of electrical infrastructure as a result of bird streamers and nesting activity. The Northern Cape is known for the characteristic sociable weavers which nest on the telephone poles and other tall infrastructure. No sociable weavers nests were noted in close proximity to the study area or near Kimberley. However regular checks for these species must be undertaken on the electrical infrastructure associated with the plants.

Should renovations/ maintenance of the power line be undertaken, the impacts associated with the disturbance of the vegetation would be much the same as the impacts listed here for the construction phase. Mitigation measures mentioned below for the operational phase would reduce these impacts associated with vegetation removal during renovations/ maintenance and result in the unlikelihood of their occurrence.

The impacts of the proposed development on biodiversity during the operational phase, both before and after mitigation measures, are provided in Table 5 to Table 8 below.

Table 5: Rating of impacts related to loss of habitat for red data / general species during operation

LOSS OF HABITAT	
Environmental Parameter	Biodiversity
Issue/Impact/Environmental Effect/Nature	Loss of habitat for red data / general species
<i>Extent</i>	The impact is only expected to affect the site.
<i>Probability</i>	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
<i>Reversibility</i>	The impact is partly reversible but more intense mitigation measures are required.
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources
<i>Duration</i>	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years)
<i>Cumulative effect</i>	The impact would result in minor cumulative effects
<i>Intensity/magnitude</i>	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general

LOSS OF HABITAT		
	integrity (some impact on integrity).	
<i>Significance Rating</i>	<p>Prior to mitigation measures: There will be a negative Low impact i.e. the anticipated impact will have negligible negative effects however mitigation measures must be implemented.</p> <p>After mitigation measures: After mitigation measures, the negative low impact persists.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	1	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-10 (low negative)	-6(low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ Maintain footprint strictly during operation ▪ Constant removal of alien invasive species in and around site. 	

Table 6: Rating of impacts related to edge effect during operation

EDGE EFFECT	
Environmental Parameter	Biodiversity
Issue/Impact/Environmental Effect/Nature	Edge effect
<i>Extent</i>	The impact is only expected to affect the site.
<i>Probability</i>	The impact may occur (Between a 25% to 50% chance of occurrence).
<i>Reversibility</i>	The impact is partly reversible but more intense mitigation measures are required.
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources

EDGE EFFECT		
<i>Duration</i>	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years)	
<i>Cumulative effect</i>	The impact would result in minor cumulative effects	
<i>Intensity/magnitude</i>	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	
<i>Significance Rating</i>	<p>Prior to mitigation measures: There will be a negative low impact i.e. the anticipated impact will have moderate negative effects and will require moderate mitigation measures</p> <p>After mitigation measures: After mitigation measures, a negative low impact will be achieved.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	2
Reversibility	2	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-26 (low negative)	-7(low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ The client should be responsible for implementing a programme of weed control ▪ The spread of exotic species occurring throughout the site should be controlled. ▪ All exotic vegetation must be removed from the site (if present). 	

Table 7: Rating of impacts related to bird collisions during operation

BIRD COLLISIONS		
Environmental Parameter	Biodiversity	
Issue/Impact/Environmental Effect/Nature	Bird Collisions	
<i>Extent</i>	The impact is only expected to affect the site.	
<i>Probability</i>	Impact will certainly occur (Greater than a 75% chance of occurrence).	
<i>Reversibility</i>	The impact is reversible	
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources	
<i>Duration</i>	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years)	
<i>Cumulative effect</i>	The impact could result in minor cumulative effects. The increase in power line infrastructure could be to the detriment of bird populations within the study area and mitigation measures must be put in place to avoid bird collisions.	
<i>Intensity/magnitude</i>	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	
<i>Significance Rating</i>	<p>Prior to mitigation measures: There will be a negative medium impact i.e. the anticipated impact will have moderate negative effects and will require intense mitigation measures</p> <p>After mitigation measures: After mitigation measures, a negative low impact will be achieved.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1

BIRD COLLISIONS		
Probability	4	2
Reversibility	1	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-28 (medium negative)	-7(low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ New bird diverters must be maintained on the power line. 	

- Bird Electrocutions

Table 8: Rating of impacts related to bird electrocutions during operation

BIRD ELECTROCUTIONS	
Environmental Parameter	Biodiversity
Issue/Impact/Environmental Effect/Nature	Bird Electrocutions
<i>Extent</i>	The impact is only expected to affect the site.
<i>Probability</i>	Impact will certainly occur (Greater than a 75% chance of occurrence).
<i>Reversibility</i>	The impact is reversible
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources
<i>Duration</i>	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years)
<i>Cumulative effect</i>	The impact could result in minor cumulative effects
<i>Intensity/magnitude</i>	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).

BIRD ELECTROCUTIONS		
<i>Significance Rating</i>	<p>Prior to mitigation measures: There will be a negative medium impact i.e. the anticipated impact will have moderate negative effects and will require intense mitigation measures</p> <p>After mitigation measures: After mitigation measures, a negative low impact will be achieved.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	2
Reversibility	1	1
Irreplaceable loss	2	1
Duration	3	1
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-28 (medium negative)	-7 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ New Bird diverters must be maintained on the power line. 	

Decommissioning Phase

The impacts of the proposed development on biodiversity during the decommissioning phase, both before and after mitigation measures, are provided in to below.

Table 9: Rating of impacts related to loss of habitat for red data / general species during decommissioning

LOSS OF HABITAT	
Environmental Parameter	Biodiversity
Issue/Impact/Environmental Effect/Nature	Loss of habitat for red data / general species
<i>Extent</i>	The impact is only expected to affect the site.
<i>Probability</i>	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).

LOSS OF HABITAT		
<i>Reversibility</i>	The impact is partly reversible but more intense mitigation measures are required.	
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources	
<i>Duration</i>	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).	
<i>Cumulative effect</i>	The impact would result in negligible to no cumulative effects and will eliminate any cumulative impacts that could occur during the operation phase.	
<i>Intensity/magnitude</i>	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	
<i>Significance Rating</i>	<p>Prior to mitigation measures: There will be a positive Low impact i.e. the anticipated impact will have negligible negative effects however mitigation measures must be implemented.</p> <p>After mitigation measures: After mitigation measures, the positive low impact persists.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	1	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	+8 (low positive)	+6(low positive)
Mitigation measures	<ul style="list-style-type: none"> ▪ Maintain footprint strictly during decommissioning ▪ Existing access roads must be used. ▪ All infrastructure must be removed from the site. ▪ A rehabilitation plan must be compiled by a qualified ecologist. ▪ Re-vegetation of affected areas must be made a priority to avoid erosion. 	

LOSS OF HABITAT	
	<ul style="list-style-type: none"> ▪ Suitable stormwater / wind controls must be put in place until rehabilitation is complete ▪ Constant removal of alien invasive species in and around plant. ▪ Update and implementation of the EMPr.

Table 10: Rating of impacts related to edge effect

EDGE EFFECT	
Environmental Parameter	Biodiversity
Issue/Impact/Environmental Effect/Nature	Edge effect
<i>Extent</i>	The impact is only expected to affect the site.
<i>Probability</i>	The impact may occur (Between a 25% to 50% chance of occurrence).
<i>Reversibility</i>	The impact is reversible with implementation of minor mitigation measures
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources
<i>Duration</i>	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
<i>Cumulative effect</i>	The impact would result in minor cumulative effects and will eliminate any cumulative impacts that could occur during the operation phase.
<i>Intensity/magnitude</i>	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
<i>Significance Rating</i>	<p>Prior to mitigation measures:</p> <p>There will be a positive low impact i.e. the anticipated impact will have moderate negative effects and will require moderate mitigation measures</p> <p>After mitigation measures:</p> <p>After mitigation measures, a positive low impact will be achieved.</p>

EDGE EFFECT		
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	2
Reversibility	1	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	3	1
Intensity/magnitude	1	1
Significance rating	+10 (low positive)	+7(low positive)
Mitigation measures	<ul style="list-style-type: none"> ▪ The contractor should be responsible for implementing a programme of weed control ▪ The spread of exotic species occurring throughout the site should be controlled. ▪ All exotic vegetation must be removed from the site (if present). 	

2(b) Surface Water Impact

A Surface Water Assessment was conducted by SiVEST and is included in Appendix D2.

From the field assessment an extensive network of drainage lines will be traversed by the proposed route alignments and no wetlands were found on the proposed development site. No surface water resources were identified at the site for the switchyard and substation and the planned access road. However, several drainage lines cross all three of the proposed power line routes. Route option 1a is affected by eleven (11) drainage lines, route option 1b is affected by thirteen (13) drainage lines whilst route option 1c is affected by six (6) drainage lines (Figure 8). However, the width of the identified drainage lines is not especially wide and it is anticipated that these will be able to be spanned by the proposed power line. From the assessment, Option 1c is considered the preferred power line alignment. However, even though Option 1c is the more suitable alternative in terms of fewer areas that will need to be crossed, it must be stated that each alternative is still a viable option as all the drainage lines across all the alternative power line options are likely to be able to be spanned.

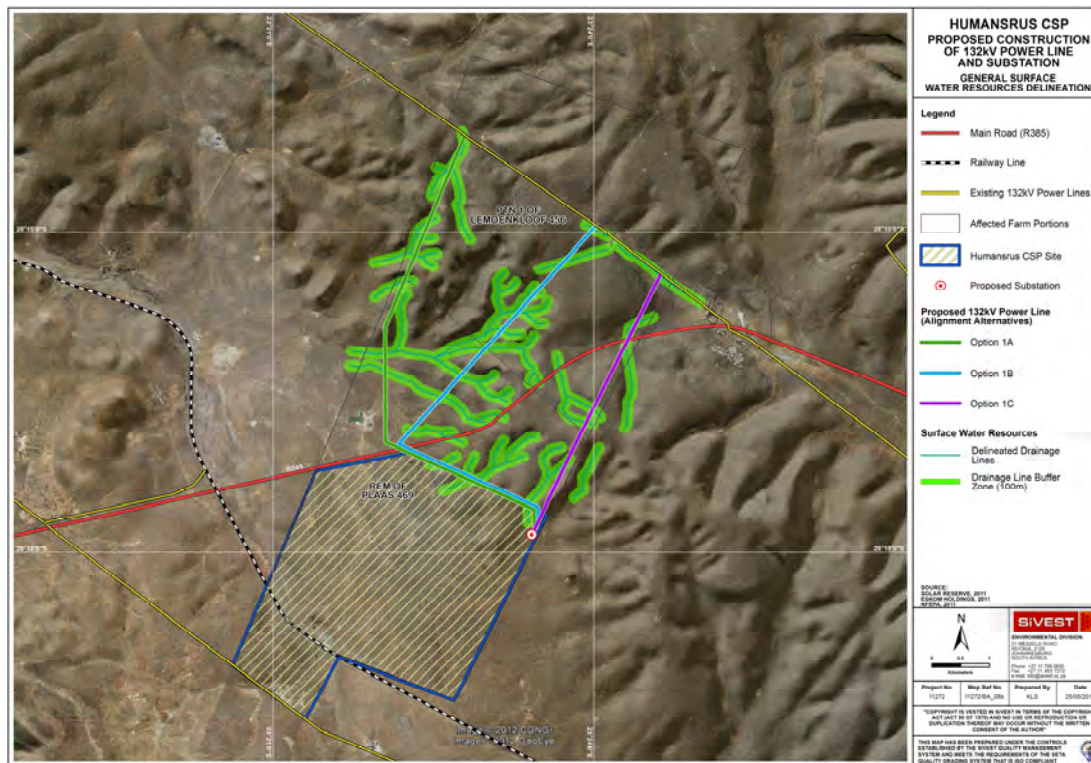


Figure 8: General surface water resources delineation map

In consideration of the types of surface water resources identified a buffer zone of 100m was applied to all the delineated drainage lines. The buffer zones are regarded as sensitive areas and no development should take place within these areas.

The proposed development may require a water use license should the structures and roads need to be constructed in a watercourse (drainage line), as the construction activities will most likely involve altering the bed, banks and characteristics of the watercourse. This will only be applicable once the final positions of the structures and roads have been finalised and whether (once finalised) the structure and road positions are indeed required to be placed within any of the various drainage lines. Ideally, the drainage lines are to be avoided to prevent unnecessary impacts. At this stage, it appears that all systems will be able to be spanned.

Construction Phase Impacts

Electricity towers are relatively large structures that require foundations in order for the structures to be fixed in place and remain standing. The process of excavating the foundations would disturb the substrate and result soil and vegetation being removed from under the tower footprint, as well as potential damage to vegetation and soils in the nearby area due to the movement of construction machinery in the vicinity. Moreover, sedimentation (due to excavated, erosion of exposed stockpiled soil and deposition via surface water run-off into nearby watercourses) can affect the functioning of a watercourse by causing pollution

(sediment). Exposed excavations are furthermore susceptible to erosion inside watercourses if left exposed and no mitigation measures are implemented to minimise or negate the possible impacts. Should these activities need to take place either inside or nearby any watercourses and the associated buffer zones, the aforementioned impacts are likely to take place if appropriate mitigation measures are not implemented.

Further impacts that are associated with the placing of towers in or near watercourses and the associated buffer zones include the presence and movement vehicles as well as the use of machinery near and/or in a watercourse. The use of vehicles and machinery may result in accidental leakages (fuel, oils and cement) and the consequent introduction of pollutants into these sensitive hydrological systems. Additionally, the movement of heavy construction vehicles and machinery into the watercourses and associated buffer zones could likely result in the physical degradation of soils by means of compaction or destruction of vegetation.

Finally, workers entering the watercourse and associated buffer zone areas for inappropriate activities (dumping of materials, depositing human faecal and urine waste etc.) may impact on the identified surface water resources. It is important that the aforementioned anticipated potential impacts are mitigated. Generic impact mitigation measures are provided below.

The impact rating and mitigation measures for the proposed 132kV power line and substation during the construction phase are provided in Table 11 below. The impacts are based on the worst case scenario which assumes that construction will need to take place inside the identified watercourses and associated buffers.

Table 11: Rating of impacts for placing electricity towers structures in the watercourse and associated buffer zone areas.

IMPACT ON WATERCOURSES	
Environmental Parameter	Watercourses (Drainage Lines)
Issue/Impact/Environmental Effect/Nature	Placing electricity towers structures in the watercourse and associated buffer zone areas
<i>Extent</i>	Local
<i>Probability</i>	Possible
<i>Reversibility</i>	Partly reversible
<i>Irreplaceable loss of resources</i>	Marginal loss of resource
<i>Duration</i>	Short term
<i>Cumulative effect</i>	Medium cumulative Impact

IMPACT ON WATERCOURSES		
<i>Intensity/magnitude</i>	Medium	
<i>Significance Rating</i>	Pre-mitigation significance rating is low but negative. With appropriate mitigation measures, the post mitigation impact rating can be significantly reduced.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-24 (low negative)	-7 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ A construction method statement must be supplied to a suitably qualified wetland or aquatic specialist in order that suitable site specific mitigation measures are devised for the construction phase, in addition to the measures specified here. ▪ Vehicle access into or through watercourses may only be allowed where absolutely necessary and after the requisite environmental authorisation and water use license has been obtained. ▪ Vehicles must be restricted to smaller vehicles where possible and not heavy vehicles to limit compaction impacts. The number of trips into or through the watercourses must be limited to the absolute minimum. ▪ In order to limit the amount of damage caused by vehicles, activity must be limited to a narrow track or "Right of Way" (ROW) only. This track should not be more than 5m wide. ▪ Heavy machinery and vehicles must be checked for oil leaks before operating in the watercourse or the associated buffer zones. Additionally, no fuelling or re-fuelling is allowed to take place in the watercourses and the associated buffer zone areas. ▪ The removal of excavated sub-soils or substrate of the watercourses for the foundations of the towers must take place only if completely necessary (i.e. if the excavated soil cannot be re-instated due to it being an unsuitable grade of backfill for the foundation of the structure etc.). Removed excavated soils will need to be dumped at a registered landfill that has sufficient capacity. ▪ Soil stockpiles should separate topsoils from sub-surface soils. Where excavated soils can be re-instated, the order of soils horizons should 	

IMPACT ON WATERCOURSES

be backfilled correctly (i.e. sub-surface soils first, topsoil last).

- All stockpiled soils should preferably be placed outside the identified watercourses. However, where this is not practical, the stockpiled soils should be placed next to the excavation pits. The stockpiles must be bunded by suitable material that can resist heavy rains and prevent increased run-off (for example fixed wooden planks or bricks). This will prevent erosion and sedimentation of the nearby sensitive hydrological systems.
- Any mixing of cement must either only take place over a covered surface nearby or beside the excavation pit. Cement mixing can take place in the load bin of a vehicle. It is important that no cement spills unnecessarily in the area around the tower construction area for risk of entering the watercourses.
- Sanitary facilities must be available for workers (at a ratio of 1 toilet to 15 workers) to use in order to prevent urine and faecal waste entering the watercourse and associated buffer zone areas. Importantly portable sanitary facilities are to be used and must be placed outside of the watercourse and associated buffer zone areas.
- Watercourses must be cordoned off around the construction areas and the RoW to prevent any unnecessary access by unauthorised personnel or vehicles. These areas must be identified as “no-go” zones.
- Vegetation must not to be damaged or removed unless they are located within the construction footprint of the towers or RoW tracks. Where sensitive vegetation is identified in the foot print of a tower, the relevant authority must be contacted and must advise on the most appropriate plan of action (i.e. removal and/or translocation).
- Stringing operations must be undertaken by hand where possible and not vehicles to limit ingress and associated damage through and across wetlands.
- The fitment of bird anti-collision devices over the watercourse sections of the power line must take place on the ground prior to stringing to prevent the need for vehicles to undergo operations in problematic areas (i.e. through watercourses).
- A site-specific post-construction wetland rehabilitation plan compiled by a suitably qualified wetland or aquatic specialist will be required to rehabilitate and monitor the affected watercourses and associated buffer zones where construction impacts have been caused.

Operational and Maintenance Phase Impacts

Maintenance activities will need to be carried out on the power line and the tower structures to ensure continued supply of electricity. Access will therefore be required in order for Eskom personnel to conduct maintenance activities along the power line alignments. Access will most likely be required by means of vehicles. As previously mentioned, vehicular activity into watercourse and the associated buffer zones can cause damage not only to the vegetation, but also to the substrate and soils. The vegetation and soil components are critical functional elements of watercourses and each depends on the unique properties or characteristics of one another. Once the properties and characteristics of a watercourse has been compromised or changed (for example compaction caused by vehicle movement), the natural dynamics and functioning of the watercourse may change. Mitigation measures are provided below to minimise anticipated damage and degradation during the operational phase.

The impact rating and mitigation measures for the proposed 132kV power line and substation during the operation and maintenance phase are provided in Table 12 below. The impacts are based on the worst case scenario which assumes that vehicles damage will take place inside the identified watercourses and associated buffers.

Table 12: Rating of impacts for vehicle damage to watercourses and associated buffer zones during maintenance.

IMPACT ON WATERCOURSES	
Environmental Parameter	Watercourses (Drainage Lines)
Issue/Impact/Environmental Effect/Nature	Vehicle damage to watercourses and associated buffer zones during maintenance
<i>Extent</i>	Site
<i>Probability</i>	Possible
<i>Reversibility</i>	Partly reversible
<i>Irreplaceable loss of resources</i>	Marginal loss of resource
<i>Duration</i>	Medium term
<i>Cumulative effect</i>	Medium cumulative Impact
<i>Intensity/magnitude</i>	Medium
<i>Significance Rating</i>	Pre-mitigation significance rating is low but negative. With appropriate mitigation measures, the post mitigation impact rating can be limited somewhat.
	Pre-mitigation impact Post mitigation impact

IMPACT ON WATERCOURSES		
	rating	rating
Extent	1	1
Probability	2	2
Reversibility	2	2
Irreplaceable loss	2	1
Duration	3	3
Cumulative effect	3	3
Intensity/magnitude	2	2
Significance rating	-26 (low negative)	-24 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ It is crucial that existing roads are used so that damage is limited. Where new service roads are required in the watercourses and the necessary environmental authorisations and water use licenses are obtained, these roads must be limited in extent (i.e. go directly to the desired tower) and will need to be maintained for erosion. ▪ Ideally, if service roads are required inside the watercourses, coarse gravel should be used as the infill. This material will not erode away after rainfall events and will provide a relatively solid foundation when surface water accumulates. Additionally, erosion will be limited by this material as opposed to exposed dirt roads. ▪ If dirt roads will be the means of access, these will have to be regularly checked for erosion. This should be done on a weekly to monthly basis and after short or long periods of heavy rainfall or after long periods of sustained rainfall. ▪ Where erosion begins to take place, this must be dealt with immediately to prevent severe erosion damage to the wetlands. Should severe erosion occur, a rehabilitation plan will be required and Input from a suitably qualified wetland or aquatic specialist must be obtained. 	

2(c) Agricultural Potential and Soil Impact

An Agricultural Potential and Soil Impact Assessment was conducted by SiVEST and is included in Appendix D3.

In terms of this study, agricultural potential is described as an area's suitability and capacity to sustainably accommodate an agricultural land use and in most cases this potential is benchmarked against crop production. By taking all the site characteristics (climate, geology, land use, slope and soils) into account the agricultural potential for the majority of the impacted study area is classified as being low for crop production, while moderately low for grazing. This poor agricultural potential rating is primarily due to restrictive climatic characteristics and soil depth limitations. The areas influenced by the proposed

developments are not classified as high potential nor are they unique dry land agricultural resource. Higher potential areas are precluded from the current development layout and no active agricultural fields will be impacted upon.

Land influenced by the power line alignments is classified as low potential grazing land, which can be seen as a non-sensitive land use in terms of agricultural production when assessed within the context of the proposed development. This is due to the fact that grazing, the dominant agricultural activity; can continue within the power line servitudes. The only loss of grazing land will be under the towers themselves and this loss is considered inconsequential within the context of this assessment.

The construction of the proposed substation will entail the clearing of vegetation and leveling of the area. This will effectively eliminate the lands agricultural potential in terms of crop production and grazing for as long the development persists. However, the total land area lost to this development is only 0.5ha. The remaining land will continue to function as they did prior to the development.

The site can be classified as having a low agricultural value and is replaceable when assessed within the context of the proposed development. Consequently, the overall impact of the substation on the study area's agricultural potential and production will be negligible due to the site's low inherent agricultural potential. The proposed substation site does not influence active agricultural fields

There are no centre pivots, irrigation schemes or active agricultural fields which will be influenced by the proposed developments and as such there are no problematic or fatal flaw areas for the Lemoenkloof Site.

The impact rating and mitigation measures for the proposed 132kV power line and substation are provided in Table 13 and Table 14 below.

Table 13: Rating of impacts related to the loss of agricultural land and / production as a result of the proposed 132kV power line

IMPACT ON AGRICULTURAL LAND AND PRODUCTION	
Environmental Parameter	Soil and agricultural potential
Issue/Impact/Environmental Effect/Nature	Loss of agricultural land and / or production as a result of the proposed construction of the 132kV power line
<i>Extent</i>	Site
<i>Probability</i>	Definite
<i>Reversibility</i>	Completely Reversible
<i>Irreplaceable loss of resources</i>	Marginal Loss
<i>Duration</i>	Long Term

IMPACT ON AGRICULTURAL LAND AND PRODUCTION		
<i>Cumulative effect</i>	Negligible Cumulative Impact	
<i>Intensity/magnitude</i>	Low	
<i>Significance Rating</i>	The anticipated impact will have negligible negative effects and will require little to no mitigation.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	4
Reversibility	1	1
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-12 (low negative)	-12 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ Due to the overarching site characteristics and the nature of the proposed development viable mitigation measures are limited and will most likely revolve around erosion control: <ul style="list-style-type: none"> ○ Clearing activities should be kept to a minimum. ○ In the unlikely event that heavy rains are expected activities should be put on hold to reduce the risk of erosion. ○ If additional earthworks are required, any steep or large embankments that are expected to be exposed during the 'rainy' months should either be armoured with fascine like structures. ▪ If earth works are required then storm water control and wind screening should be undertaken to prevent soil loss from the site. 	

Table 14: Rating of impacts related to the loss of agricultural land and / production as a result of the proposed substation

IMPACT ON AGRICULTURAL LAND AND PRODUCTION	
Environmental Parameter	Soil and agricultural potential
Issue/Impact/Environmental Effect/Nature	Loss of agricultural land and / or production as a result of the proposed construction substation (10 000 m2 footprint)
<i>Extent</i>	Site
<i>Probability</i>	Definite
<i>Reversibility</i>	Barely Reversible

IMPACT ON AGRICULTURAL LAND AND PRODUCTION		
<i>Irreplaceable loss of resources</i>	Marginal Loss	
<i>Duration</i>	Long Term	
<i>Cumulative effect</i>	Negligible Cumulative Impact	
<i>Intensity/magnitude</i>	Low	
<i>Significance Rating</i>	The anticipated impact will have negligible negative effects and will require little to no mitigation.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	4
Reversibility	3	3
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-14 (low negative)	-14 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ Due to the overarching site characteristics and the nature of the proposed development viable mitigation measures are limited and will most likely revolve around erosion control: <ul style="list-style-type: none"> ○ Clearing activities should be kept to a minimum. ○ In the unlikely event that heavy rains are expected activities should be put on hold to reduce the risk of erosion. ○ If additional earthworks are required, any steep or large embankments that are expected to be exposed during the 'rainy' months should either be armoured with fascine like structures. ▪ If earth works are required then storm water control and wind screening should be undertaken to prevent soil loss from the site. 	

2(d) Heritage Impact

A Heritage Assessment was conducted by PGS, prior to the substation site and power line routes being amended. This study is included in Appendix D4.

Archival research of the study area shows that the area between Postmasburg and Daniëlskuil generally referred to as the Ghaap plato. This area has a rich history of occupation from the Stone Age with hunter

gatherers to the Thlaping and Thlaro during the Iron Age period. The 1800's saw the rise of the Griqua people in the area and their loss of sovereignty after 1880 to Cape rule.

A field survey of the three alignments was conducted in March 2012 with the aim of conducting an archaeological survey of the alignments. Due to the nature of cultural remains, with the majority of artefacts occurring below the surface, a controlled-exclusive surface survey was conducted over a period of two (2) days on foot by an archaeologist of PGS.

Only one definitive heritage site was identified during the field survey within the alignment of option 1a. A small informal cemetery with four (4) graves was identified approximately 350m to the east of the farmstead on Humansrus Farm. The cemetery was fenced, but the fence has fallen down in some places. The graves were placed in a single line next to each other and all of them were orientated from west to east. The graves were not maintained and were overgrown with grass and other vegetation. The negative impact of route alignment option 1a on the cemetery without mitigation is regarded to be high.

It should be noted that the route alternatives and substation site were adjusted subsequent to the heritage field work being undertaken. As such, a short section of Option 1a and 1b where it follows the northern boundary of the Humansrus site, as well as short section of Option 1a directly north of the proposed substation site were not assessed as part of the Heritage Assessment. As it cannot be verified that no heritage resources are located within these sections of the routes, it is stipulated in the EMP that a heritage walk down must be undertaken prior to finalising the tower positions. In this way the heritage walk down will be used to inform the final tower locations and mitigate the impact of the proposed project on any heritage resources.

Impacts on Heritage Resources

The impact rating and mitigation measures for the proposed development on heritage resources discovered on the site during the fieldwork and probable impacts on undiscovered heritage resources are presented in Table 15 below.

Table 15: Rating of impacts on Heritage Resources

IMPACT ON HERITAGE RESOURCES	
Environmental Parameter	Destruction of Cemetery – Alignment Option 1a
Issue/Impact/Environmental Effect/Nature	Destruction of cemeteries during construction
<i>Extent</i>	Site - limited to the site where the cemetery occurs on option 1a.
<i>Probability</i>	Possible - if no mitigation measures have been applied
<i>Reversibility</i>	Completely reversible - only reversible by selecting another route alignment (option 1b or 1c). If option 1a is

IMPACT ON HERITAGE RESOURCES		
	selected as the preferred alignment the impact will be irreversible and relocation will be required.	
<i>Irreplaceable loss of resources</i>	Complete loss of resources - cultural resources are irreplaceable	
<i>Duration</i>	Permanent - if the cemetery is not avoided and destroyed without mitigation measures the loss will be permanent.	
<i>Cumulative effect</i>	Low cumulative impact	
<i>Intensity/magnitude</i>	Very high	
<i>Significance Rating</i>	High negative	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	1
Reversibility	1	1
Irreplaceable loss	4	1
Duration	4	1
Cumulative effect	2	1
Intensity/magnitude	4	2
Significance rating	-60 (high negative)	-12 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ Adjust alignment option 1a and demarcate the cemetery site with at least a 10 meter buffer or select another route alignment (option 1b or 1c). ▪ In the event that sites cannot be avoided a grave relocation process, as described in Section 5 of the Heritage Impact Assessment (included in Appendix D4), needs to be implemented. ▪ A walk down must be undertaken by the heritage specialist prior to finalising the tower positions and commencing with construction. This will be done in order to mitigate and manage the impact of the proposed project on any heritage resources. 	

Impacts on Cultural Landscapes

Heritage significance of the cultural landscape is derived from the interaction between the natural landscape, such as valleys, undulating plains and rivers courses usually framed by mountain ranges or accentuated by ridges and koppies, and access routes, human settlements and farmsteads. Also

interacting with these physical entities are intangible and historic landscapes and events that are known to have added to the cultural fabric of a place or area.

The evaluation of the study area and surrounds show that the area is rich in heritage resources which span the archaeological to historical timeframe.

The cultural landscape of the study area has an agricultural rural appearance, with industrial activities associated with the proposed electrical energy generation in the form of the proposed Humansrus Solar Park to the south of the proposed alignment.

The larger study area is already impacted and sensitized towards infrastructure, notably the railway lines, roads (tarred and dirt) as well as some power lines to the northern parts of the alignments area. The addition of the new alignments and substation may however aggravate the cumulative effect of this infrastructure type on the cultural landscape.

The visual impact of the proposed power line and substation on the cultural landscape were addressed in the Visual Impact Assessment and the findings are detailed in item 2(e) below.

The impact rating and mitigation measures for the proposed development on the cultural landscape are presented in Table 16 below.

Table 16: Rating of impacts on the Cultural Landscape

IMPACT ON HERITAGE RESOURCES	
Environmental Parameter	Cultural Landscape
Issue/Impact/Environmental Effect/Nature	Changes to cultural landscape by new power line and substation
<i>Extent</i>	Local / district - limited to visibility of the development
<i>Probability</i>	Probable - due to visibility of power line
<i>Reversibility</i>	Irreversible – the visual impact cannot be mitigated
<i>Irreplaceable loss of resources</i>	Marginal loss - reversible after decommissioning of the line
<i>Duration</i>	Long term – the impact will last the entire operational life of the development
<i>Cumulative effect</i>	High - combined with the construction and operation of the Humansrus Solar Park the cumulative impact is seen as high
<i>Intensity/magnitude</i>	Medium

IMPACT ON HERITAGE RESOURCES		
<i>Significance Rating</i>	Medium negative	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	3
Reversibility	4	2
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	4	2
Intensity/magnitude	2	1
Significance rating	-36 (Medium negative)	-14 (Low negative)
Mitigation measures	<ul style="list-style-type: none"> Refer to the recommendations of the visual specialist detailed Section E below. 	

2(e) Visual Impact

A Visual Impact Assessment (VIA) was conducted by SiVEST and is included in Appendix D5. The findings of the assessment are outlined below.

- Visual Character and Sensitivity of the Surrounding Area

It was established that due to the topographical and vegetative characteristics of the area, a viewer in the study area will have a general impression of a natural, rural area in which the topography is largely hilly. The generally low degree of human habitation and minimal obvious impact on the landscape provokes a largely natural, rural feel in the area. This would normally engender the area with a relative degree of visual sensitivity, as any large-scale infrastructural development would be likely to alter this visual character. However, the existing presence of mining activities in the wider area that are typically responsible for the introduction of large scale, highly visible industrial infrastructure, in combination with the very low density of receptor locations that would be potentially sensitive to the introduction of the power line will reduce the visual sensitivity of the area. In addition to the proposed PV plant from where the power line would run, a CSP (concentrating solar power) plant is also being proposed on the Humansrus site. When one considers the potential impact of the proposed solar power plants (CSP and PV) at the Humansrus site on the visual character and baseline on the site, the visual sensitivity of the area would markedly decrease. The CSP power plant as proposed is a power tower-type, solar power plant that would consist of a massive central tower arranged around a very large number of mirrors which would focus the sun's rays onto it. The scale of this infrastructure would mean that within the surrounds of the plant the visual character would be altered from a natural / rural one into an industrial-type character, with a much lesser sensitivity level.

Taking all of these factors into account, two scenarios from a visual sensitivity perspective are present:

- **Under the current baseline** the absence of any formal protected areas or leisure / nature-based tourism activities coupled with the very low density of human habitation provides the area with a low to moderate degree of visual sensitivity.
 - **Under the scenario in which the solar power plant would be developed**, the study area would have a very low degree of visual sensitivity.
- Presence and Location of Sensitive Visual Receptors

A sensitive receptor is defined as a receptor which could experience a potential adverse visual impact resulting from a development such as the proposed power line and substation. The table below lists all of the potential receptor locations identified that would be potentially visually affected by the proposed power line and substation. The table includes those receptor locations within a 5km radius of the development site.

Receptor Location	Distance Band Zone in which Receptor is located
Owendale Mining Village	1000m-200m
Humansrus Farmstead	0m-500m
Groenwater Farmhouses	2000m-5000m
Darehope Farmstead	2000m-5000m
Lemoenkloof Farmstead (abandoned)	0m-500m

The location of the visual receptors with respect to the proposed power line alternatives and substation site are illustrated on the map below.

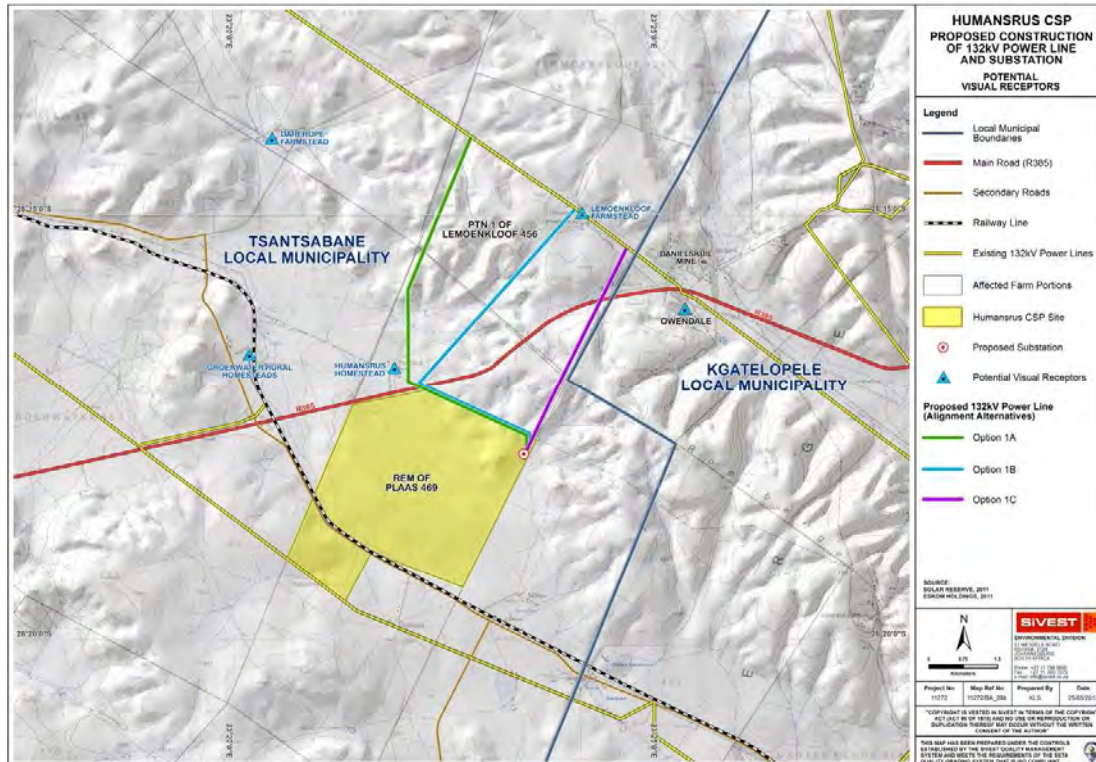


Figure 9: Potential Visual Receptors

The Owendale Mining Village is apparently used on a short-term basis for mining-related accommodation needs and thus is unlikely to be sensitive to visual impacts related to the power line. The farm workers' houses near the Groenwater Farmstead are unlikely to be sensitive to the power line as they are relatively far from the new proposed line alternatives and are located in close proximity to the existing power lines. The Lemoenkloof Farmstead is currently abandoned and uninhabited, and has only been included as it could theoretically be reoccupied, however for practical purposes it cannot be considered sensitive. The Humansrus Farmstead is the closest farmstead to the proposed line, however this farmstead belongs to the owner of the property across which the power line would run and on which the solar power plant would be built. For this reason, it is unlikely that the owner would be sensitive to the visual impacts associated with the power line, and thus this farmstead has not been listed as a sensitive receptor. The last remaining farmstead is the Darehope Farmstead. It is not known whether this farmstead is inhabited, but as it is situated in a highly natural context away from significant infrastructure, it has been listed as a sensitive receptor location. Thus only one static sensitive receptor location exists within the study area.

In many cases, roads, along which people travel, are considered as sensitive receptors. Two public roads traverse the area around the development site. The primary thoroughfare through the area is the R385 provincial (tarred) road. The road is the primary access road into Postmasburg from the areas to the east, and carries much of the local access traffic to and from the town. The road is not part of a scenic tourist route, and is not valued or utilised for its scenic or tourism potential. The road would therefore not

typically be classed as a sensitive receptor road – i.e. a road along which motorists would object to the potential visual intrusion posed by power lines. However, the road in the vicinity of the site traverses hilly ground in close proximity to the proposed alignments rising up into, and then descending down from the hilly ground. Thus while the road cannot be considered to be sensitive, consideration should be given in the planning of the power line routing to affecting the scenic and aesthetically quality of the journey through this area as little as possible, so as to maintain the scenic integrity of this part of the route.

- Likely Impacts on Static Receptor Locations

As described above, the only likely sensitive receptor location in the study area is the Darehope Farmstead. This farmstead is located within a valley bottom, which is an important topographical factor as its viewshed is thus likely to be restricted by the higher, hilly ground to the east. The closest power line alternative is located about 3.5km to the east. Although distance factor is important in reducing the intensity of the visual impact, the shielding offered by topography is a much more important factor and the hilly ground between the receptor location and the nearest lines would mostly shield the line completely from view. An analysis completed in Google Earth, whereby the height of the power line alternatives were raised to a worst case scenario maximum height of 22m above ground level has indicated that only a very small length of the most western alternative (Option 1a) would be visible from this location. The Google Earth analysis does not take into account the further screening effect of vegetation, both at the receptor location itself and in the area in between. Taking this factor into account, the likely impact of the proposed power line in this context on the receptor location is likely to be minimal.

Although not considered sensitive, the potential impact of the line alternatives on the receptor locations at the (abandoned) Lemoenkloof Farmstead, and the Humansrus Farmstead can be considered. The Lemoenkloof Farmstead is located at the foot of a hill. The closest line is Option 1b (to the west) and Option 1c (to the east). Due to the location of the farmstead, topography would similarly play a big role in shielding most of the line from view for any future inhabitants – only the last span of either alternatives of the proposed line would be visible as it enters the valley to join to the existing lines. The presence of a clump of large eucalyptus trees near the house would provide further screening towards in the direction of Option 1c – the direction of the typical orientation of the house.

The farm Humansrus is in a much more open location. The most western alternative (Option 1a) runs very close to the farmstead and thus it would be highly visible in the flat setting. The power line would be highly visible, but the degree of intrusiveness of the proposed power line can be debated. The farmhouse would be located very close to the boundary of the CSP solar plant site, and as such this would be likely to completely dominate the immediate visual environment due to its size. In this context the proposed power line is unlikely to be considered visually intrusive. However, placing the proposed power line along one of the other two alternatives, away from the farmstead may be more optimal in order to negate any potential negative visual influence of the line on the farmstead.

The remaining two static receptor locations (the Owendale mining village) and the Groenwater Farm houses are unlikely to be sensitive to visual impacts. The distance factor, as well as the context of the

much greater visibility of the solar power plant will also negate any visual impact associated with the line at the Groenwater Farmstead. The temporary inhabitants of the Owendale Mining accommodation are unlikely to be sensitive to the proposed power line. In any event only a portion of the option 1c alternative would be visible, and the presence of trees and vegetation at the village would screen views towards the proposed line.

To sum up the above, the impacts of the proposed line on static receptor locations would be likely to be negligible, due to a combination of the shielding impact of topography and the likely low level of sensitivity of any of the locations.

- Potential Impacts Associated with the Proposed Substation

The substation is proposed to be located approximately 2km to the south-east of the R385 road adjacent to the solar power plants being proposed on the Humansrus site. On its own, the substation's location relatively close to an important arterial road in a rural context, may be considered to be visually intrusive. However, it must be assumed that if the substation were to be built that the PV power plant would be developed as well. The substation would be likely to form part of this solar power plant complex, as viewed from the road and the Humansrus farmstead. Although the final layout and components of the solar power plants are not known, it is assumed that the power plant would take up most of the site. Thus the substation would be likely to be seen as part of the solar power plants. It is likely to be dwarfed by the components on the solar power plants, and not be responsible for any visual impacts on its own.

- Potential Visual Impact for Travelers on the R385 Road

Although the road is not considered to be a sensitive receptor road, the relative visual impact of the three alternatives on the road can be considered as part of the comparative assessment of the alternatives. All of the three alternatives would be visible for motorists approaching the proposed power line alternatives from the west. The line in this area would form part of the much larger and visually intrusive power plant context and would not draw attention on their own. Overall, none of the power line alternatives would be responsible for a significant visual intrusion at any point along the R385 road as it traverses the study area, mainly due to the shielding impact of topography, and the mobile nature of the viewer along the road which would make all views transient. The presence of a lay by, at which people could stop to enjoy the view of the natural hilly ground to the north-west is the only factor that provides a reasonable motivation to choose one alignment over the others from a visual perspective. Viewers at this point would be drawn to the towers and servitude across the hilly ground, and clearing a servitude of vegetation is likely to be a visual focal point. This 'line' or 'band' across the landscape (where visible) would draw attention, as it would create an artificial line in an otherwise natural landscape of hilly bushveld vegetation characterised by an amorphous vegetative texture.

Option1c was recommended as the preferred alignment from a visual perspective. The area to the south of the road is largely shielded from view by the terrain which rises up from the road. Motorists would not see the lines from the R385, other than from a short section of road just north of the Humansrus site and

where Option 1a crosses the road near the Owendale Mining housing complex. Where Option 1a and 1b run along the northern boundary of the Humansrus site the lines would form part of the view of the solar plant complex. However, Alternative 1a and 1b both run up into the hilly ground behind (to the north of) the Humansrus Farmstead and both alignments would cross over the spurs, or highest-lying ground in this hilly terrain. Towers placed in these positions would be highly visible from the areas to the south. These towers would be likely to 'break' the horizon, being visually intrusive in an otherwise natural landscape context.

The overall visual impact rating before and after mitigation measures is provided in Table 17 below.

Table 17: Rating of Visual Impacts

VISUAL IMPACT		
Environmental Parameter	Visual Impact	
Issue/Impact/Environmental Effect/Nature	The proposed power line and substation could create a visual impact on sensitive receptors in the study area by creating visual change and visual intrusion	
<i>Extent</i>	Local / District (2)	
<i>Probability</i>	Possible (2)	
<i>Reversibility</i>	Partly reversible (2)	
<i>Irreplaceable loss of resources</i>	No loss of resources (3)	
<i>Duration</i>	Long term (3)	
<i>Cumulative effect</i>	Low cumulative impact (2)	
<i>Intensity/magnitude</i>	Low (1)	
<i>Significance Rating</i>	The pre-mitigation significance rating is low but negative and will require little to no mitigation.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	2
Reversibility	2	2
Irreplaceable loss	3	2
Duration	3	3
Cumulative effect	2	2
Intensity/magnitude	1	1
Significance rating	-14 (low negative)	-14 (low negative)

VISUAL IMPACT	
Mitigation measures	<ul style="list-style-type: none"> Use alignment option 1c that avoids impacting the aesthetic quality of the R385 as it runs through the hilly ground in the study area.

2(f) Social Impact

A Social Impact Assessment was conducted by MasterQ Reserach and is included in Appendix D6. The findings of the assessment are outlined below.

The social study assessed impacts that are expected to result from proposed project by categorising them according to change processes. A change process is defined as a change that takes place within the receiving environment due to direct or indirect intervention (cf. Vanclay, 2002). Impacts follow because of the change processes taking place, once they are experienced by an individual / community on a physical and / or cognitive level.

The various change processes associated with the proposed construction and operation of the proposed 132kV power line and substation include the following:

- Geographical processes, which refer to the processes that affect the land uses of the local area.
- Demographical processes, which refer to the composition and structure of the local community.
- Economic processes, which refer to the movement of money between industries and between industries and consumers.
- Institution and Legal processes, which refer to the processes that affect service delivery to the local area.
- Socio-cultural processes, which refer to the processes that affect the local culture, i.e. the way in which the local community live (however, sometimes different cultural groups occupy the same geographical area and these groups are seldom homogenous).

The social impacts resulting from each change process that are expected to result during each project phase are summarised in Table 18 below.

Table 18: Social Impact Summary

Project Phase	Impact Type	Potential Issues and Impacts
Pre-Construction	Geographical	<p>No structures or socio-economically important land uses were found within the potential servitude of any of the distribution line route options.</p> <p>The nearest town to the power line routes is Owendale which is approximately 5.5 km away from the</p>

Project Phase	Impact Type	Potential Issues and Impacts
		<p>substation and 1.3 km away from the nearest power line. Owendale and two isolated homestead fall outside the specified servitude of 31m for the 132kV distribution line; therefore no concerns relating to displacement of households.</p> <p>The power line crosses the R385, however, no pre-construction related socio-economic impacts on the local road system are expected.</p> <p>The nearest airfield is approximately 8km away from the project site and therefore no significant impacts on the airfield are expected.</p>
	Institutional & Legal	<p>Not communicating the land use change with the airfield operators or road maintainers may impinge on the rights of the users to be informed about changes in their surroundings and potential impacts thereof.</p> <p>Issues of compensation may need to be negotiated between Eskom Land and Rights and the affected landowner. Financial gain received by landowners as compensation for the potential loss of livelihood may positively impact on landowners.</p>
Construction	Geographical	<p>Temporary change in landscape character and use of green farmland due to site clearance and excavation works.</p> <p>Temporary economic impacts, in the form of partial loss of income on the farm owner due to loss of farm produce as a result of clearance if of construction footprint.</p>
	Demographic	<p>Temporary change in the size of the population within the affected local area, due to the arrival of the construction team.</p> <p>Minimal impacts expected due to influx of workers from elsewhere (at least 8 workers), as most job seekers will be from the local area (potentially 25 local workers).</p>

Project Phase	Impact Type	Potential Issues and Impacts
	Economic	Potential employment opportunities for unskilled labour from the local communities. This will make up to approximately 80% of the total workforce required for the substation and power line.
	Institutional & Legal	<p>Temporary presence and location of a construction camp and factors such as access to the construction site(s), access to municipal services, and access to materials have implications on socio-cultural problems for the surrounding communities. Left unmanaged problems, including health problems in the form of prostitution, sexually transmitted diseases and unplanned pregnancies could occur.</p> <p>Infrastructure and services (e.g. water and sanitation) that are <u>not</u> managed and maintained properly within a construction camp can lead to waterborne diseases such as cholera.</p> <p>Alcohol abuse, and resultant criminal activities such as rape and theft, could result in breakdown of any social cohesion that may have existed.</p> <p>The above impacts are expected to be minimal due to a small number of workers from outside expected to be accommodated at the site camp.</p>
	Socio-Cultural	Potential conflict situations could arise between construction workers and local community members - particularly where there is a marked dissimilarity in social practices, and if "migrant workers" take job opportunities from the local people.
Operations & Maintenance	Geographical	Permanent change in the landscape, although land to be occupied is considerably small compared to the vast amount of open spaces that will be left intact by this development.
	Economic	Improved fuel supply and economic growth due to increased electricity transmission. Expansion of businesses and establishment of new ones will not be hindered by shortages of power, to a certain extent.
	Socio-Cultural	The visual presence of the transmission line could

Project Phase	Impact Type	Potential Issues and Impacts
	(specifically sense of place)	affect the sense of place for the local community.

Overall it is foreseen that this project will not significantly impact on the local socio-economic environment.

It should be noted, that the route alternatives and substation site were adjusted subsequent to the social impact assessment being undertaken. However, no on-site impacts were identified and the project amendments did not alter the results of the social assessment. The findings of the social assessment recommended that the most practical route, with the shortest distance to follow and less line to potentially construct, should be constructed (option 1c). However, the differential impacts between the three route options were considered negligible.

Pre-construction Phase Impacts

The overall pre-construction impact rating before and after mitigation measures are provided in Table 19 and Table 20 below.

Table 19: Rating related to geographical change process during pre-construction

GEOGRAPHICAL CHANGE PROCESS	
Environmental Parameter	Any changes and/or alterations to be made on the socio-economic landscape in terms of geography. This includes the potential for relocating houses, affecting farmland and changing infrastructure. In terms of this project it was reasoned that a servitude of 31m would be upheld and that avoidance of any and all human/commercial/social infrastructure and activities can and should be achieved. In addition route alignment 2 is preferred as, differences between routes are negligible as regards impact status, but route 2 is the shortest which will likely assist in reducing sense of place and construction phase impacts as the construction period would likely be shorter, as will the line distance.
Issue/Impact/Environmental Effect/Nature	Minor effects on agricultural practices relating to a clearing of the servitudes for the power line and clearing of a 10 000m ² zone for the substation.
<i>Extent</i>	The effect will be site related only.
<i>Probability</i>	Definite.

GEOGRAPHICAL CHANGE PROCESS		
<i>Reversibility</i>	Completely reversible as the vast amounts of available land and low presence of crops would mean that the impact due to land lost to the presence of new infrastructure could be easily overcome.	
<i>Irreplaceable loss of resources</i>	There would only be a marginal loss of resources.	
<i>Duration</i>	Short term - as any loss of land could easily be negated by introducing minor mitigation measures.	
<i>Cumulative effect</i>	Negligible cumulative effects would arise and overall it is expected that these would result in small shifts in land use at most.	
<i>Intensity/magnitude</i>	Low intensity	
<i>Significance Rating</i>	Negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	1
Reversibility	1	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-10 (low negative)	-6 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ Engage in thorough, open, and constructive consultation with any and all land owners. ▪ Maintain servitudes throughout the pre-construction planning process and construction process. 	

Table 20: Rating of impacts related to institutional and legal processes during pre-construction

INSTITUTIONAL & LEGAL PROCESSES	
Environmental Parameter	Institutional and Legal Change Processes gauge the way in which a development of this nature could change the face of service delivery in the affected area and how this change in turn could affect the quality of life of local residents. During pre-construction a main concern is for the outcome of power relations emanating from negotiation processes.

INSTITUTIONAL & LEGAL PROCESSES		
Issue/Impact/Environmental Effect/Nature	The need for relocation of homes and/or a disturbance of the geographical status quo can and should be avoided. This table outlines potential effects should the proponent decide to take up a route that could encroach upon private, commercial, or institutional land. Therefore, the institutional and legal effects in this case relate directly to the potential for conflict and a community backlash should negotiation processes and the infringement on other land uses take place.	
<i>Extent</i>	The extent would be limited to the exact area of the 'site' that traverses existing land uses.	
<i>Probability</i>	This impact is unlikely as the necessity for traversing important or valuable infrastructure is very low.	
<i>Reversibility</i>	The impact is partly reversible through negotiation processes that are open, honest, and professionally conducted.	
<i>Irreplaceable loss of resources</i>	Marginal loss.	
<i>Duration</i>	This would likely be a short term impact.	
<i>Cumulative effect</i>	A cumulative effect of a breakdown in relations between the proponent and the community can result in a backlash, bad public relations for the proponent, and the potential for legal proceedings. These could all serve to delay the project. This would be a medium cumulative effect.	
<i>Intensity/magnitude</i>	Medium intensity.	
<i>Significance Rating</i>	Negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	1	1
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-22 (low negative)	-6 (low negative)

INSTITUTIONAL & LEGAL PROCESSES	
Mitigation measures	<ul style="list-style-type: none"> ▪ To ensure that any negotiations that do take place are conducted openly, with respect to land owners, and with the best interests of all parties at the forefront. ▪ To avoid traversing areas near to infrastructure as this appears to be entirely possible.

Construction Phase Impacts

The overall construction impact rating before and after mitigation measures are provided in Table 19, Table 21, Table 22 and Table 23 below.

Table 21: Rating related to demographic change process during construction

DEMOGRAPHIC CHANGE PROCESSES	
Environmental Parameter	Demographic change processes refer to any changes impacting on the nature, composition, size, and appearance of a community or populated area.
Issue/Impact/Environmental Effect/Nature	<p>At current there are a number of settlements near to the site location for the substation and near to the proposed line routes. The settlements range from mining villages to farming towns, with associated small suburban areas.</p> <p>Potential impacts include:</p> <ul style="list-style-type: none"> ▪ Influx of construction workers. This is predicted to be a small impact as relatively few workers are expected. ▪ In-migration of job seekers. This is expected to be a minor impact should job seekers arrive as the project is not one generally associated with a large influx of employment seekers.
<i>Extent</i>	The extent would be limited to the local area/district.
<i>Probability</i>	Unlikely (The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence). This is due to the relatively small nature of the project, the low number of construction workers expected to arrive, and the low expectation of job seekers.
<i>Reversibility</i>	The impact is partially reversible. The workers are only contracted to be present temporarily but the effects on local areas may be irreversible should unwanted pregnancies occur, if disease becomes prevalent, and if the presence of job seekers results in the spread of

DEMOGRAPHIC CHANGE PROCESSES		
	informal settlements.	
<i>Irreplaceable loss of resources</i>	Marginal loss.	
<i>Duration</i>	The effects of this would likely be medium term in nature.	
<i>Cumulative effect</i>	The cumulative effects of spreading informal settlements, introducing disease, engaging in unsafe sexual practices, and abusing substances could be medium in nature.	
<i>Intensity/magnitude</i>	Medium intensity.	
<i>Significance Rating</i>	Negative low impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	1	1
Reversibility	2	1
Irreplaceable loss	2	2
Duration	2	1
Cumulative effect	3	1
Intensity/magnitude	2	1
Significance rating	-24 (low negative)	-7 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ Instruct construction workers, prior to arrival, as to the appropriate conduct on site, and to control substance abuse/use. ▪ To inform communities prior to any intervention that few or no job opportunities are available so as to reduce the likelihood of any job seekers arriving. 	

Table 22: Rating of impacts related to economic change processes during construction

ECONOMIC CHANGE PROCESSES	
Environmental Parameter	Economic impacts pertain to the effects that the project will have on micro- and macro- economic, commercial, financial, and values-based phenomena.
Issue/Impact/Environmental Effect/Nature	A predicted impact during construction, regardless of the route decided upon, is the provision of jobs to local people.
<i>Extent</i>	This would affect the local area/district.

ECONOMIC CHANGE PROCESSES		
<i>Probability</i>	Highly probable as the proponent has stated that 80% of labour will be sourced locally.	
<i>Reversibility</i>	The impact is partly reversible.	
<i>Irreplaceable loss of resources</i>	No loss of resources.	
<i>Duration</i>	The effects of this would likely be medium term in nature, or for the duration of the project construction process.	
<i>Cumulative effect</i>	The cumulative effects of empowering unemployed people are high but, in this instance, no more than 25 people are expected to receive employment – therefore the regional cumulative effects will be low and relatively short-lived, overall there will be a medium cumulative effect.	
<i>Intensity/magnitude</i>	Medium.	
<i>Significance Rating</i>	Low positive impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	4
Reversibility	2	3
Irreplaceable loss	1	1
Duration	2	2
Cumulative effect	3	3
Intensity/magnitude	2	2
Significance rating	+26 (low positive)	+30 (medium positive)
Mitigation measures	<ul style="list-style-type: none"> ▪ Ensuring that local employment be used as far as possible. ▪ Ensuring that Eskom adhere to local employment intentions. ▪ Effectively communicating the number and types of jobs available to surrounding communities. 	

Table 23: Rating of impacts related to socio-cultural processes during construction

SOCIO-CULTURAL PROCESSES	
Environmental Parameter	Socio-cultural processes relate to the way in which humans behave, interact and relate to each other and their environment, as well as the belief and value systems which guide these interactions. In addition, the

SOCIO-CULTURAL PROCESSES		
	change processes relate to any impacts that may disrupt the socio-cultural status quo locally.	
Issue/Impact/Environmental Effect/Nature	<p>The presence of construction workers may result in upsetting the local status quo as regards socio-cultural on goings. This may take place in the following ways:</p> <ul style="list-style-type: none"> ▪ Possible increases in prostitution, ▪ STIs and HIV increases, ▪ Upsetting of socio-cultural norms locally through conflict and differences between language, racial, and/or religious groups. <p>It is expected that such effects would be mild in nature as the number of incoming workers is very <i>low</i>.</p>	
<i>Extent</i>	This would affect the local area/district.	
<i>Probability</i>	The impact is unlikely.	
<i>Reversibility</i>	Should the impact occur it would be unlikely to be reversed even with intense mitigation measures.	
<i>Irreplaceable loss of resources</i>	A loss of resources may arise through the spread of disease, should this occur.	
<i>Duration</i>	The effects of disease may last for some time after the construction workers have left, while intra-group conflict, should it arise, may also hold moderate longevity.	
<i>Cumulative effect</i>	Possible cumulative effects include familial upheaval due to unwanted pregnancies, death and negative health effects associated with disease, disruption of norms leading to community conflict, degradation of socio-cultural practices, and anomie.	
<i>Intensity/magnitude</i>	High – Should the indicated impacts occur then the intensity would be high and would affect the system in a significant way.	
<i>Significance Rating</i>	Medium negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	1	1
Reversibility	3	2
Irreplaceable loss	3	2
Duration	2	2
Cumulative effect	3	2

SOCIO-CULTURAL PROCESSES		
Intensity/magnitude	3	2
Significance rating	-42 (medium negative)	-22 (low negative)
Mitigation measures	<p>It is recommended that mitigation measures are implemented in 3 ways:</p> <ul style="list-style-type: none"> ▪ An information campaign targeting both communities near to the construction village and workers regarding the effects of HIV/AIDS and STIs as well as promoting condom use. In addition, informing the local SAPS of the location of the construction village (should it be used) so that loitering and prostitution are entirely discouraged. ▪ Instructing construction workers as to the appropriate conduct expected of them and informing them of the local norms, languages, and customs. ▪ Using local contractors and labourers such that socio-cultural differences are negated. 	

Operations and Maintenance Phase Impacts

The overall operational impact rating before and after mitigation measures are provided in Table 19 Table 24 and Table 25 below.

Table 24: Rating of impacts related to economic change processes during operation

ECONOMIC CHANGE PROCESSES	
Environmental Parameter	Economic impacts pertain to the effects that the project will have on micro- and macro- economic, commercial, financial, and values-based phenomena.
Issue/Impact/Environmental Effect/Nature	<p>Predicted impacts during the operations and maintenance phase, regardless of the corridor in question, are the following:</p> <ul style="list-style-type: none"> ▪ Economic injections resulting from project activities; ▪ Facilitation of regional growth through the presence of physical energy enhancing infrastructure.
<i>Extent</i>	The impact would be positive for the entire region through the facilitation of growth on a micro-level (for those receiving employment) and on a macro-level (through the facilitation of socio-economic energy-based growth).
<i>Probability</i>	High
<i>Reversibility</i>	Partly reversible

ECONOMIC CHANGE PROCESSES		
<i>Irreplaceable loss of resources</i>	None	
<i>Duration</i>	The duration would be long term in terms of energy provision and bolstering of economic growth.	
<i>Cumulative effect</i>	All industrial, commercial, and private processes require energy in order to develop and thrive. Such a project will greatly assist residential settlements to expand securely and will facilitate business sectors' growth for the future.	
<i>Intensity/magnitude</i>	High	
<i>Significance Rating</i>	Medium negative impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	3	3
Probability	3	2
Reversibility	2	2
Irreplaceable loss	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/magnitude	3	3
Significance rating	+48 (medium positive)	+48 (medium positive)
Mitigation measures	<ul style="list-style-type: none"> ▪ None 	

Table 25: Rating of impacts related to socio-cultural processes during operation

SOCIO-CULTURAL PROCESSES	
Environmental Parameter	During the operation and maintenance phase of the project a concern is that of a sense of place impact.
Issue/Impact/Environmental Effect/Nature	An alteration in the emotional and personal well-being of local residents due to their sense of place being disrupted by the proposed project affecting their attachment to a certain place.
<i>Extent</i>	There would be an effect on those near the site only.
<i>Probability</i>	This is difficult to predict as the nature and status of peoples' current attachment to an area, the degree to which it can/will be affected, and what this means to individuals can never truly be known. At this point it is

SOCIO-CULTURAL PROCESSES		
	believed that the effect is possible (25% to 50% chance of occurrence).	
<i>Reversibility</i>	The effect is very difficult to reverse as it would have to involve altering attitudes towards the presence of physical infrastructure.	
<i>Irreplaceable loss of resources</i>	None.	
<i>Duration</i>	The duration is likely to be medium term as local people may well grow used to the presence of the line but this would take a certain period of time.	
<i>Cumulative effect</i>	Cumulative effects may not be very high but could come in the form of a community backlash should the line traverse an area of particular importance to them (e.g. areas of natural beauty, sports and recreation areas etc.).	
<i>Intensity/magnitude</i>	Medium	
<i>Significance Rating</i>	Negative Medium Impact	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	3	2
Irreplaceable loss	1	1
Duration	2	3
Cumulative effect	2	2
Intensity/magnitude	3	2
Significance rating	-33 (medium negative)	-20 (low negative)
Mitigation measures	<ul style="list-style-type: none"> Providing information to local people regarding the benefits of the project in terms of employment opportunities and a strengthening of electrical infrastructure regionally. 	

3 Environmental Impact Statement

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

This section summarises the impact that the proposed construction of the 132kV distribution power line, substation, switchyards and access road will have on the environment. A summary of the environmental impacts according to each environmental aspect, are provided for each activity alternative, including the option of not undertaking the development. Detailed information regarding the types of impacts, duration of the impacts, likelihood of the impacts actually occurring and the significance of the impacts are detailed in the impact rating tables, in section 2 above.

Substation (including switchyard)

Alternative S1 (only alternative)

Environmental Aspect	Impact Summary
Biodiversity	The substation will transform a very small area of the Humansrus farm. The impact of the substation on biodiversity will therefore be relatively low.
Surface Water	No surface water resources were identified at the proposed substation site.
Agriculture Potential and Soils	The construction of the proposed substation will eliminate approximately 0.5 hectare of low value agricultural land. Consequently, the overall impact of the substation on the study area's agricultural potential and production will be negligible.
Heritage	The heritage specialist will undertake a heritage walk down, prior to commencing with construction. This will be done in order to mitigate and manage the impact of the proposed project on any heritage resources and determine if a permit in terms of the National Heritage Resources Act, 1999 is required.
Visual	The substation is likely to be viewed as part of the solar power plant complex, from the road and the Humansrus farmstead. The visual impact of the substation will, therefore be dwarfed by the components of the solar power plants, and will not be responsible for any visual impacts on its own.
Social	The proposed substation will not result in any significant impacts except for the usual social impacts associated with construction activities.

Power Line

Alternative S1 – Option 1C (Purple) (preferred alternative)

Environmental Aspect	Impact Summary
Biodiversity	Option 1c is the preferred alternative from a biodiversity perspective as it follows the existing farm boundary and road, which will provides easy access. As a result, the route will result in the least amount of habitat destruction, both during the construction and operation phases of the development.
Surface Water	Option C is considered the preferred power line alignment as it will only be affected by six (6) drainage lines.
Agriculture Potential and Soils	The land traversed by the proposed route alignment has a low sensitivity and is dominated by grazing activities. No centre pivots, irrigation schemes or active agricultural fields will be influenced by the proposed alignment, and as such, there are no problematic or fatal flaw areas. From an agricultural perspective, this route is recommended as it is the shortest alignment.
Heritage	No heritage sites were identified within the area traversed by route alignment option 1c, and therefore the alignment is regarded as favourable from a heritage perspective.
Visual	Option 1c is preferred as it would have the least impact on motorists travelling along the R385. This is because the area to the south of the road is largely shielded from view by the terrain which rises up from the road. Motorists travelling along the R385 will only see this line option, where it crosses the road near the Owendale mining housing complex, and as it runs up into the hilly ground from the proposed PV substation (in the latter case the line would form part of the view of the solar plant complex). Option 1c is also further away from the Lemoenkloof and Darehope farmsteads than the other two proposed alignment options and there are no sensitive receptors located on the southern side of the road.
Social	No structures or socio-economically important land uses are within the potential servitude of option 1c. This option is preferred as it is likely be the most practical - with a shorter distance to follow and less line to potentially construct.

Alternative S2 – Option 1B (Blue)

Environmental Aspect	Impact Summary
Biodiversity	Option 1b traverses the game farm on Lemoenkloof farm which is dominated by untransformed mountain bushveld. In addition, the alignment does not follow any existing infrastructure and therefore it will result in more habitat destruction than the other two alignments. From a biodiversity perspective option 1b will be the least preferable alternative.

Surface Water	Although thirteen (13) drainage lines will affect this route alignment it is considered to be a favourable alternative as most of these surface water features are likely to be able to be spanned.
Agriculture Potential and Soils	The land traversed by the proposed route alignment has a low sensitivity and is dominated by grazing activities. No centre pivots, irrigation schemes or active agricultural fields will be influenced by the proposed alignment, and as such, there are no problematic or fatal flaw areas. From an agricultural perspective, this route is considered a favourable alternative.
Heritage	No heritage sites were identified within the area traversed by route alignment option 1b, and therefore the alignment is regarded as favourable from a heritage perspective.
Visual	Similarly to option 1a, this route alignment would be highly visible to motorists travelling along the R385 as it runs up into the hilly ground to the north of the Humansrus Farmstead and crosses over the spurs (highest-lying ground) in this hilly terrain. Towers placed in these positions would also be highly visible from areas to the south and would be likely to 'break' the horizon and be visually intrusive in the context of an otherwise natural landscape. Where Option 1b runs along the northern boundary of the Humansrus site the line would form part of the view of the solar plant complex. In terms of static receptors, option 1b would also have a much greater potential to visually impact on the Humansrus Farmstead.
Social	No structures or socio-economically important land uses are within the potential servitude of option 1b.

Alternative S3 – Option1A (Green)

Environmental Aspect	Impact Summary
Biodiversity	Option 1a follows the western farm boundary as well as other existing infrastructure. For this reason the route alignment will not result in a significant amount of habitat destruction and it is considered to be a favourable alternative from a biodiversity perspective.
Surface Water	Although eleven (11) drainage lines will affect this route alignment it is considered to be a favourable alternative as most of these surface water features are likely to be able to be spanned.
Agriculture Potential and Soils	The land traversed by the proposed route alignment has a low sensitivity and is dominated by grazing activities. No centre pivots, irrigation schemes or active agricultural fields will be influenced by the proposed alignment, and as such, there are no problematic or fatal flaw areas. From an agricultural perspective, this route is considered a favourable alternative.
Heritage	A small informal cemetery with four (4) graves was identified within the area traversed by route option 1a. This alignment is therefore not preferred as a grave relocation process would need to be implemented if the heritage site cannot be

	avoided by the pylon placement.
Visual	Option 1a would be highly visible to motorists travelling along the R385 as it runs up into the hilly ground to the north of the Humansrus Farmstead and crosses over the spurs (highest-lying ground) in this hilly terrain. Towers placed in these positions would be highly visible from areas to the south and would be likely to 'break' the horizon and be visually intrusive in the context of an otherwise natural landscape. Where Option 1a runs along the northern boundary of the Humansrus site the line would form part of the view of the solar plant complex. In terms of static receptors, this route alignment would have a much greater potential to visually impact on the Humansrus Farmstead.
Social	No structures or socio-economically important land uses are within the potential servitude of option 1a.

Access Road

Alternative S1 (only alternative)

Environmental Aspect	Impact Summary
Biodiversity	The access road follows an existing farm boundary and power line. As a result, the proposed road will not result in significant habitat destruction.
Surface Water	The access road has been routed in order to avoid all surface water resources.
Agriculture Potential and Soils	The land traversed by the proposed access road has a low sensitivity and is dominated by grazing activities. No centre pivots, irrigation schemes or active agricultural fields will be influenced by the proposed access road.
Heritage	The heritage specialist will undertake a heritage walk down, prior to commencing with construction. This will be done in order to mitigate and manage the impact of the proposed project on any heritage resources and determine if a permit in terms of the National Heritage Resources Act, 1999 is required.
Visual	The access road will not cause any visual impacts on its own, as it will be viewed as part of the solar power plant complex.
Social	The proposed gravel road leading to the substation site is accessed from the R385, however, no pre-construction related socio-economic impacts on the local road system are expected.

No-go Alternative

The "no-go" alternative assumes that the proposed activity does not go-ahead, implying a continuation of the current situation or the status quo. The "no-go" or "no-action" alternative is regarded as a type of alternative that provides the means to compare the impacts of project alternatives with the scenario of a project not going ahead. In evaluating the "no-go" alternative it is important to take into account the implications of foregoing the benefits of the proposed project.

In the case of this project, the no go alternative would result in no 132kV power line, substation,

switchyards or access road being constructed. The absence of the new 132kV distribution power line and substation could have implications for the Humansrus Solar Energy Power Plants (should it receive a license and be constructed), as the power supplied by the plant would not be fed into to the National Grid. This would have negative implications in terms of the demand for electricity and more specifically renewable energy targets in South Africa. Should the proposed power line and substation not go ahead it may also hinder the economic injection that the Humansrus Solar Energy Power Plants would provide for the town of Postmasburg, Danieskuil and Lime Acres (should it receive a license and be constructed) in the form of short term employment, long term job creation and financial injection.

Although the impacts identified, such as visual impacts, would not occur if the project did not go ahead, the socio economic benefit of the proposed project should not be overlooked. The No-Go alternative has thus been eliminated due to the fact that the identified environmental impacts can be suitably mitigated and that by not building the project, the socio-economic benefits would be lost.

As described above, route alternative option 1c is regarded as the preferred route for the power line proposed from the new substation to the existing 132kV power line near Owendale. This is because it is regarded a preferred or favourable alternative in terms of all environmental aspects. Option 1b is not a preferable alignment from a biodiversity and visual perspective, due to the intact vegetation it will traverse on Lemoenkloof Farm and the visual impact it will have on motorists travelling along the R385 and on the Humansrus Farmstead. Option 1a was not a preferable alternative from a heritage perspective due to the heritage resource identified within the area traversed by this route.

The preferred route alternative as recommended by each specialist, is summarised in Table 26 below.

Table 26: Preferred Route Corridor for each Environmental Aspect

Environmental Aspect	Preferred Route Corridor		
	Option 1A	Option 1B	Option 1C
Biodiversity	FAVOURABLE	NOT PREFERRED	PREFERRED
Surface Water	FAVOURABLE	FAVOURABLE	PREFERRED
Agriculture Potential and Soils	FAVOURABLE	FAVOURABLE	PREFERRED
Heritage	NOT PREFERRED	FAVOURABLE	FAVOURABLE
Visual	NOT PREFERRED	NOT PREFERRED	PREFERRED
Social	FAVOURABLE	FAVOURABLE	PREFERRED

The preferred route alignment, according to the specialist findings, is indicated in Figure 10 below.

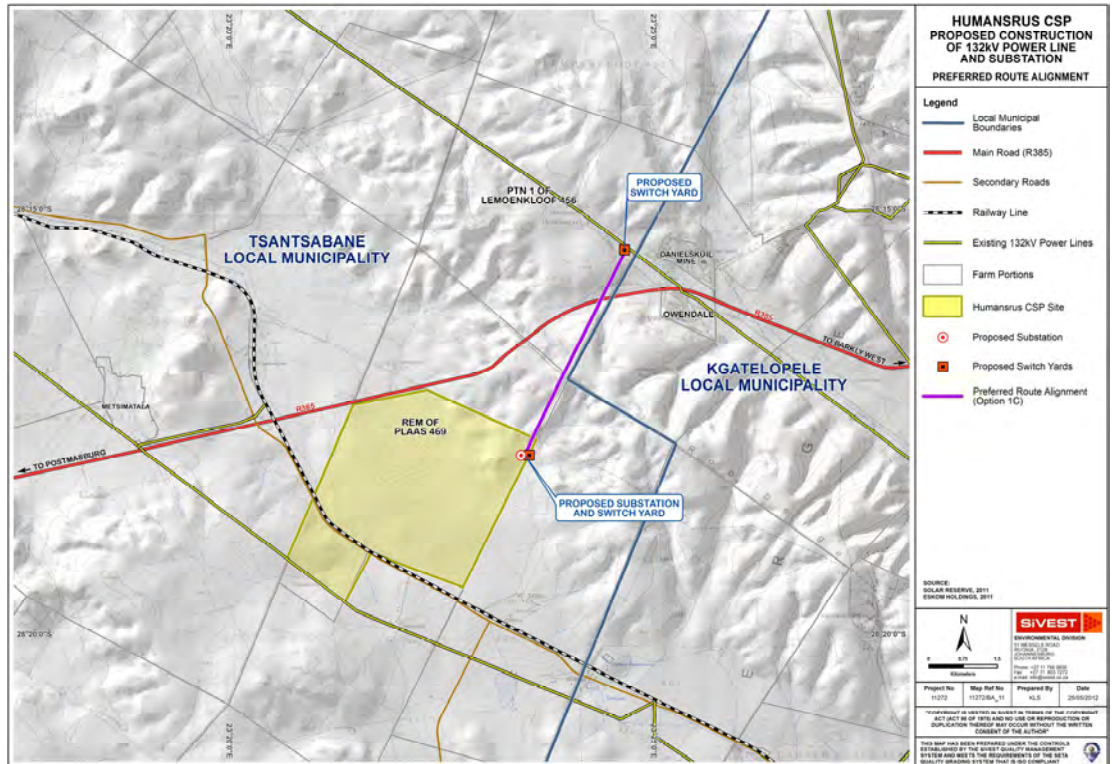


Figure 10: Preferred Route Alignment

A summary of the major findings (both biophysical and social) as determined by each environmental specialist is provided in Table 27 below.

Table 27: Summary of major findings

Environmental Parameter	Summary of major findings
Biodiversity	<ul style="list-style-type: none"> ▪ The vegetation in the study area is characterised by intact mountain bushveld and open plains which have been transformed in part by agricultural practices. ▪ The impact of the proposed development during construction will be limited to the tower footprints and access roads. Surrounding vegetation will remain intact and will not be impacted upon. ▪ Operation phase impacts are mostly related to birds, as they may collide with the power line or get electrocuted when perching on the line. ▪ The impacts of the proposed power line and substation can be properly addressed with suitable mitigation measures due to the relatively small scale of the development.
Surface Water	<ul style="list-style-type: none"> ▪ No surface water resources were identified in the vicinity or on the location of the proposed switch and substation yard as well as the proposed access road. ▪ Although no wetlands were identified, numerous drainage lines traverse the proposed alternative power line routes. ▪ It is anticipated that all the drainage lines will be able to be spanned by the proposed power line route alternatives, even though the 100m buffer zone may not be able to be spanned (particular where they overlap).
Agricultural potential and soils	<ul style="list-style-type: none"> ▪ The agricultural potential for majority of the study area is classified as being low for crop production and moderately low for grazing, due to the restrictive climatic characteristics and soil depth limitations of the site. ▪ No centre pivots, irrigation schemes or active agricultural fields will be influenced by the proposed development, and as such, there are no problematic or fatal flaw areas for the proposed project. ▪ The anticipated impacts from the proposed developments will have negligible negative effects and will require little to no mitigation.
Heritage	<ul style="list-style-type: none"> ▪ The study area and surrounding area has a history of Stone Age and Iron Age occupation and is rich in heritage resources. ▪ However, only one (1) heritage site consisting of a small informal cemetery with four (4) graves was identified on the site within option 1a.
Visual	<ul style="list-style-type: none"> ▪ The area, although largely natural and rural in character is not very sensitive from a visual perspective, due to the low density of potential sensitive receptors and the presence of mining activities. The proposed solar power plants (CSP and PV) directly to the south, are also likely to alter the visual character of the immediate area, and lower the potential sensitivity of the area even further. ▪ The proposed power line would not be responsible for significant impacts on any static receptor location.

Environmental Parameter	Summary of major findings
	<ul style="list-style-type: none"> ▪ Alternative 1c is associated with the lowest degree of visual impact, as it is located away from all the static receptor locations, and most of its length is not visible from the R385 as it would be shielded by the hilly topography. ▪ The proposed substation is not likely to be associated with any significant visual impacts on its own, as it is likely to form part of the cluster of infrastructure associated with the solar power plants.
Social	<ul style="list-style-type: none"> ▪ No structures or socio-economically important land uses were found within the potential servitude of any of the distribution line route options. ▪ Overall it is foreseen that this project will not significantly impact on the local socio-economic environment.

The impact rating of the proposed development according to each environmental aspect are provided in Table 28 below.

Table 28: Impact rating summary for the proposed 132kV power line, substation and switchyards

Environmental Aspect	Environmental Impacts	Impact Rating without Mitigation	Impact Rating with Mitigation
Biodiversity	Loss of habitat for red data / general species during construction.	-26 (low negative)	-6 (low negative)
	Edge effect during construction	-30 (medium negative)	-7 (low negative)
	Loss of habitat for red data / general species during operation	-10 (low negative)	-6 (low negative)
	Edge effect during operation	-26 (low negative)	-7 (low negative)
	Bird collisions during operation	-28 (medium negative)	-7 (low negative)
	Bird electrocutions during operation	-28 (medium negative)	-7 (low negative)
	Loss of habitat for red data / general species during decommissioning	+8 (low positive)	+6 (low positive)
	Edge effect during decommissioning	+10 (low positive)	+7 (low positive)
Surface Water	Placing tower structures in watercourses and associated buffer zone areas.	-24 (low negative)	-7 (low negative)
	Vehicle damage to watercourses and associated buffer zones during maintenance	-26 (low negative)	-24 (low negative)
Agricultural	Loss of agricultural land and / or	-12 (low negative)	-12 (low negative)

Potential and Soil	production due to the proposed 132kV power line		
	Loss of agricultural land and / or production due to the proposed substation	-14 (low negative)	-14 (low negative)
Heritage	Impact on heritage resources	-60 (high negative)	-12 (low negative)
	Impact on the cultural landscape	-36 (medium negative)	-14 (low negative)
Visual	Visual impact	-14 (low negative)	-14 (low negative)
Social	Geographical processes during pre-construction	-10 (low negative)	-6 (low negative)
	Institutional and legal processes during pre-construction	-22 (low negative)	-6 (low negative)
	Demographic change processes during construction	-24 (low negative)	-7 (low negative)
	Economic change processes during construction	+26 (low positive)	+30 (medium positive)
	Socio-cultural processes during construction	-42 (medium negative)	-22 (low negative)
	Economic change processes during operation	+48 (medium positive)	+48 (medium positive)
	Socio-cultural processes during operation	-33 (medium negative)	-20 (low negative)

SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?

YES ✓

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

Recommendations of the Biodiversity Specialist

- A formal monitoring and reporting strategy/protocol should be developed for monitoring the impact on the vegetation and biodiversity in general in the area during construction to ensure that the mitigation measures stipulated for the construction phase are well enforced and the identified impacts minimised as much as possible.
- If Red Data species are located during construction, the relevant permits must be applied for from the relevant authorities. No listed plants may be removed without these permits.
- The precautionary principle should be applied during the construction and care taken to implement the recommended mitigation measures.
- Once the proposed development has been constructed, rehabilitation needs to take place. This needs to take place timeously to ensure that alien plant emergence and erosion do not occur.

The following mitigation measures are recommended during the construction phase:

- Intensive environmental audits by an independent party should be undertaken during the construction period.
- A copy of the Basic Assessment Report and associated Environmental Management Programme as well as the specialist study must be present at the construction site for easy reference to specialist recommendations in sensitive areas.
- Construction crew should be educated about the sensitivities involved in these areas as well as the potential species they could encounter. A poster of sensitive species (compiled by a qualified specialist) should be kept on the construction site for easy reference.
- Rehabilitation to be undertaken as soon as possible after construction in sensitive area has been completed.
- Only vegetation within the study area must be removed.
- Vegetation removal must be phased in order to reduce impact of construction.
- Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas.

SOLARRESERVE / ESKOM HOLDINGS SOC LIMITED

prepared by: SiVEST

Postmasburg a Power Line, Substation and Switchyards - Draft Amended Basic Assessment Report

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- All natural areas impacted during construction must be rehabilitated with locally indigenous plant species.
- A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas.
- Construction areas must be well demarcated and these areas strictly adhered to.
- The use of pesticides and herbicides in the study area must be discouraged as these impacts on important pollinator species of indigenous vegetation.
- Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.

The following mitigation measures are recommended during the operational phase:

- Six monthly checks of the area should take place for the emergence of invader species.
- Mitigation measures mentioned for the construction phase above must be implemented for any maintenance of the development that may be undertaken during the operation phase.
- Correct rehabilitation with locally indigenous species.
- Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion and the edge effect are avoided.
- Constant maintenance of the area to ensure re-colonisation of floral species.
- Regular removal of alien species which may jeopardise the proliferation of indigenous species.

Recommendations of the Surface Water Specialist

- A construction method statement must be supplied to a suitably qualified wetland or aquatic specialist in order that suitable site specific mitigation measures are devised for the construction phase, in addition to the measures specified here.
- Vehicle access into or through watercourses may only be allowed where absolutely necessary and after the requisite environmental authorisation and water use license has been obtained.
- Vehicles must be restricted to smaller vehicles where possible and not heavy vehicles to limit compaction impacts. The number of trips into or through the watercourses must be limited to the absolute minimum.
- In order to limit the amount of damage caused by vehicles, activity must be limited to a narrow track or "Right of Way" (ROW) only. This track should not be more than 5m wide.
- Heavy machinery and vehicles must be checked for oil leaks before operating in the watercourse or the associated buffer zones. Additionally, no fuelling or re-fuelling is allowed to take place in the watercourses and the associated buffer zone areas.
- The removal of excavated sub-soils or substrate of the watercourses for the foundations of the towers must take place only if completely necessary (i.e. if the excavated soil cannot be re-instated due to it being an unsuitable grade of backfill for the foundation of the structure

etc.). Removed excavated soils will need to be dumped at a registered landfill that has sufficient capacity.

- Soil stockpiles should separate topsoils from sub-surface soils. Where excavated soils can be re-instated, the order of soils horizons should be backfilled correctly (i.e. sub-surface soils first, topsoil last).
- All stockpiled soils should preferably be placed outside the identified watercourses. However, where this is not practical, the stockpiled soils should be placed next to the excavation pits. The stockpiles must be bunded by suitable material that can resist heavy rains and prevent increased run-off (for example fixed wooden planks or bricks). This will prevent erosion and sedimentation of the nearby sensitive hydrological systems.
- Any mixing of cement must either only take place over a covered surface nearby or beside the excavation pit. Cement mixing can take place in the load bin of a vehicle. It is important that no cement spills unnecessarily in the area around the tower construction area for risk of entering the watercourses.
- Sanitary facilities must be available for workers (at a ratio of 1 toilet to 15 workers) to use in order to prevent urine and faecal waste entering the watercourse and associated buffer zone areas. Importantly portable sanitary facilities are to be used and must be placed outside of the watercourse and associated buffer zone areas.
- Watercourses must be cordoned off around the construction areas and the RoW to prevent any unnecessary access by unauthorised personnel or vehicles. These areas must be identified as “no-go” zones.
- Vegetation must not to be damaged or removed unless they are located within the construction footprint of the towers or RoW tracks. Where sensitive vegetation is identified in the foot print of a tower, the relevant authority must be contacted and must advise on the most appropriate plan of action (i.e. removal and/or translocation).
- Stringing operations must be undertaken by hand where possible and not vehicles to limit ingress and associated damage through and across wetlands.
- The fitment of bird anti-collision devices over the watercourse sections of the power line must take place on the ground prior to stringing to prevent the need for vehicles to undergo operations in problematic areas (i.e. through watercourses).
- A site-specific post-construction wetland rehabilitation plan compiled by a suitably qualified wetland or aquatic specialist will be required to rehabilitate and monitor the affected watercourses and associated buffer zones where construction impacts have been caused.
- During operation, it is crucial that existing roads are used so that damage is limited. Where new service roads are required in the watercourses and the necessary environmental authorisations and water use licenses are obtained, these roads must be limited in extent (i.e. go directly to the desired tower) and will need to be maintained for erosion.
- Ideally, if service roads are required inside the watercourses during operation, coarse gravel should be used as the infill. This material will not erode away after rainfall events and will provide a relatively solid foundation when surface water accumulates. Additionally, erosion will be limited by this material as opposed to exposed dirt roads.

- If dirt roads will be the means of access, these will have to be regularly checked for erosion. This should be done on a weekly to monthly basis and after short or long periods of heavy rainfall or after long periods of sustained rainfall.
- Where erosion begins to take place, this must be dealt with immediately to prevent severe erosion damage to the wetlands. Should severe erosion occur, a rehabilitation plan will be required and Input from a suitably qualified wetland or aquatic specialist must be obtained.

Recommendations of the Agricultural Potential and Soils Specialist

- Clearing activities should be kept to a minimum.
- In the unlikely event that heavy rains are expected activities should be put on hold to reduce the risk of erosion.
- If additional earthworks are required, any steep or large embankments that are expected to be exposed during the 'rainy' months should either be armoured with fascine like structures.
- If earth works are required then storm water control and wind screening should be undertaken to prevent soil loss from the site.

Recommendations of the Heritage Specialist

- If route alignment option 1a is selected, it will need to be adjusted so as to avoid the informal cemetery on the site and the site will need to be demarcated with at least a 10 meter buffer.
- In the event that the sites cannot be excluded from the alignment and pylon placement a grave relocation process needs to be implemented.
- A walk down must be undertaken by the heritage specialist prior to finalising the tower positions and commencing with construction. This will be done in order to inform the tower locations and mitigate the impact of the proposed project on any heritage resources.

Recommendations of the Visual Specialist

- Option 1c should be selected as the alignment for the proposed 132kV power line.

Recommendations of the Social Specialist

- Ensure an open dialogue prior to, and during, construction. This would relate to informing community members of the arrival of construction workers to the area, speaking to local landowners who may have specific concerns, briefing construction workers regarding appropriate conduct, and liaising with municipal structure such that institutional involvements can mitigate any potential for higher level disruptions.
- Local contractors and workers should be employed as far as possible. A local contractor, with his own workers, may assist in empowering local people and businesses financially and will reduce socio-cultural impacts.
- The location of a construction village (should it be used) be investigated in depth as doing so may serve as a good mitigation measure.

General Recommendations of the EAP

- All mitigation measures recommended by the various specialist should be strictly implemented.
- Final EMPr should be approved by DEA prior to construction.

YES ✓

Is an EMPr attached?

The EMPr must be attached as Appendix F.

The EMPr is included with this report in Appendix F.

DRAFT

REFERENCES

AGIS Database 2012. Source: <http://www.agis.agric.za/agisweb/agis.html>

Almond, J.E. 2008. Fossil record of the Loeriesfontein sheet area (1: 250 000 geological sheet 3018). Unpublished report for the Council for Geoscience, Pretoria, 32 pp.

Almond, J.E. & PETHER, J. 2008. Palaeontological heritage of the Northern Cape. Interim SAHRA technical report, 124 pp. Natura Viva cc., Cape Town.

Barnes, K.N. 2000. The Eskom Red Data book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Branch, W.R. 1998. Field guide to snakes and other reptiles of southern Africa. Struik, Cape Town.

Du Preez L., and Carruthers, V., 2009: A complete guide to the Frogs of Southern Africa.

Carruthers, V.C. 2001. Frogs and Frogging. Struik, Cape Town

Census 2001. Statistics South Africa (2001).

Collins, N.B., 2005: Wetlands: The basics and some more. Free State Department of Tourism, Environmental and Economic Affairs.

Community Survey. Statistics South Africa (2007).

Department of Environmental Affairs and Tourism. (2001) *Environmental Potential Atlas for South Africa*. Source: www.environment.gov.za/enviro-info/enpat.htm.

Department of Water Affairs and Forestry (DWAF), 2005: A practical field procedure for identification and delineation of wetlands and riparian areas (edition 1). DWAF, Pretoria.

Driver A., Maze K., Rouget M., Lombard A.T., Nel J., Turpie J.K., Cowling R.M., Desmet P., Goodman P., Harris J., Jonas Z., Reyers B., Sink K. & Strauss T. 2005. National Spatial Biodiversity Assessment 2004: priorities for biodiversity conservation in South Africa. Strelitzia 17. SANBI, Pretoria.

Eriksson, P.G., Altermann, W. & Hartzler, F.J. 2006. The Transvaal Supergroup and its precursors. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) *The geology of South Africa*, pp. 237-260. Geological Society of South Africa, Marshalltown.

Esler, J.K., Milton, S.J and Dean, W.R.J., 2006: Karoo Veld: Ecology and Management. Briza publications

FAO. (2007) Mapping biophysical factors that influence agricultural production and rural vulnerability. Source: www.fao.org/docrep/010/a1075e/a1075e00.HTM.

Friedmann Y. & Daly B. (eds) 2004. Red Data Book of the mammals of South Africa: a conservation assessment. CBSG Southern Africa, Conservation Breeding Specialist Group (SSC/IUCN), Endangered Wildlife Trust, South Africa.

Gauteng Department of Agriculture, Conservation and Environment (GDACE), 2005: Minimum Requirements for Biodiversity Assessments (Version 2). Directorate of Nature Conservation.

Germishuizen, G & Meyer, N.L, (eds). Plants of Southern Africa: an annotated checklist. Strelitzia 14. National Botanical Institute, Pretoria.

Google Earth™.

<http://www.miningne.ws/pg/company/news/82984/loading-the-iron-at-beeshoek>

http://www.northerncape.org.za/getting_around/towns/Danielskuil/

<http://www.sa-venues.com/attractionsnc/danielskuil.php>

<http://www.sa-venues.com/attractionsnc/postmasburg.php>

Karlsson, J. 1983: Faglar och vindkraft. Lund, Sweden: Ekologihuset.

McVicar *et al.* (Soil Classification Working Group) 2006: Soil classification – a taxonomic system for South Africa. Memoirs of the Agricultural Natural Resources of South Africa No. 15, The soil and Irrigation Research Institute, Department of Agricultural Development, Pretoria.

Mucina L. and Rutherford M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Municipal Demarcation Board (2011).

Northern Cape Provincial Government Spatial Development Framework (2011).

Partridge, T.C., Botha, G.A. & Haddon, I.G. 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp. 585-604. Geological Society of South Africa, Marshalltown.

Passmore, N.I & V.C Carruthers. 1995. South African Frogs - a Complete Guide. Southern Book Publishers and Witwatersrand University Press. Johannesburg.

Polteau, S. 2000. Stratigraphy and geochemistry of the Makganyene Formation, Transvaal Supergroup, South Africa. Unpublished MSc thesis, Rhodes University, Grahamstown, 146 pp.

Polteau, S. 2005. The Early Proterozoic Makganyene glacial event in South Africa: its implication in sequence stratigraphy interpretation, paleoenvironmental conditions, and iron and manganese ore deposition. Unpublished PhD thesis, Rhodes University, Grahamstown, South Africa, 215 pp.

Polteau, S., MOORE, J.M. & TSIKOS, H. 2006. The geology and geochemistry of the Palaeoproterozoic Makganyene diamictite. *Precambrian Research* 148, 257-274.

Raimondo, D., Helme, N.A. & Koopman, R. 2006. *Marasmodes undulata* Compton. National Assessment: Red List of South African Plants version 2011.1. Accessed on 2012/01/25

Rouget M., Reyers B., Jonas Z., Desmet P., Driver A., Maze K., Egoh B., Cowling R.M., Mucina L. and Rutherford M.C. 2005: South African National Spatial Biodiversity Assessment 2004: Technical Report. Vol. 1: Terrestrial Component. South African National Biodiversity Institute, Pretoria.

SA Rainfall Atlas. Source: <http://134.76.173.220/rainfall/index.html> (Accessed 22/03/2011)

Siyanda District Municipality. 2011/2012. Draft Integrated Development Plan (IDP).

Skinner J.D. and Chimimba C.T. (eds) 2005. *The Mammals of the Southern African Subregion*. Van der Horst D. (Ed.). Third Edition. Cambridge University Press, Cambridge.

Smith, B. 2006. *The Farming Handbook*. University of KwaZulu-Natal Press.

Tsantsabane Municipality. 2010/2011. Integrated Development Plan, Final Draft 04/06.



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