MAINSTREAM RENEWABLE POWER

BASIC ASSESSMENT REPORT

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the Rietrug Wind Energy Facility (WEF), Northern and Western Cape Provinces (Rietrug WEF – Electrical Grid Infrastructure)

Prepared for: South Africa Mainstream Renewable Power Developments (Pty) Ltd

CSIR Report Number:
CSIR/IU/021SE/ER/2017/0012/B

August 2017

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report details

Title:	**Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the Rietrug Wind Energy Facility (WEF), Northern and Western Cape Provinces (Rietrug WEF – Electrical Grid Infrastructure): BASIC ASSESSMENT REPORT**
Purpose of this report:	This Basic Assessment (BA) Report forms part of a series of reports and information sources that have been compiled during the BA Process for the proposed construction of Electrical Grid Infrastructure to support the authorised Rietrug WEF, Northern and Western Cape Provinces (Rietrug WEF – Electrical Grid Infrastructure). The purpose of this BA Report is to: • Present the proposed project and the need for the proposed project; • Describe the affected environment at a sufficient level of detail to facilitate informed decision-making; • Provide an overview of the BA Process being followed, including public consultation; • Assess the predicted positive and negative impacts of the proposed project on the environment; • Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; and • Provide an Environmental Management Programme (EMPr) for the proposed project. This BA Report is being made available to all Interested and Affected Parties (I&APs), Organs of State and stakeholders for a 30-day review period. All comments submitted during the 30-day review of this BA Report will be incorporated into a finalised BA Report, as applicable and where necessary. The finalised BA Report will then be submitted to the National Department of Environmental Affairs (DEA), in accordance with Regulation 19 (1) of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations (as amended), for decision-making in terms of Regulation 20 of the 2014 NEMA EIA Regulations.
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contents

APPENDICES

tables

figures

executive summary

Introduction, Background and Environmental Assessment Process

South Africa Mainstream Renewable Power Developments (PTY) Ltd (hereinafter referred to as Mainstream) appointed an independent Environmental Assessment Practitioner (EAP) in 2010 to undertake an Environmental Impact Assessment (EIA) for the proposed construction and operation of the Sutherland Renewable Energy Facility (REF), consisting of a Solar Energy Facility and a Wind Energy Facility (WEF), with a collective generation capacity (i.e. for wind and solar) of 747 MW to 1137 MW. The EIA was undertaken in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the NEMA EIA Regulations promulgated on 21 April 2006, in Government Notice (GN) R385, R386, and R387. Mainstream received Environmental Authorisation (EA) on 22 February 2012 (DEA Reference Number: 12/12/20/1782), from the National Department of Environmental Affairs (DEA) to construct and operate the proposed Sutherland REF.

Following this, a non-substantive amendment process (to amend certain project details, the details of the Applicant, and to extend the validity period of the EA) was undertaken and an amended EA, dated 6 October 2015 (DEA Reference Number: 12/12/20/1782/AM1), was issued to Mainstream. In addition, in 2016, a substantive EA Amendment Application was undertaken by the Council for Scientific and Industrial Research (CSIR) on behalf of Mainstream, in order to split the existing EA into three separate projects so that Mainstream is able to potentially bid these projects in a tender round of the Department of Energy's (DOE) Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which currently stipulates 140 MW as the maximum generation capacity that can be bid for a WEF. The three split WEFs are referred to as the Sutherland WEF; Sutherland 2 WEF; and Rietrug WEF. In line with this, on 10 November 2016, the National DEA granted separate EAs for the Sutherland, Sutherland 2, and Rietrug WEFs (DEA Reference Numbers: 12/12/20/1782/2; 12/12/20/1782/3; and 12/12/20/1782/1). These EAs replace the original EA (dated 22 February 2012) and the amended EA (dated 6 October 2015). A second amendment (i.e. Amendment 2) is currently underway to apply to change the turbine and hub specifications of the split and authorised WEFs.

Linked to the above, as part of this project, Mainstream is proposing to construct Electrical Grid Infrastructure in order to support the proposed and authorised Sutherland, Sutherland 2 and Rietrug WEFs and to ensure that the electricity generated by the proposed WEFs is able to connect to the National Grid. The proposed Electrical Grid Infrastructure for each WEF includes an on-site substation, laydown area, Operational and Maintenance (O&M) Building, 132 kV distribution line, including a service road and the connection to a proposed third party substation.

In terms of the NEMA and the 2014 NEMA EIA Regulations promulgated on 8 December 2014 (GN R982, R983, R984 and R985) and as amended on 7 April 2017 promulgated in Government Gazette 40772 and GN R324, R325, R326 and R327, a Basic Assessment (BA) Process is required for the construction of the proposed Electrical Grid Infrastructure. The proposed Electrical Grid Infrastructure BA projects are referred to as:

- Sutherland WEF – Electrical Grid Infrastructure;
- Sutherland 2 WEF – Electrical Grid Infrastructure; and
- Rietrug WEF – Electrical Grid Infrastructure (i.e. this project).

This BA Report is only focused on the proposed **Rietrug WEF – Electrical Grid Infrastructure** project.

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), the Applicant has appointed the CSIR to undertake the separate BA Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activity. The BA Team also includes various specialists that have been appointed to undertake specialist studies to contribute to the BA Process. These specialist studies are included in Appendix D of the BA Report.

Since the three BA projects are located within the same geographical area and constitute the same type of activity (i.e. distribution of electricity generated from wind resources), an integrated Public Participation Process (PPP) is being undertaken for the proposed BA projects. However, separate Applications for EA are currently being lodged with the National DEA for each Electrical Grid Infrastructure BA project. Furthermore, separate BA Reports have been compiled for each project. The BA Reports are currently being released to I&APs, Stakeholders and Organs of State for a 30-day review period.

All comments received during the 30-day review period will be included in the finalised BA Report as applicable and where necessary, which will be submitted to the DEA, in accordance with Regulation 19 (1) of the 2014 NEMA EIA Regulations (as amended), for decision-making in terms of Regulation 20 of the 2014 NEMA EIA Regulations (as amended).

Project BA Team

As mentioned above, the CSIR has been appointed to undertake the separate BA Processes. The project team, including the relevant specialists, are indicated in the table below:

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Environmental Assessment Practitioners		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Surina Laurie	CSIR	Project Leader (*Pr. Sci. Nat.)*
Rohaida Abed	CSIR	Project Manager (*Pr. Sci. Nat.)*
Andile Dludla	CSIR	Project Officer
Specialists		
Simon Bundy	Sustainable Development Projects cc	Terrestrial Ecology Impact Assessment
Stephen van Staden and Amanda Mileson	Scientific Aquatic Services (SAS Environmental)	Aquatic Ecology (Freshwater) Impact Assessment
Henry Holland	Private	Visual Impact Assessment
Dr. Jayson Orton and Dr. John Almond	ASHA Consulting (Pty) Ltd and Natura Viva cc	Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape)
Chris van Rooyen	Chris van Rooyen Consulting	Avifauna Impact Assessment

Project Description

The Rietrug WEF – Electrical Grid Infrastructure project (i.e. this BA Process) includes the following:

- On-site substation (including O&M building and laydown area);
- Fencing of the proposed on-site substation;
- 132 kV distribution line from the proposed Rietrug WEF on-site substation to the third party substation (including tower/pylon infrastructure and foundations);
- Connection to the third party substation; and
- Service road below the line.

Two alternatives of the proposed third party substation and associated 132 kV distribution line routing have been considered in this BA Process, as described further below. The table below provides a summary of the approximate details of the proposed Rietrug WEF Electrical Grid Infrastructure Project.

NAME	Alternative 1: Connection to the proposed collector hub	Alternative 2: Connection to the proposed Eskom Nuwerust Substation
Capacity of Distribution Line	132 kV	132 kV
Length of Distribution Line	17 km	44 km
Details of Distribution Line	Overhead with concrete foundations and steel tower structures (i.e. pylons). Monopole pylon structures will be adopted for the proposed distribution line. The line	

NAME	Alternative 1: Connection to the proposed collector hub	Alternative 2: Connection to the proposed Eskom Nuwerust Substation
	will consist of self-supporting monopoles and guyed monopoles. The towers will all have a maximum height of 32 m. Lattice type structures will only be considered and implemented where required and necessary due to the topography within the region.	
Connection to the Third Party Substation	Associated electrical infrastructure at the proposed collector hub.	Associated electrical infrastructure at the proposed Eskom Nuwerust Substation.
Gravel Service Road	Width: 4 m to 6 m Length: 17 km	Width: 4 m to 6 m Length: 46 km
On-site Substation	200 m X 200 m (40 000 m^2)	200 m X 200 m (40 000 m^2)
Laydown Area	100 m X 100 m (10 000 m^2)	100 m X 100 m (10 000 m^2)
O&M Building	120 m X 120 m (14 400 m^2)	120 m X 120 m (14 400 m^2)
Affected Farm Portions	▪ Remaining Extent of Hartebeeste Fontein Farm 147 ▪ Remaining Extent of Nooitgedacht Farm 148 ▪ Remaining Extent of Beeren Valley Farm 150	▪ Remaining Extent of Hartebeeste Fontein Farm 147 ▪ Remaining Extent of Nooitgedacht Farm 148 ▪ Remaining Extent of Beeren Valley Farm 150 ▪ Portion 1 of Farm 219 ▪ Remaining Extent of Farm 219 ▪ Farm 280 ▪ Portion 1 of Rheebokkenfontein Farm 4 ▪ Portion 2 of Rheebokkenfontein Farm 4 ▪ Portion 2 of Farm De Molen 5 ▪ Portion 6 of Farm Hamelkraal 16 ▪ Portion 7 of Farm Hamelkraal 16

As noted above, two alternatives of the proposed third party substation (and the associated distribution line routing thereto) are being considered as part of the BA Process. These two alternatives are noted below:

- Alternative 1 is the proposed 132 kV Suurplaat on-site substation, which is referred to as the proposed collector hub for the BA Projects. The proposed collector hub is located on the Remaining Extent of Hartebeeste Fontein Farm 147 in the Northern Cape.
- Alternative 2 is the proposed 400 kV Eskom Main Transmission Substation, which is also known as the proposed Eskom Nuwerust Substation. The proposed Eskom Nuwerust Substation is located on Portion 7 of Farm Hamelkraal 16 in the Western Cape.

It is understood that both the abovementioned alternatives of the proposed third party substation have been assessed as part of the separate Moyeng Energy (PTY) Ltd Suurplaat WEF EIA, which received EA on 5 April 2011 (DEA Reference Number: 12/12/20/1583) and is currently undergoing a separate amendment process. Therefore, the proposed third party substations will not be considered as part of these BA Processes. The proposed third party substations, which are expected to have multiple users and service many projects, have not been constructed yet.

Each separate Electrical Grid Infrastructure BA Project will include an assessment of all necessary infrastructure to ensure that each WEF is equipped, and able to function fundamentally and to connect to the National Grid. This is based on the worst case scenario (i.e. if any of the three WEFs do not receive preferred bidder status or EA or if one falls away for any reason, the remaining WEFs will still be able to efficiently connect to the National Grid as the BA Processes include an assessment of all necessary infrastructure). This also satisfies the requirements of the REIPPPP, which require separate EAs for each project to be bid.

However, in terms of the best case scenario, if all three WEFs receive EA (should such authorisation be granted), as well as preferred bidder status in terms of the REIPPPP, and should all three WEFs materialise from a construction perspective, then Mainstream will not construct three separate distribution lines (and service roads) connecting each WEF to the third party substation. Instead, Mainstream will then opt to construct a distribution line from the proposed Rietrug on-site substation and the proposed Sutherland 2 on-site substation, to tie into and connect to the proposed Sutherland on-site substation, followed by a single line to either alternative of the third party substation. This approach will also be followed if only two of the proposed WEFs receive EA and preferred bidder status.

As noted above, both Alternatives 1 and 2 of the distribution line routing and third party substation have been considered and assessed in this BA Process. However, only one preferred alternative, based on the findings of

all the specialist studies, has been selected and recommended by the EAP. It is necessary that both distribution line routing and third party substation alternatives are considered and assessed in the BA Process as a precaution, should either third party substation (i.e. Alternative 1 (proposed collector hub) or Alternative 2 (proposed Eskom Nuwerust Substation)) not be constructed for any reason.

Where applicable the specialists have studied an estimated 500 m buffer area on either side of the proposed distribution line (for both Alternatives 1 and 2) and a 25 ha development envelope (although the physical footprint will be smaller than 25 ha) for the proposed on-site substation, O&M Building and laydown area in order to identify any development constraints or environmental sensitivities within a larger investigation area, which can be avoided in the final siting and location of the proposed electrical infrastructure. Based on the findings of the specialist studies, an environmental sensitivity map has been produced (and included in Appendix A of this BA Report, as well as the Environmental Management Programme (EMPr) included in Appendix G of this BA Report). This map shows the sensitivities found on site within the 500 m buffer area, 25 ha development envelope and the general specialist investigation area. Overall, the location and routing of the proposed electrical infrastructure (as indicated in Appendix A) largely avoids the sensitive features that were identified by the specialists.

The proposed project will take place in the Northern Cape, approximately 23 km south of Sutherland and 50 km north of Laingsburg, under the jurisdiction of the Namakwa District Municipality and the Karoo Hoogland Local Municipality. If Alternative 2 is approved, the proposed project will also extend into the Western Cape, under the jurisdiction of the Central Karoo District Municipality and the Laingsburg Local Municipality.

Need for the BA

As noted above, in terms of the 2014 NEMA EIA Regulations (as amended), a BA Process is required for the proposed project. The need for the BA is triggered by, amongst others, the inclusion of Activity 11 (i) listed in GN R327 (Listing Notice 1):

- *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts".*

Section A (7) of this BA Report contains the detailed list of activities contained in GN R327 (Listing Notice 1) and GN R324 (Listing Notice 3), published on 7 April 2017 (i.e. 2014 NEMA EIA Regulations (as amended)), which are triggered by the various project components and thus form part of this BA Process.

The purpose of the BA is to identify, assess and report on any potential impacts the proposed project, if implemented, may have on the receiving environment. The Environmental Assessment therefore needs to show the Competent Authority, the DEA, and the project proponent, Mainstream, what the consequences of the decision on the biophysical and socio-economic environment will be and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

Impact Assessment

Five specialist studies were carried out as part of the BA Process. These included:

- Terrestrial Ecology Impact Assessment;
- Aquatic Ecology (Freshwater) Impact Assessment;
- Visual Impact Assessment;
- Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape); and
- Avifauna Impact Assessment.

Terrestrial Ecology Impact Assessment:

A Terrestrial Ecology Impact Assessment (Appendix D.1 of the BA Report) has been undertaken in order to provide supporting information relating to terrestrial ecological features and associated impacts, in terms of the proposed construction of the electrical infrastructure. The ecological evaluation of the proposed electrical infrastructure incorporated desktop and site reconnaissance of the affected area across a number of farms within the Sutherland region. The evaluation included consideration of the biophysical state of the study area and consideration of topographic features and vegetation in order to establish a holistic view of all

components within the ecological landscape. Sites of ecological value or "sensitivity" were identified using eco-geomorphological parameters and such sites were considered with regard to their position in the landscape and their interface with the proposed development.

The Terrestrial Ecology Impact Assessment established that areas of ecological sensitivity or value lie primarily below the 1600 m amsl contour and include steep "lithic" scarp areas. Furthermore the study confirmed that the area allocated for the siting of the proposed on-site substation (including the O&M Building and laydown area) is of limited ecological sensitivity, showing little topographic variation; and that no areas within the study site were considered to show a "very high" or "high" ecological sensitivity.

The following main impacts were identified in the Terrestrial Ecology Impact Assessment:

- Changes in the local habitat as a consequence of variation in physical factors within the proposed on-site substation site and along the proposed power line route (primarily limited to excavation and the removal of lithic habitat);
- Changes in local surface and possibly subsurface hydrology around the proposed on-site substation site; and
- The ousting, and in some cases recruitment, of species, with subsequent variation in populations and changes in ecological processes in and around the proposed on-site substation and powerline.

The ecological evaluation has determined that with the application of appropriate management measures that the abovementioned major potential impacts may be mitigated and reduced to low or very low levels of impact significance. None of the potential impacts have been identified as being of high significance (with the implementation of mitigation measures).

In addition, the Terrestrial Ecology Impact Assessment also explains that both Alternative 1 and Alternative 2 of the distribution line routing and connection to the third party substation are suitable and no fatal flaws that would prevent the utilisation of these routes have been identified. From a terrestrial ecological point of view, although Alternative 1 is preferred over Alternative 2 based on its shorter length and lesser extent, the selected routing for Alternative 2 (despite extending below the 1600 m contour), cannot be dismissed as a no-go option, from an impact assessment perspective.

A number of management recommendations have been proposed in order to mitigate potential impacts on the terrestrial environment that may arise during the construction and operational phases of the proposed project. The following main mitigation measures were identified for the construction and operational phases in the Terrestrial Ecology Impact Assessment:

- Avoidance of major earthworks and the removal of topographic or eco-morphologically significant features;
- Avoidance of excessive clearance of vegetation adjacent to the proposed on-site substation, O&M Building, laydown area, and across the route of the proposed 132kV line and service road;
- Management of exotic weed invasion that may arise;
- Management of activities in and around the subject site to reduce faunal mortalities and changes in faunal behaviour that may influence ecological processes; and
- General land management practices to avoid excessive erosion, dust emissions and other nuisance factors.

Aquatic Ecology (Freshwater) Impact Assessment:

An Aquatic Ecology (Freshwater) Impact Assessment specialist study (Appendix D.2 of this BA Report) was undertaken as part of the BA Process to define the ecology of the study area in terms of riparian and other freshwater resources associated with the proposed development within the investigation area, in order to provide supplementary, detailed information to guide the activities associated with the proposed development, to ensure the ongoing functioning of the freshwater ecosystems in such a way as to support local and regional conservation requirements, and the provision of ecological services in the local area. In order to identify all potential freshwater resources that may potentially be impacted by the proposed development, a 500 m zone of investigation (i.e. an investigation area) around the proposed infrastructure was used as a guide in which to assess possible sensitivities of the receiving environment.

The assessment included a desktop study and two field assessments. Three main rivers, with associated riparian characteristics were identified, namely the Riet, Van Wyk's and Juk Rivers, along with their associated tributaries and their applicable riparian zones. In addition, unnamed tributaries of the Portugal's River were identified in the western portion of the investigation area, although the Portugal's River itself is not located within the investigation area. Several smaller, ephemeral drainage lines without riparian vegetation were also identified; however, these features were not assessed as they do not have any true

riparian characteristics (i.e. vegetation of the terrestrial zone does not differ from that of the vegetation found within the adjacent terrestrial areas) and thus from an ecological point of view cannot be defined as watercourses as defined by the National Water Act (Act 36 of 1998).

The following main direct and cumulative impacts were identified in the Aquatic Ecology (Freshwater) Impact Assessment specialist study for all phases of the proposed development (i.e. construction, operation and decommissioning):

- Loss of habitat and ecological structure;
- Changes to ecological and sociocultural service provision;
- Hydrological function and sediment balance; and
- Impacts on water quality.

Overall, the above impacts identified as part of the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) are predicted to be of a very low significance with the implementation of mitigation measures. No impacts were assessed as being of high significance after the implementation of mitigation.

Furthermore, the Aquatic Ecology (Freshwater) Impact Assessment explains that the perceived impacts, significance thereof, impact ratings and mitigation measures are the same for both Alternatives 1 and 2 of the proposed distribution line routing and third party substation due to the similarity of the perceived impacts, as well as the largely similar sensitivities of the freshwater resources associated with the study area. Therefore, there is no specific preference for a certain alternative, and furthermore from a freshwater resource conservation perspective, the proposed project is not considered to be "fatally flawed" although it is considered essential that suitable mitigation measures are implemented throughout all phases of the project in order to ensure that perceived impacts remain of low significance. The following main mitigation measures were identified in the Aquatic Ecology (Freshwater) Impact Assessment specialist study:

- Careful planning of the location of monopoles, taking into consideration the locality of riparian habitats and as much as possible, avoid placement of monopoles within riparian habitat, and powerlines are preferably to span the relevant resource. If at all possible, all monopoles should be developed above the relevant zone of regulation in terms of Regulation GN509 of the National Water Act (Act 36 of 1998);
- Where it is impossible to avoid placing infrastructure within riparian habitat, flow connectivity must be retained by preventing fragmentation of the riparian habitat. It must also be ensured that no canalization or incision of the riparian resource takes place as a result of the construction activities;
- Careful planning of the location of the proposed substations must be undertaken. The applicable 32 m zone of regulation around the freshwater resources in terms of must be adhered to, in order to assist in minimising impacts on the freshwater resources in close proximity to the proposed substations;
- Clearing of vegetation at all impact sites must be kept to an absolute minimum, and strict alien vegetation controls must be implemented throughout all phases of the project. The re-growth of indigenous vegetation must be encouraged following construction; and
- Strict erosion control and soil management measures must be implemented during the construction and operational phases, particularly in areas where vegetation has been removed.

Visual Impact Assessment:

A Visual Impact Assessment specialist study was conducted as part of the BA Process and is included in Appendix D.3 of this BA Report. The study notes that the landscape surrounding the proposed site has a rural agricultural character with a strong sense of remoteness, and potential for scenic views. Very few sensitive visual receptors will potentially be affected by the proposed power line, as indicated below:

- Residents and viewpoints on farms surrounding the proposed development site. These are highly sensitive visual receptors since they have an active interest in their surrounding landscape; and
- Motorists using secondary gravel roads and private tracks. These are low sensitivity visual receptors since their attention will be on the road.

In addition, visual intrusion will be low for visual receptors on surrounding farms since the landscape is already transformed by structures similar to those of the proposed power line.

The following main impacts were identified in the Visual Impact Assessment:

Construction Phase:

- Potential visual intrusion of construction activities on existing views of sensitive visual receptors in the surrounding landscape.

Operational Phase:
- Potential landscape impact of the proposed electrical infrastructure on a rural agricultural landscape with a strong sense of remoteness and potential for scenic views; and
- Potential visual intrusion of the proposed electrical infrastructure on the views of sensitive visual receptors.

Decommissioning Phase:
- Potential visual intrusion of decommissioning activities on existing views of sensitive visual receptors.

Cumulative Impacts (Operational Phase):
- Cumulative impact of renewable energy generation projects and electrical infrastructure on the existing rural-agricultural landscape; and
- Cumulative visual impact of renewable energy generation projects and electrical infrastructure on existing views of sensitive visual receptors in the surrounding landscape.

Overall, the above impacts identified as part of the Visual Impact Assessment (Appendix D.3 of this BA Report) are predicted to be of a low to very low significance with the implementation of mitigation measures. No impacts were assessed as being of high significance after the implementation of mitigation.

The assessment also explains that the preferred distribution line route and third party substation connection is Alternative 1 from a visual impact perspective since it is shorter and it will affect fewer sensitive visual receptors, however no fatal flaws are associated with Alternative 2.

The following main mitigation measures were identified in the Visual Impact Assessment specialist study:

- Construction Phase: Adopt best practice guidelines for the construction activities; locate construction camps and laydown areas where sensitive visual receptors are least likely to be affected; care should be taken to avoid erosion scarring along ridge down the escarpment; night lighting of the construction site should be minimised within safety and efficiency requirements; and work at night should be avoided where possible.
- Operational Phase: Lattice type towers should be used as they will be better camouflaged against the mottled vegetation and rock background than monopole towers. This mitigation measure is not essential.
- Decommissioning Phase: Revegetation and reclamation of cleared areas should be done in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape; locate decommissioning camps and laydown areas where sensitive visual receptors are least likely to be affected; night lighting of the decommissioning site should be minimised within safety and efficiency requirements; and work at night should be avoided where possible.

Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape):

A Heritage Impact Assessment (HIA) was undertaken as part of the BA Process and is included in Appendix D.4 of this BA Report. The HIA includes a description of the palaeontology, archaeology and cultural landscape. The HIA is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the heritage resources. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued for consideration by the DEA who will review the finalised BA Report and grant or withhold authorisation.

Archaeology and Cultural Landscape:

The HIA explained that archaeological remains are generally scarce but are found throughout the area. Very little Stone Age material was found with just two 'sites' being recorded (i.e. a kraal complex and a geometric rock art site). Isolated stone artefacts were remarkably rare. The vast majority of archaeological remains found were historical and ranged from a ruined farm complex to small, isolated ruined structures and isolated individual artefacts. Alternative 1 does not have any heritage sites on its alignment. Alternative 2 of the proposed distribution line routing has more significant sites in close proximity to it but significant impacts are not expected, as the routing was devised by the heritage specialist, in conjunction with the remaining specialists in order to avoid these sites. A single site (i.e. a small ruined stone structure) may be directly impacted by the proposed project, as it lies within the development envelope of the proposed Sutherland on-site substation. Some graveyards and buildings are present in the area but are located well away from the proposed power line alignments and no impacts are expected. The rural cultural landscape extends throughout the study area but, aside from fences and farm tracks, human interventions are generally very sparse. The site

lies within a proposed Renewable Energy Development Zone (REDZ) and it is noted that a new electrical layer is due to be added to this landscape in the very near future.

The following main impacts were identified in the HIA:

Construction, Operational and Decommissioning Phases (including Cumulative Impacts for the Construction Phase):

- Destruction of archaeological remains;
- Destruction of palaeontological material; and
- Alteration of the cultural and natural landscape.

Overall, the above potential impacts identified in the HIA (Appendix D.3 of this BA Report) are rated as being of moderate to very low significance (without the implementation of mitigation measures) and low to very low significance (with the implementation of mitigation measures). No impacts were assessed as being of high significance after the implementation of mitigation.

The Heritage Impact Assessment also explains that neither Alternative 1 nor Alternative 2 of the proposed third party substation and distribution line routing has any fatal flaws but Alternative 1 is preferred because its alignment is shorter and therefore it passes close to fewer heritage sites.

Palaeontology:

The Palaeontology Impact Assessment (which is included as an appendix of the HIA) notes that the study area of the proposed electrical infrastructure is entirely underlain by continental sediments of the Abrahamskraal Formation (Lower Beaufort Group) of Middle Permian age. Fossil material recorded from the Abrahamskraal Formation during a six-day field-based survey of the broader study region between Sutherland and Merweville includes sparsely-scattered, and often highly weathered, bones of unidentified robust-bodied tetrapods (probably pareiasaurs and/or dinocephalians) with only one well-articulated post-cranial skeleton (that will not be impacted on by the proposed project). An extensive surface scatter of petrified wood blocks, some of which are well-preserved, was located in the western Koup, approximately 500 m from Alternative 2 of the proposed distribution line on Farm Hamel Kraal 16. With the exception of the articulated skeleton and petrified wood scatter, most of these fossil occurrences are of limited palaeontological value and lie well away from the electrical infrastructure footprint and do not warrant mitigation. No significant fossil remains were recorded at the proposed on-site substation and third-party substation sites. The overall palaeontological sensitivity of the electrical grid infrastructure study area is rated as low.

The following main impacts were identified in the Palaeontological Impact Assessment:

Construction Phase:

- Disturbance, damage or destruction of scientifically important fossils at or beneath the ground surface as a result of surface clearance and excavations for the proposed electrical infrastructure.

The assessment notes that with the implementation of mitigation measures, the significance of the abovementioned potential impact is assessed as very low (negative) in terms of palaeontological heritage resources. Significant further impacts during the operational and decommissioning phases of the electrical grid infrastructure are not anticipated. There are no fatal flaws in the proposed project as far as fossil heritage is concerned; and the assessment also explains that there are no preferences on palaeontological grounds for any particular powerline connection to a third-party substation or particular powerline route option.

The following main mitigation measures were identified in the HIA for Palaeontology, Archaeology and Cultural Landscape:

- Significant palaeontological and archaeological sites should be identified on project maps, safeguarded and regarded as no-go zones with buffers of at least 30 m (the exception is the service road diversion which comes within 20 m of the rock art site but uses an existing farm track);
- Ensure that all areas not already surveyed as part of this assessment are examined by both an archaeologist and a palaeontologist in order to identify any areas or sites that should be protected or mitigated prior to commencement of development. Note that this requirement pertains to unsurveyed parts of the assessed routes as well as to any alterations to the routing made after completion of the HIA. The resulting report, together with any recommendations for mitigation or monitoring, will need to be approved by the relevant heritage management authority (South African Heritage Resources Agency (SAHRA) for the Northern Cape and Heritage Western Cape (HWC) for the Western Cape);

- The Environmental Control Officer (ECO) should be aware of the potential occurrence of scientifically-important fossil remains within the development footprint. All surface clearance and substantial excavations (>1 m deep) should be monitored by the ECO on an on-going basis during the construction phase; and
- If any archaeological material, palaeontological material or human burials (i.e. chance finds) are uncovered during the course of development then work in the immediate area should be halted and they should be safeguarded and protected *in situ* and immediately reported to a palaeontologist or archaeologist, as well as the heritage authorities (i.e. SAHRA or HWC) in order to plan a way forward. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Avifauna Impact Assessment:

An Avifauna Impact Assessment specialist study (Appendix D.5 of this BA Report) was undertaken as part of the BA Process to investigate the potential impact of the proposed project on avifauna and to assess whether the project is fatally flawed from an avifaunal impact perspective, and to recommend mitigation measures to reduce the significance of potential impacts. The assessment was based on the findings of a 12-months pre-construction monitoring programme that was separately conducted over four seasons in 2015/2016 for the proposed Sutherland, Sutherland 2 and Rietrug WEFs.

The assessment explains that a total of 146 bird species could potentially occur in the study area and of these, 12 are classified as priority (Red Data) species. In terms of environmental sensitivities, the entire study area can be classified as medium-sensitivity. The area is largely untransformed and the natural habitat supports a number of Red Data powerline sensitive species, notably Ludwig's Bustard and Karoo Korhaan. No-go areas lie in close proximity to known active Verreaux's Eagle nests; however these areas are not expected to be impacted by the proposed distribution line alternatives. Areas of high sensitivity were identified and include areas within 300 m of small waterbodies, and within 500 m of large waterbodies (both artificial dams and natural pans), as well as ephemeral drainage lines, where the proposed distribution will constitute a collision risk.

The following main direct and cumulative impacts were identified in the Avifauna Impact Assessment specialist study for all phases of the proposed development:

- Construction Phase: Displacement of Red Data avifauna due to disturbance and habitat transformation associated with the construction activities.
- Operational Phase: Mortality of Red Data avifauna due to collisions with the earth wire of the proposed 132kV line; and electrocution of Red Data avifauna on the proposed 132kV line and in the on-site substation yard.
- Decommissioning Phase: Displacement of Red Data avifauna due to disturbance associated with decommissioning activities.
- Cumulative Impacts: Displacement of Red Data avifauna due to disturbance and habitat transformation associated with the construction of the proposed powerline, service road and on-site substation (including laydown area and O&M Building) in conjunction with existing and future similar projects.

Overall, the above impacts identified as part of the Avifauna Impact Assessment (Appendix D.5 of this BA Report) are predicted to be of a low to moderate significance with the implementation of mitigation measures. No impacts were assessed as being of high significance after the implementation of mitigation. In addition, overall from an avifaunal perspective, both Alternatives 1 and 2 of the proposed distribution line (and service road) and third party substation are acceptable and do not have any fatal flaws, however Alternative 1 is the preferred option due its shorter length.

The following main mitigation measures were identified in the Avifauna Impact Assessment specialist study:

- Ensure that the project footprint is restricted to the absolute minimum;
- Implement maximum use of existing roads and do not permit off-road driving;
- Implement measures to control dust and noise;
- Ensure that access to the rest of the property is restricted and that all disturbed areas are rehabilitated;
- Ensure that the ECO is trained to identify Red Data avifauna nests during construction;
- An Avifaunal Specialist must be appointed to undertake a pre-construction walk-through of the final alignment of the proposed distribution line in order to identify any Red Data nests, sensitive areas and sections that require mitigation. The results of the pre-construction walk-through may inform the final construction schedule in close proximity to a specific sensitive area, including abbreviating the construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise;

- An Avifaunal Specialist should be appointed to certify the proposed powerline design as bird-friendly before construction commences;
- Ensure the fitting of Bird Flight Diverters on the pre-identified sections and quarterly line inspections by the Avifaunal Specialist to record collision-related mortality; and
- Record electrocutions at the proposed on-site substation site and implement reactive mitigation if needed.

EAP's Recommendation

This BA Report has investigated and assessed the significance of the potential positive and negative direct, indirect and cumulative impacts associated with the proposed Rietrug WEF – Electrical Grid Infrastructure project. No negative impacts have been identified within this BA that, in the opinion of the EAPs who have conducted this BA Process, should be considered "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.

Based on the findings of the specialist studies, the proposed project is considered to have an overall very low to moderate negative environmental impact and an overall moderate positive socio-economic impact (with the implementation of respective mitigation and enhancement measures). All of the specialists have recommended that the proposed project receive EA and that the recommended mitigation measures are implemented.

In addition, it is recommended that Alternative 1 of the distribution line routing and third party substation be approved by the DEA (should an EA be issued). However, it should be re-iterated that Alternative 2 does not display any fatal flaws, it is deemed acceptable, and should be available should Mainstream require connection to the proposed Eskom Nuwerust Substation, subject to the relevant environmental legislation promulgated at the time.

This BA considered the nature, scale and location of the proposed development as well as the wise use of land (i.e. is this the right time and place for the development of this proposed project). The proposed project is required as part of the REIPPPP bidding process to confirm that the proposed Rietrug WEF is enabled and equipped with the necessary infrastructure to connect to the national grid. Overall the proposed Rietrug WEF – Electrical Grid Infrastructure project will fundamentally support and enable the functioning of the proposed Rietrug WEF and to ensure that it is allowed to contribute to the renewable energy targets proposed by the DOE. In addition, on a municipal planning level, the proposed project does not go against any of the objectives set within the IDP of the local municipality.

Taking into consideration the findings of the BA Process, it is the opinion of the EAP, that the project benefits outweigh the costs and that the project will make a positive contribution to sustainable infrastructure development in the Sutherland region. The proposed project will play a key role in enabling and facilitating the construction of the proposed Rietrug WEF which will add electricity to the national grid. Provided that the specified mitigation measures are applied effectively, it is recommended that the proposed project receive EA in terms of the EIA Regulations promulgated under the NEMA.

Section 24 of the Constitutional Act states that "everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." Based on this, this BA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental features present on site and through appropriate monitoring and management plans. In order to ensure the effective implementation of the mitigation and management actions, an EMPr has been compiled and is included in Appendix G of the BA Report. The mitigation measures necessary to ensure that the project is planned and carried out in an environmentally responsible manner are listed in the EMPr. The EMPr is a dynamic document that should be updated as required and provides clear and implementable measures for the proposed project.

glossary

AC	Alternating Current
BA	Basic Assessment
BGIS	Biodiversity Geographic Information System
BID	Background Information Document
CA	Competent Authority
CBA	Critical Biodiversity Area
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEA&DP	Western Cape Department of Environmental Affairs and Development Planning
DC	Direct Current
DMR	Department of Minerals Resources
DOE	Department Of Energy
DOT	Department of Transport
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioner Association of South Africa
EIA	Environmental Impact Assessment
EIP	Environmental Implementation Plan
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
ERM	Environmental Resources Management (PTY) Ltd
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Protection Areas
GG	Government Gazette
GIS	Geographical Information Systems
GN	Government Notice
GN R	Government Notice Regulation
HWC	Heritage Western Cape
I&AP	Interested and Affected Party
IEM	Integrated Environmental Management
IDP	Integrated Development Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
MW	Megawatts
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA)
NFEPA	National Freshwater Ecosystems Protected Areas
NHRA	National Heritage Resources Act (Act 25 of 1999)
NPAES	National Protected Expansion Strategy

NWA	National Water Act (Act 36 of 1998)
O&M	Operation and Maintenance
PES	Present Ecological State
PPA	Power Purchasing Agreement
PPP	Public Participation Process
PSDF	Provincial Spatial Development Framework
PSSA	Palaeontological Society of South Africa
PV	Photovoltaic
REDZs	Renewable Energy Development Zones
REC	Recommended Ecological Category
REF	Renewable Energy Facility
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SIP	Strategic Infrastructure Project
SKA	Square Kilometre Array
TOR	Terms of Reference
WEF	Wind Energy Facility
WCBSP	Western Cape Biodiversity Spatial Plan
WUL	Water Use License
WULA	Water Use License Application

Summary of where requirements of Appendix 1 of the 2014 NEMA EIA Regulations (as amended, GN R326) are provided in this BA Report

Appendix 1	YES / NO	SECTION IN BA REPORT
Objective of the basic assessment process 2) The objective of the basic assessment process is to, through a consultative process- a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context; b) identify the alternatives considered, including the activity, location, and technology alternatives; c) describe the need and desirability of the proposed alternatives; d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine- (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and (ii) the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; and e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to- (i) identify and motivate a preferred site, activity and technology alternative; (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and (iii) identify residual risks that need to be managed and monitored.	**Yes**	**Legislation and Policy - Section A (7) and Section A (10)** **Alternatives - Section A (8)** **Need and Desirability – Section A (1), Section A (8) and Section A (9)**
Scope of assessment and content of basic assessment reports 3) (1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include: (a) details of: (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	**Yes**	**Section A (1), Section A (2) and Appendix H**
(b) the location of the activity, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name;	**Yes**	**Sections A (1), Section A (8), Section B (1), and Appendix A**

Appendix 1	YES / NO	SECTION IN BA REPORT
(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;		
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	**Yes**	**Section A and Appendix A**
(d) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the activities to be undertaken including associated structures and infrastructure;	**Yes**	**Section A**
(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	**Yes**	**Section A (7), Section A (9), Section A (10) and Appendix D**
f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	**Yes**	**Section A (1), Section A (8) and Section A (9)**
(g) a motivation for the preferred site, activity and technology alternative;	**Yes**	**Section A (8)**
(h) A full description of the process followed to reach the proposed preferred alternative within the site, including - (i) details of all the alternatives considered;	**Yes**	**Refer to Section A (8) of the BA Report for a description of the alternatives considered, and a justification for the inapplicability of certain alternatives.**
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	**Yes**	**Refer to Section C of the BA Report for a description of the Public Participation Process undertaken. Supporting Public Participation Documents are included in Appendix E of this BA Report.**
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	**Yes**	**Refer to Section C and Appendix E of this BA Report for a description of the issues raised by I&APs during the Public Participation Process.**
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**Yes**	**Refer to Section A (8) of the BA Report for a description of the alternatives considered. Site alternatives are not applicable as it is dependent on the location of the proposed Sutherland, Sutherland 2 and Rietrug WEFs and the third party substations. The specialist studies included in Appendix D of this BA**

Appendix 1	YES / NO	SECTION IN BA REPORT
		Report also includes a description of the environment relating to the alternatives for the proposed distribution line and third party substation.
(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	**Yes**	**Refer to Section A (8) of the BA Report for a description of the alternatives considered, and a justification for the inapplicability of certain alternatives. Note that a complete impact assessment is included in Section D of this BA Report, with specialist studies included in Appendix D, which also includes relevant mitigation measures. The impact assessment methodology is also included in Section D of this BA Report. The specialists assessed two alternatives of the proposed distribution line and third party substation.**
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	**Yes**	
(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**Yes**	
(viii) the possible mitigation measures that could be applied and level of residual risk;	**Yes**	
(ix) the outcome of the site selection matrix;	**Yes**	
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	**Yes**	
(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	**Yes**	**Section A (8)**
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	**Yes**	**Section D and Appendix D**
(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	**Yes**	**Section D, Appendix D, and Appendix F**

Appendix 1	YES / NO	SECTION IN BA REPORT
(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	**Yes**	**Section D and Section E**
(l) an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	**Yes**	**Section D and Section E, and Appendix A, Appendix D and Appendix G**
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	**Yes**	**Section D and Section E, and Appendix D and Appendix G**
(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	**Yes**	**Section D and Section E, and Appendix D and Appendix G**
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	**Yes**	**Appendix D**
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	**Yes**	**Section E of this BA Report and the Relevant Sections of the Specialist Studies in Appendix D of this BA Report**
(q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	**X**	**Not Applicable**
(r) an undertaking under oath or affirmation by the EAP in relation to - (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	**Yes**	**Appendix H**
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	**X**	**Not Applicable**
(t) any specific information that may be required by the competent authority; and	**X**	**Not Applicable**
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	**X**	**Not Applicable**
2) Where a government notice *gazetted* by the Minister provides for the basic assessment process to be followed, the requirements as indicated in such a notice will apply.	**X**	**Not Applicable**

BASIC ASSESSMENT REPORT

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the Rietrug Wind Energy Facility (WEF), Northern and Western Cape Provinces (Rietrug WEF – Electrical Grid Infrastructure)

BASIC ASSESSMENT REPORT

contents

SECTION A: INTRODUCTION, PROJECT DESCRIPTION AND LEGISLATIVE REVIEW

1. INTRODUCTION

1.1. Background and Environmental Authorisation Process

1.1.1. Approved Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities

South Africa Mainstream Renewable Power Developments (PTY) Ltd (hereinafter referred to as Mainstream) appointed an independent Environmental Assessment Practitioner (EAP) in 2010 to undertake an Environmental Impact Assessment (EIA) for the proposed construction and operation of the Sutherland Renewable Energy Facility (REF), consisting of a Solar Energy Facility and a Wind Energy Facility (WEF), with a collective generation capacity (i.e. for wind and solar) of 747 MW to 1137 MW. The EIA was undertaken in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the NEMA EIA Regulations promulgated on 21 April 2006, in Government Notice (GN) R385, R386, and R387. Subsequent to the completion of the EIA Process (Environmental Resources Management (ERM), 2011), Mainstream accordingly received Environmental Authorisation (EA) on 22 February 2012 (DEA Reference Number: 12/12/20/1782), from the National Department of Environmental Affairs (DEA) to construct and operate the proposed Sutherland REF. Following this, a non-substantive amendment process (to amend certain project details, the details of the Applicant, and to extend the validity period of the EA) was undertaken and an amended EA, dated 6 October 2015 (DEA Reference Number: 12/12/20/1782/AM1), was issued to Mainstream.

As noted above, the original and amended EA authorised Mainstream to develop a 747 MW to 1137 MW REF, with 325 turbines on site. Based on the generation capacity of the wind turbines, this provision allocated roughly 650 MW to the WEF component of the REF. Mainstream wishes to potentially bid these projects in a tender round of the Department of Energy's (DOE) Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). However, the maximum generation capacity that can currently be bid for a WEF is 140 MW. Therefore, in February 2016, Mainstream appointed the Council for Scientific and Industrial Research (CSIR) to submit applications to the National DEA for two further substantive amendments of the original EA (dated 22 February 2012) and the amended EA (dated 6 October 2015).

The first amendment (i.e. Amendment 1) was undertaken to split the existing EA into three separate projects so that each WEF has a generation capacity of 140 MW. The three split WEFs are referred to as the Sutherland WEF; Sutherland 2 WEF; and Rietrug WEF projects, and their approximate locality is indicated in Figure 1 below. The majority of the proposed Sutherland WEF occurs in the Northern Cape Province, approximately 23 km south of Sutherland and 50 km north of Laingsburg, under the jurisdiction of the Namakwa District Municipality and the Karoo Hoogland Local Municipality. However, a small portion of the proposed Sutherland WEF occurs in the Western Cape Province, under the jurisdiction of the Central Karoo District Municipality and the Laingsburg Local Municipality. On the other hand, the proposed Sutherland 2 WEF and Rietrug WEF occur entirely within the Northern Cape Province.

The CSIR accordingly submitted the Application for EA Amendment (i.e. Amendment 1) to the National DEA on 20 April 2016, as well as three separate Amendment Reports for each WEF (which were subjected to Public Participation) in July 2016 for consideration and decision-making in terms of Regulation 33 of the 2014 NEMA EIA Regulations (GN R983). On 10 November 2016, the National DEA accordingly granted separate EAs for the Sutherland, Sutherland 2, and Rietrug WEFs (DEA Reference Numbers: 12/12/20/1782/2; 12/12/20/1782/3; and 12/12/20/1782/1). These EAs replace the original EA (dated 22 February 2012) and the amended EA (dated 6 October 2015).

The second amendment (i.e. Amendment 2) is to apply to change the turbine and hub specifications, as associated layout, of the split and authorised WEFs. The Amendment 2 Projects are referred to as the Sutherland WEF – Amendment 2; Sutherland 2 WEF – Amendment 2; and Rietrug WEF – Amendment 2 projects. The CSIR completed and submitted three separate Applications for Amendment to the EAs (dated 10 November 2016) on 3 February 2017 for the WEFs. An Amendment Report has been compiled for each Amendment 2 project and was released to the public for a 30-day comment period extending from 17 February 2017 to 22 April 2017. Thereafter, in May 2017, the Amendment Reports were submitted to the National DEA for consideration and decision-making in terms of Regulation 33 of the 2014 NEMA EIA Regulations (as amended). **It is important to note that the separate Amendment 2 Processes currently in the decision-making phase do not fall within the scope of this project. It should be noted that the outcome of this amendment process does not influence the validity of the current application.**

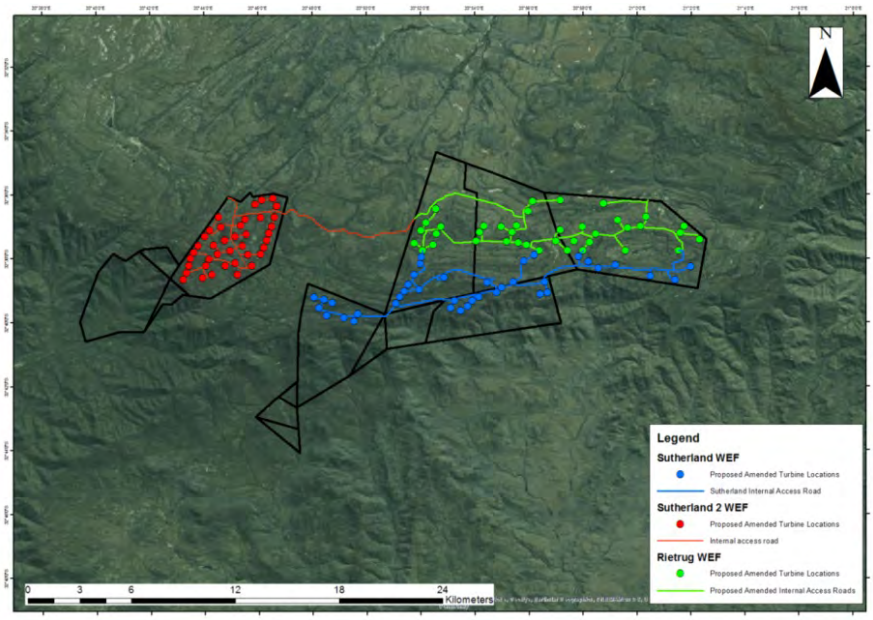


Figure 1: The proposed locality of the authorised Sutherland, Sutherland 2 and Rietrug WEFs, which are currently undergoing a second Substantive Amendment Process regarding the turbine specifications and layout.

1.1.2. Proposed Electrical Grid Infrastructure to Support the authorised Sutherland, Sutherland 2 and Rietrug WEFs

In line with the above, as part of this project, Mainstream is also proposing to construct Electrical Grid Infrastructure in order to support the three proposed Sutherland, Sutherland 2 and Rietrug WEFs and to ensure that the electricity generated by the proposed WEFs is able to connect to the National Grid. The proposed Electrical Grid Infrastructure for each WEF includes an on-site substation, laydown area, Operational and Maintenance (O&M) Building, 132 kV distribution line, including a service road and the connection to a proposed third party substation. In terms of the NEMA and the 2014 NEMA EIA Regulations (8 December 2014, as amended) promulgated in Government Gazette 40772 and GN R326, R327, R325 and R324 on 7 April 2017, a Basic Assessment (BA) Process is required for the construction of the proposed Electrical Grid Infrastructure. Separate Applications for EA are currently being lodged with the National DEA for each Electrical Grid Infrastructure project requiring a BA Process. The proposed Electrical Grid Infrastructure BA projects are referred to as:

- Sutherland WEF – Electrical Grid Infrastructure;
- Sutherland 2 WEF – Electrical Grid Infrastructure; and
- Rietrug WEF – Electrical Grid Infrastructure (i.e. this project).

This BA Report is only focused on the proposed **Rietrug WEF – Electrical Grid Infrastructure** project. Figure 2 below shows the affected farm portions for the proposed Electrical Grid Infrastructure BA Projects, as well as the proposed distribution line routing and third party substation alternatives being considered in this BA Process, as well as the proposed on-site substation.

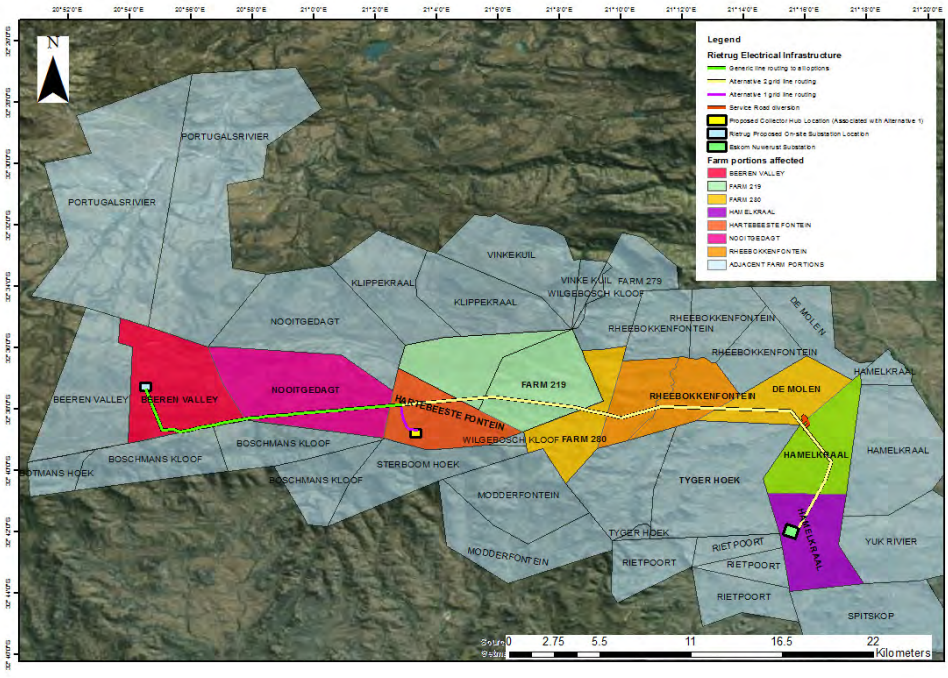


Figure 2: The farms affected by the proposed Rietrug WEF Electrical Grid Infrastructure BA Project.

2. PROJECT TEAM

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended, GN R326), the Applicant has appointed the CSIR to undertake the separate BA Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activity. The BA Project Team is led by Surina Laurie (EAP), who is supported by the Project Manager, Rohaida Abed, and the Project Officer, Andile Dludla. Paul Lochner serves as a Technical Advisor for the proposed projects. Surina has more than 6 years of experience in environmental assessment and management, and is a Senior EAP in the Environmental Management Services (EMS) group of the CSIR with a Masters degree in Environmental Management from the University of Stellenbosch and a Certificate in Environmental Economics from the University of London. She is a Registered Professional Natural Scientist (Registration Number: 400033/15) with the South African Council for Natural Scientific Professions (SACNASP). Surina has experience in the management and integration of various types of environmental assessments in South Africa for various sectors, including renewable energy, industry and tourism. She has also been part of advisory teams advising on financing, real estate, corporate, construction, environmental and regulatory aspects for various sponsors, developers and lenders during the DOE's first and second bidding windows in 2012 and 2013. Surina has undertaken several Solar Photovoltaic (PV) and Wind Energy Environmental Assessments (i.e. EIAs, BAs, and Amendment and Appeal Processes) in the Northern Cape, Western Cape and Free State. Surina was the Project Leader for the adjacent Sutherland, Sutherland 2, and Rietrug WEF – Amendment 1 projects, which received positive EAs, and she is currently leading the Sutherland, Sutherland 2, and Rietrug WEF – Amendment 2 projects. Refer to Appendix H of this BA Report for the Curriculum Vitae of the BA Team, which also includes a declaration of and affirmation by the EAP as required by the 2014 NEMA EIA Regulations (as amended).

The BA Team also includes various specialists that have been appointed to undertake specialist studies to contribute to the BA Process. These specialist studies are included in Appendix D of this BA Report. Appendix I of this BA Report includes the declarations of interest by the specialists. The team which is involved in this BA Process is listed in Table 1 below.

Table 1: The BA Team

Name	Organisation	Role/ Specialist Study
EAPs		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Surina Laurie	CSIR	Project Leader (*Pr. Sci. Nat*.)
Rohaida Abed	CSIR	Project Manager (*Pr. Sci. Nat*.)
Andile Dludla	CSIR	Project Officer
Specialists		
Simon Bundy	Sustainable Development Projects cc	Terrestrial Ecology Impact Assessment
Stephen van Staden and Amanda Mileson	Scientific Aquatic Services (SAS Environmental)	Aquatic Ecology (Freshwater) Impact Assessment
Henry Holland	Private	Visual Impact Assessment
Dr. Jayson Orton and Dr. John Almond	ASHA Consulting (Pty) Ltd and Natura Viva cc	Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape)
Chris van Rooyen	Chris van Rooyen Consulting	Avifauna Impact Assessment

It should be noted that the Heritage Impact Assessment specialist study (Appendix D.4 of this BA Report) is an integrated report including Palaeontology, Archaeology and Cultural Landscape. In addition, the Avifauna Impact Assessment (Appendix D.5 of this BA Report) provides a general description of the baseline avifaunal conditions, the corresponding impact of the proposed project on avifauna and recommendations for mitigation. It is important to note that the Avifauna Impact Assessment is based on separate avifaunal pre-construction monitoring that has been undertaken for the proposed and authorised Sutherland, Sutherland 2 and Rietrug WEFs, as required by the National DEA and stipulated in the EAs issued on 10 November 2016, as well as the original EA (dated 22 February 2012) and the amended EA (dated 6 October 2015).

Note that a Soils and Agricultural Impact Assessment was not undertaken as part of this BA Process, as it was undertaken for the actual Sutherland REF project (ERM, 2011). According to the Final EIA Report undertaken by ERM (2011) for the proposed Mainstream Sutherland REF (which has now been spilt into the three separate Sutherland, Sutherland 2 and Rietrug WEFs), the primary land use in the area is agriculture (cultivation and grazing), and the proposed REF will have a low significance impact on the loss of agricultural land (with the implementation of mitigation measures). The extent of the proposed WEFs is much greater than that of the proposed electrical grid infrastructure, which is the subject of this BA Process. As such, a Soils and Agricultural Potential Assessment is not required for the Rietrug WEF – Electrical Grid Infrastructure project.

It is also important to point out that the Background Information Document that was released to Interested and Affected Parties (I&APs) for the BA Projects in December 2016, incorrectly noted that a Bat Impact Assessment and Noise Impact Assessment would be undertaken for the proposed Electrical Grid Infrastructure BA Projects. These specialist studies have not been undertaken for the BA Projects as the proposed Electrical Grid Infrastructure is expected to have a low significance impact in terms of bats and noise sensitive areas in comparison to the actual proposed Sutherland, Sutherland 2 and Rietrug WEFs. Furthermore, these specialist studies were undertaken for the actual Sutherland REF project (ERM, 2011).

Since the three BA projects are located within the same geographical area and constitute the same type of activity (i.e. distribution of electricity generated from wind resources), an integrated Public Participation Process (PPP) is being undertaken for the proposed BA projects. It was originally planned to run an integrated PPP for the three BA Projects and the three abovementioned

Amendment 2 projects, however the schedules of these projects became misaligned during the processes. However, as noted above separate Applications for EA are currently being lodged with the National DEA for each Electrical Grid Infrastructure BA project (together with the submission of the BA Reports for comment). Furthermore, separate BA Reports are being compiled for each project. The BA Reports are currently being released to I&APs, Stakeholders and Organs of State for review.

3. PROJECT OVERVIEW

The Applicant is proposing to develop three WEFs with a possible maximum, combined installed capacity of 420 MW. As noted above, the electricity produced will be transmitted to the National Grid via distribution lines and associated electrical infrastructure (i.e. this component is the subject of this BA Process). Once a Power Purchase Agreement (PPA) is awarded, the proposed Rietrug WEF will generate electricity for a minimum period of 20 years.

Table 2 below indicates the proposed project components that will be assessed as part of the BA Processes. It should be noted that a detailed project description (based on the conceptual design) is provided in Section A (4) of this BA Report for the Rietrug WEF – Electrical Grid Infrastructure project.

Table 2: Scope of the BA Processes

Sutherland WEF – Electrical Grid Infrastructure:

- On-site substation (including O&M building and laydown area);
- Fencing of the proposed on-site substation;
- 132 kV distribution line from the proposed Sutherland WEF on-site substation to the third party substation (including tower/pylon infrastructure and foundations);
- Connection to the third party substation; and
- Service road below the line.

Sutherland 2 WEF – Electrical Grid Infrastructure:

- On-site substation (including O&M building and laydown area);
- Fencing of the proposed on-site substation;
- 132 kV distribution line from the proposed Sutherland 2 WEF on-site substation to the third party substation (including tower/pylon infrastructure and foundations);
- Connection to the third party substation; and
- Service road below the line.

Rietrug WEF – Electrical Grid Infrastructure (i.e. this project):

- On-site substation (including O&M building and laydown area);
- Fencing of the proposed on-site substation;
- 132 kV distribution line from the proposed Rietrug on-site substation to the third party substation (including tower/pylon infrastructure and foundations);
- Connection to the third party substation; and
- Service road below the line.

4. PROJECT DESCRIPTION

The Locality Map included in Appendix A.1 of this BA Report provides an overview of the proposed locality of the Electrical Grid Infrastructure. It should be noted that the routing of the proposed distribution line (as indicated in Figure 2) has been amended since the Background Information Document was released to I&APs for comment in December 2016. As noted above, this Rietrug WEF – Electrical Grid Infrastructure project includes the following:

- On-site substation (including O&M building and laydown area);
- Fencing of the proposed on-site substation;
- 132 kV distribution line from the proposed Rietrug WEF on-site substation to the third party substation (including tower/pylon infrastructure and foundations);
- Connection to the third party substation; and
- Service road below the line.

The three abovementioned Electrical Grid Infrastructure BA projects will be structured in such a way to ensure that each BA Project includes one on-site substation (including an O&M Building and laydown area), one 132 kV distribution line, the connection to the third party substation, and a service road below the distribution line (as shown in Table 2). This will ensure that all three WEFs are equipped with the necessary infrastructure to fundamentally function, and to ensure that any of the proposed WEFs (i.e. Sutherland, Sutherland 2 or Rietrug) will be enabled to connect to the National Grid. This will ensure that, if for any reason, one of the Electrical Grid Infrastructure projects do not receive EA or preferred bidder status, or if one falls away, the remaining WEFs will still be allowed to efficiently connect to the National Grid. This approach is based on the worst case scenario, which has been assessed in this BA Process. It has also been structured accordingly to meet the requirements of the REIPPPP, which require separate EAs.

However, in terms of the best case scenario, if all three WEFs receive EA (should such authorisation be granted), as well as preferred bidder status in terms of the REIPPPP, and should all three WEFs materialise from a construction perspective, then Mainstream will not construct three separate distribution lines (and service roads) connecting each WEF to the third party substation. Instead, Mainstream will then opt to construct a distribution line from the proposed Rietrug on-site substation and the proposed Sutherland 2 on-site substation, to tie into and connect to the proposed Sutherland on-site substation, followed by a single high voltage line to either alternative of the third party substation If this scenario realises (should all three or even two projects receive EA or preferred bidder status), then it is understood that Mainstream can apply for a non-substantive Amendment to the EA to amend the specific connection details contained in the EA (should such authorisation be granted).

A description of the key components of the proposed project is described below. It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase.

4.1. On-site Substation, O&M Building and Laydown Area

As noted above, an on-site substation will be constructed at the proposed Rietrug WEF in order to facilitate connection to the National Grid. The proposed on-site substation for the Rietrug WEF will be constructed on the Remaining Extent of Beeren Valley Farm 150, within the Northern Cape. The proposed on-site substation building is expected to extend approximately 200 m X 200 m (40 000 m^2) in area.

As noted above, the proposed on-site substation will also include an O&M Building and a laydown area for construction purposes. It is understood that the laydown area will be rehabilitated at the end of construction. The proposed O&M building is expected to extend approximately 120 m X 120 m (14 400 m^2) in area. The proposed laydown area is planned to cover an estimated area of 10 000 m^2 (1 ha).

Overall, a large 500 m X 500 m (25 ha) development envelope area has been considered by the specialists for the proposed establishment of the on-site substation, laydown area, O&M Building and the infrastructure required at the on-site substation to connect to the third party substation. However, it is important to note that the aforementioned infrastructure will cover a significantly smaller area and the entire 25 ha will not be developed. Furthermore, all non-linear components of the proposed project (i.e. the on-site substation, O&M Building and laydown area) will cover an area less than 20 ha (per project). The proposed on-site substation, laydown area and O&M Building will be fenced off temporarily during the construction phase. In addition, permanent security fencing will be provided during the operational phase for the proposed on-site substation and O&M Building.

4.2. Distribution Line, Tower Structures and Third Party Substation

4.2.1. Third Party Substation

Two alternatives of the proposed third party substation (and the associated distribution line routing thereto) are being considered as part of the BA Process. These two alternatives are noted below:

- Alternative 1 is the proposed 132 kV Suurplaat on-site substation, which is referred to as the proposed collector hub for the BA Projects. The proposed collector hub is located on the Remaining Extent of Hartebeeste Fontein Farm 147 (Surveyor General 21 Digit Code: C07200000000014700000) in the Northern Cape.
- Alternative 2 is the proposed 400 kV Eskom Main Transmission Substation, which is also known as the Eskom Nuwerust Substation. The proposed Eskom Nuwerust Substation is located on Portion 7 of Farm Hamelkraal 16 (Surveyor General 21 Digit Code: C04300000000001600007) in the Western Cape.

It is understood that both the abovementioned alternatives of the proposed third party substations have been assessed as part of the separate Moyeng Energy (PTY) Ltd Suurplaat WEF EIA, which received EA on 5 April 2011 (DEA Reference Number: 12/12/20/1583). The EIA for the Moyeng Energy (PTY) Ltd Suurplaat WEF was undertaken by a separate EAP and it included a separate assessment of the three phases of the WEF, the transmission lines and substations (Savannah Environmental, 2016), however a single EIA Process was followed and a single EA was received. It is understood that Moyeng Energy (PTY) Ltd is currently undertaking an Application for EA Amendment to split the approved Moyeng Energy (PTY) Ltd Suurplaat WEF EIA project into four separate EAs (DEA Reference Number: 12/12/20/1583/AM3) (Savannah Environmental, 2016). Therefore, the proposed third party substations will not be considered as part of these BA Processes.

The proposed third party substations have not been constructed yet and will be constructed by a separate developer. It is expected that the proposed third party substations will have multiple users and it will service many projects. Mainstream will therefore enter into discussions and negotiations with Moyeng Energy (PTY) Ltd and Eskom in order to make use of either of the abovementioned third party substation alternatives.

It is important to note that both Alternatives 1 and 2 of the distribution line routing and third party substation have been considered and assessed in this BA Process. However, only one preferred alternative, based on the findings of all the specialist studies, has been selected and recommended by the EAP. However, it is necessary that both routing and third party substation alternatives are considered and assessed in the BA Process as a precaution, should either third party substation not be constructed for any reason. Nonetheless, the preferred alternative is Alternative 1, the proposed collector hub (132 kV Suurplaat on-site substation), as it will entail a shorter distribution line distance, which is preferred from a construction and environmental point of view. However, as discussed in Section D of this BA Report, and the specialist studies in Appendix D of this BA Report, there are no fatal flaws associated with Alternative 2. If Mainstream receives a positive EA for this Rietrug WEF – Electrical Grid Infrastructure project, with approval of Alternative 1 (i.e. distribution line routing and connection to the proposed collector hub), and if the proposed collector hub is not constructed, for any reason, then Mainstream will need to connect to the proposed Eskom Nuwerust

Substation (i.e. Alternative 2) instead. If this is the case, Mainstream will need to apply for an Amendment to the EA (should one be granted for this proposed project) to amend the distribution line routing and third party substation from Alternative 1 to Alternative 2. Considering that Alternative 2 of the proposed distribution line routing and third party substation connection have already been assessed in this BA Process by the EAP and specialists, it is understood and likely that a non-substantive EA Amendment Application would be required for submission to the DEA, however this is subject to the environmental legislation promulgated at the time of this proposed amendment, the number of years that has lapsed since the EA was issued (should such authorisation be granted), and provided that the Alternative 2 routing, as assessed in this BA Project, does not change in any way. If it does change, it is expected that a substantive amendment would be required, especially if the proposed change results in impacts of a higher significance as noted in this BA Report.

4.2.2. Distribution Line and Tower Structures

As noted above, an overhead distribution line will be constructed for each WEF, and it will be routed from each on-site substation (i.e. Sutherland, Sutherland 2 and Rietrug) to either the proposed 132 kV Suurplaat on-site substation (i.e. proposed collector hub) (Alternative 1) or to the proposed Eskom Nuwerust Substation (Alternative 2). Specifically, for this Rietrug WEF – Electrical Grid Infrastructure project, the proposed 132 kV overhead distribution line will be constructed between the proposed Rietrug WEF on-site substation and either Alternative 1 or Alternative 2 of the third party substation.

As shown in Figure 2 and Appendix A of this BA Report, the routing of the proposed distribution line for Alternative 1 and Alternative 2 are the same up until a point on the Remaining Extent of Hartebeeste Fontein Farm 147 in the Northern Cape, where it splits in a southerly direction towards the proposed collector hub for Alternative 1; and in a separate easterly direction towards the proposed Eskom Nuwerust Substation for Alternative 2. Figure 2 and Appendix A of this BA Report also illustrates the locality map of the proposed project, as well as the affected farm portions.

Alternative 1 of the proposed distribution line for the Rietrug WEF Electrical Grid Infrastructure Project will traverse the following farm portions located in the Northern Cape, approximately 23 km south of Sutherland and 50 km north of Laingsburg, under the jurisdiction of the Namakwa District Municipality and the Karoo Hoogland Local Municipality:

- Remaining Extent of Hartebeeste Fontein Farm 147;
- Remaining Extent of Nooitgedacht Farm 148; and
- Remaining Extent of Beeren Valley Farm 150.

Alternative 2 of the proposed distribution line for the Rietrug WEF Electrical Grid Infrastructure Project will traverse the following farm portions located in the Northern Cape, under the jurisdiction of the Namakwa District Municipality and the Karoo Hoogland Local Municipality; as well as in the Western Cape, under the jurisdiction of the Central Karoo District Municipality and the Laingsburg Local Municipality:

- Remaining Extent of Hartebeeste Fontein Farm 147;
- Remaining Extent of Nooitgedacht Farm 148;
- Remaining Extent of Beeren Valley Farm 150;
- Portion 1 of Farm 219;
- Remaining Extent of Farm 219;
- Farm 280;
- Portion 1 of Rheebokkenfontein Farm 4;
- Portion 2 of Rheebokkenfontein Farm 4;
- Portion 2 of Farm De Molen 5;
- Portion 6 of Farm Hamelkraal 16; and
- Portion 7 of Farm Hamelkraal 16.

The proposed project will be situated on land that is owned by third parties. It is anticipated that the properties on which the proposed project will be constructed will be leased from the landowners.

Alternative 1 of the proposed distribution line, extending to the proposed collector hub, is estimated to cover a length of approximately 17 km, whilst Alternative 2, extending to the proposed Eskom Nuwerust Substation, will extend approximately 44 km in length.

The proposed distribution line is expected to have concrete foundations and steel tower structures (i.e. pylons). Monopole pylon structures will be adopted for the proposed distribution line. Lattice type structures will also be considered for the proposed distribution line; however they will only be implemented where required due to the topography within the region. The line will consist of either self-supporting suspension structures or guyed monopoles (i.e. hybrid monopoles). The towers will all have a maximum height of 32 m. Figures 3 (a); 3 (b); and 3 (c) respectively indicate a monopole, a self-supporting suspension tower and a Guyed-Vee suspension tower. The span lengths are estimated to range between 200 m and 400 m. Exact specifications will be confirmed during the detailed design phase.

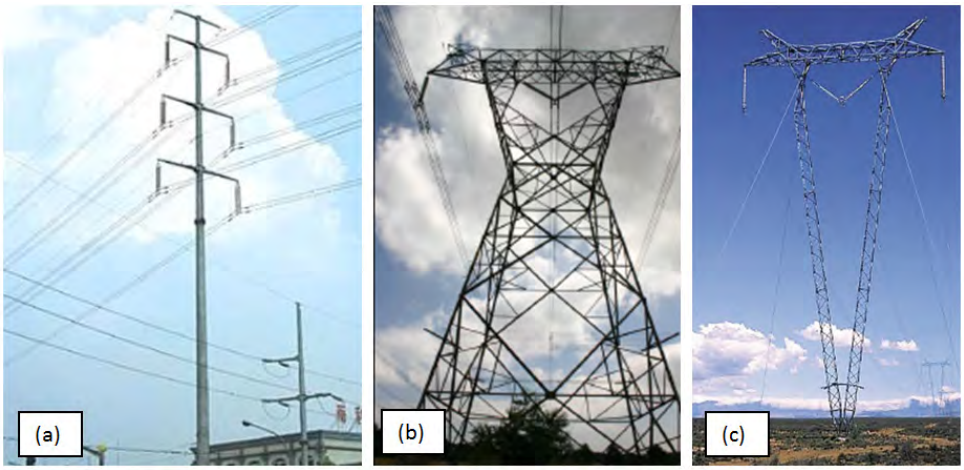


Figure 3: Different types of towers (Images: ECVV.com and Eskom)

During the construction phase, vegetation will be cleared or trimmed below the conductors and distribution line, on either side of the centre line, to allow for swing of the power line and stringing purposes. The clearing of vegetation will take place, with the aid of a surveyor and in accordance with the Environmental Management Programme (EMPr) (and any recommendations and requirements of Eskom).

4.3. Infrastructure at the Proposed Third Party Substation

Associated electrical infrastructure at the third party substation (i.e. Alternative 1 (proposed collector hub) or Alternative 2 (proposed Eskom Nuwerust Substation)) will be constructed in order to ensure that the substation is capable of receiving the additional electricity that is generated by the proposed Rietrug WEF. Discussions have been initiated with the Project Applicant and Eskom and Moyeng Energy (PTY) Ltd to determine the requirements of connecting to the third party substation.

4.4. Proposed Gravel Service Road and Access

The proposed project will include the construction of a gravel service road below the proposed 132 kV distribution line. Therefore, the proposed gravel service road will follow the same route as that of the distribution line (for both Alternatives 1 and 2) and will extend approximately 17 km in length (for Alternative 1 of the proposed distribution line route) or 46 km (for Alternative 2 of the

proposed distribution line route). Specifically relating to Alternative 2, the service road routing deviates from the proposed distribution line routing in one section to avoid a sensitive scarp, and it will alternatively follow the route of an unused farm road to avoid impacts of the service road traversing the ecologically sensitive scarp. This deviation is approximately 1.7 km in length and is located on Portion 2 of Farm De Molen 5 and Portion 6 of Farm Hamelkraal 16. The proposed service road will range between 4 m and 6 m wide for both routing alternatives. Exact specifications of the proposed service road will be confirmed during the detailed design phase.

The proposed Sutherland WEF, Sutherland 2 WEF and the Rietrug WEF are located approximately 25 km east of the junction between the R354 and the District Road DR02256 (ERM, 2011). In terms of access, the proposed Rietrug WEF and Grid Electrical Infrastructure sites can be accessed by a secondary road off the R354 and via secondary gravel roads and a network of farm tracks (ERM, 2011). The site can also be accessed via public road OG07 towards the east and District Road DR02256 towards the north. However, District Road DR02256 needs to be upgraded significantly (i.e. resurfaced etc.) and widened in order to allow for construction vehicles to access the proposed sites. This will be discussed separately between the local municipality and the various IPPs in the surrounding region, who will share access of this road. This does not form part of the scope of work of this BA Project.

In terms of traffic generation, the types of materials that will need to be transported to site during the construction phase include the following:

- Transformers;
- Steel and Aluminium;
- Switchgear and equipment;
- Cables;
- Gravel and sand;
- Concrete;
- Water;
- Reinforcement; and
- Other material.

During the operational phase, fewer materials will need to be transported to site. Trips will also be generated for the transportation of staff during the construction and operational phases.

4.5. Summary of the Approximate Details of the Proposed Infrastructure

Table 3 below provides a summary of the approximate details of the proposed Rietrug WEF Electrical Grid Infrastructure Project. However, it should be re-iterated that the physical size and dimensions of the project components will be finalised upon completion of detailed engineering, which is subject to the issuing of an EA, should such an authorisation be granted (i.e. the detailed design will be undertaken after the EA has been issued). The details provided in this section are estimates and based on the worst case, where applicable.

Table 3: Summary of Specifications of the proposed Rietrug WEF – Electrical Grid Infrastructure Project

	Alternative 1: Connection to the proposed collector hub	Alternative 2: Connection to the proposed Eskom Nuwerust Substation
Capacity of the Proposed Distribution Line	132 kV	132 kV
Length of the Proposed Distribution Line	17 km	44 km
Details of the Proposed Distribution Line	Overhead lines with concrete foundations and steel tower structures (i.e. pylons). Monopole pylon structures will be adopted for the proposed distribution line. The line will consist of self-supporting monopoles and guyed monopoles. The towers will all have a maximum height of 32 m. Lattice type structures will only be considered and implemented where required and necessary due to the topography within the region.	

	Alternative 1: Connection to the proposed collector hub	Alternative 2: Connection to the proposed Eskom Nuwerust Substation
Connection to the Proposed Third Party Substation	Associated electrical infrastructure at the proposed collector hub.	Associated electrical infrastructure at the proposed Eskom Nuwerust Substation.
Proposed Gravel Service Road	Width: 4 m to 6 m Length: 17 km	Width: 4 m to 6 m Length: 46 km
Servitude/Area within which the Proposed Service Road will occur within	68 000 m^2 to 102 000 m^2	184 000 m^2 to 276 000 m^2
Proposed On-site Substation	200 m X 200 m (40 000 m^2)	200 m X 200 m (40 000 m^2)
Proposed Laydown Area	100 m X 100 m (10 000 m^2)	100 m X 100 m (10 000 m^2)
Proposed O&M Building	120 m X 120 m (14 400 m^2)	120 m X 120 m (14 400 m^2)

4.6. Water, Sewage, Waste and Electricity Requirements

- **Water Usage**

In terms of water usage, water will be used during the construction phase mainly for earthworks, domestic purposes, dust control and re-vegetation watering processes. During the construction phase, water will be sourced from the local municipality or existing boreholes (if groundwater is available and if suitable). The exact details of water requirements will be confirmed during the detailed engineering phase. At this stage, no water is planned to be abstracted from or discharged to any surface water systems. During the operational phase of the proposed distribution line, water requirements are not applicable.

- **Sewage or Liquid Effluent**

The proposed project will require sewage services during the construction phase. Low volumes of sewage or liquid effluent are estimated. Liquid effluent will be limited to the ablution facilities during the construction phase. Portable sanitation facilities (i.e. chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a suitable (private) contractor on a regular basis. The waste water will be transported to a nearby Waste Water Treatment Works for treatment. Due to the remote location of the project site; a conservancy tank or septic tank system could be used on site, which is expected to be serviced by the municipality. Due to the remote locality of the farm, sewage cannot be disposed in the municipal waterborne sewage system. During the operational phase of the proposed distribution line, sewage generation is not applicable.

- **Solid Waste Generation**

The quantity of waste generated will depend on the construction phase, which is estimated is extend 12 to 14 months. However, it is estimated that approximately 50 m^3 of waste will be generated every month during the construction phase. During the construction phase, the following waste materials are expected:

- Packaging material, such as the cardboard, plastic and wooden packaging and off-cuts;
- Hazardous waste from empty tins, oils, soil containing oil and diesel (in the event of spills), and chemicals;
- Building rubble, discarded bricks, wood and concrete;
- Domestic waste generated by personnel; and
- Vegetation waste generated from the clearing of vegetation.

Solid waste will be managed via the EMPr (Appendix G of the BA Report), which incorporates waste management principles. General waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed, emptied into trucks, and disposed at a registered waste disposal facility on a regular basis by an approved waste disposal Contractor (i.e. a suitable

Contractor). Any hazardous waste (such as contaminated soil as a result of spillages) will be temporarily stockpiled (for less than 90 days) in a designated area on site (i.e. placed in leak-proof storage skips), and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility. Waste disposal slips and waybills will be obtained for the collection and disposal of the general and hazardous waste. These disposal slips (i.e. safe disposal certificates) will be kept on file for auditing purposes as proof of disposal. The waste disposal facility selected will be suitable and able to receive the specified waste stream (i.e. hazardous waste will only be disposed of at a registered/licenced waste disposal facility). The details of the disposal facility will be finalised during the contracting process, prior to the commencement of construction. Where possible, recycling and re-use of material will be encouraged. Waste management is further discussed in the EMPr (Appendix G of this BA Report). During the operational phase of the proposed distribution line, waste generation is not applicable.

Furthermore, it is important to note that the proposed project does not trigger any activities listed in Categories A and B of the List of Waste Management Activities published in GN 921 and as such a Waste Management Licence is not required. A Waste Management Licence, in terms of the NEMWA, is not required when activities listed in Category C are triggered; however instead, compliance with the relevant National Norms and Standards must be achieved. Activity 2 of Category C of GN 921 states the following: "the storage of hazardous waste at a facility that has the capacity to store in excess of 80 m^3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons or temporary storage of such waste". It is estimated that during the construction phase, limited amounts of hazardous waste will be generated. As noted above, the type of hazardous waste will be limited to waste hydraulic oils; waste engine, gear and lubricating oils; waste insulating and heat transmission oils; wastes of liquid fuels; or hazardous portions of other oil wastes. This could occur as a result of fuel spillages on site (due to construction equipment and vehicles). It is not likely that more than more than 80 m^3 of waste fuel spillages will emanate from the construction process that will need to be stockpiled on site for longer than 90 days. Therefore, the National Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) will not need to be complied with. However, these recommendations have been included in the EMPr.

- **Electricity Requirements**

In terms of electricity supply for the construction phase, the developer will be provided with auxiliary supply from already existing Eskom infrastructure. The exact location of this source as well as the route for provision of such supply is still to be determined by Eskom. During the operational phase, the distribution line will not have any electricity requirements as the project itself will transmit and distribute electricity.

The Project Applicant will consult with the municipality in order to confirm the supply of services (in terms of water, waste removal, sewage and electricity) for the proposed project. However, it must be noted that should the municipality not have adequate capacity for the handling of waste, provision of water and sewage handling provisions available; then the Applicant will make use of private contractors to ensure that the services are provided. The Applicant will also ensure that adequate waste disposal measures are implemented by obtaining waste disposal slips for waste removed from site (in line with the EMPr).

4.7. Overview of the Project Development Cycle

The project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and, where applicable, has therefore been assessed by the specialist studies (Appendix D of this BA Report).

4.7.1. Construction Phase

The construction phase will take place subsequent to the issuing of an EA from the DEA and a successful BID in terms of the REIPPPP (i.e. the issuing of a PPA from the DOE). The construction phase for the proposed project is expected to extend 12 to 14 months.

As noted above, the construction phase will involve the transportation of personnel, construction material and equipment to the site, and personnel away from the site. In terms of site establishment, a laydown area will be required at the outset of the construction phase, as well as dedicated access routes from the laydown area to the working areas. Haul roads for construction traffic (for the delivery of concrete, road materials and other construction materials) will be required. As noted above, it is expected that the laydown area will be temporary in nature (for the duration of the construction phase) and will include the establishment of the construction site camp (including site offices and other temporary facilities for the appointed Contractors).

During the construction phase, dust will be generated from the earthworks and excavation required for the construction of the proposed infrastructure and building foundations, the removal of vegetation, the movement of vehicles and equipment accessing the site, and the infilling of excavations and levelling. Appropriate mitigation measures will be implemented during the construction phase to reduce the dust levels. Approved soil stabilizing agents may need to be used to minimise dust. Dust generation during the construction phase will be of a short-term duration and is predicted to be of low significance with the implementation of mitigation measures. Appropriate mitigation and management measures are included in the EMPr (Appendix G of the BA Report). The construction vehicles and equipment will also generate exhaust emissions. However, these emissions are also expected to be short-term in duration and of low significance with the implementation of mitigation measures. Appropriate mitigation and management measures are included in the EMPr (Appendix G of the BA Report) with regards to traffic control.

In terms of noise generation, as part of the construction phase, noise will be generated by the construction activities, earthworks, personnel, equipment and vehicles on the site. The levels of noise are not expected to be excessive and will be in line with standard industry levels associated with the proposed activity. In addition, noise generation during the construction phase is considered to be localised and short-term, with a low to very low significance (with the implementation of mitigation measures). During the construction phase, the ambient noise is not expected to exceed 45 dB(A) during the day and 35 dB(A) at night for rural districts (as required by SANS 10103:2008). In addition, the proposed project will not generate any noise during the operational phase.

All efforts will be made to ensure that all construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the EMPr, which is included in Appendix G of this BA Report. During the construction phase, it is estimated that approximately 130 employment opportunities will be created. The employment creation is also dependent on the REIPPPP bidding requirements and the final engineering design.

The main activities that will form part of the construction phase are:

- Removal of vegetation for the proposed infrastructure;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the 132 kV distribution line and additional infrastructure.

4.7.2. Operational Phase

The following activities will occur during the operational phase:

- The transmission of electricity generated from the proposed Rietrug WEF to the third party substation; and
- Maintenance of the distribution line servitude including the gravel service road.

During the life span of the power line (approximately 20 years), on-going maintenance will be required on a scheduled basis. This maintenance work will be undertaken by contractors employed by the Project Applicant or Eskom, and in compliance with the EMPr.

4.7.3. Decommissioning Phase

The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the actual WEF becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and the site will be rehabilitated and returned to its pre-construction state.

5. ENVIRONMENTAL SENSITIVITIES

As noted above, as part of the BA Process, the large 25 ha development envelope was considered and assessed by the specialists for the proposed on-site substation, laydown area, and O&M Building. In addition, where applicable the specialists have studied the general area and an estimated 500 m buffer area on either side of the proposed distribution line (for both Alternatives 1 and 2). This was undertaken in order to identify any development constraints or environmental sensitivities within the larger development envelope and investigation area, which can be avoided in the final siting and location of the proposed on-site substation, laydown area, O&M Building, distribution line and service road. Due to the large extent of the linear development, some specialists adopted a slightly different field work methodology, and only focused on areas that were identified as a concern during the desktop survey (which preceded the field work). The relevant and significant environmental features and no-go areas that were identified in the specialist studies have been mapped and included in Appendix A.3 of this BA Report. Based on this and the findings of the specialist studies, an environmental sensitivity map has also been produced, and included in Appendix A.4 of this BA Report, as well as the EMPr (Appendix G of this BA Report). The following environmental features and sensitive areas were identified by the specialists for consideration in the layout and location.

5.1. Terrestrial Ecology Environmental Features and Sensitivities

The Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) explains that the areas of topographic variation or those which are more lithic in structure should be considered to be of greater sensitivity in respect of the maintenance of ecological processes within the study area. Features of significant relief variation or geomorphologically variable, may be considered to offer micro-environmental variations or localised niches, as well as refugia that supports increased habitat diversity within the study area.

The assessment determined the following in terms of sensitivity:

- Areas of ecological sensitivity or value lie primarily below the 1600 m above mean sea level (amsl) contour (as shown in Figure 4 below), and include steep lithic scarp areas.
- The development envelope area allocated for the siting of the proposed on-site substation (including the O&M Building and laydown area) is of limited ecological sensitivity, showing little topographic variation.
- No areas within the study site were considered to show a “very high” or “high” ecological sensitivity.

Figure 4 below shows the proposed electrical grid infrastructure and the areas of ecological value or sensitivity.

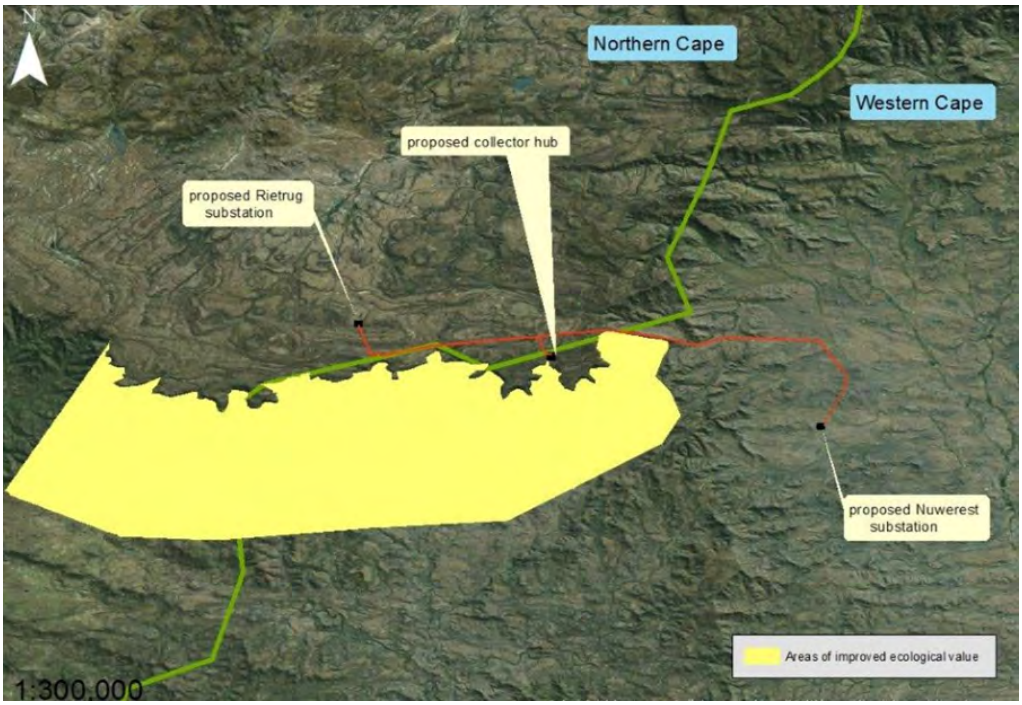


Figure 4: Image indicating the proposed electrical grid infrastructure and areas deemed to be of ecological value or sensitivity (linked to the 1600 m amsl contour) for the Rietrug WEF Electrical Grid Infrastructure Project.

As indicated in Figure 4, Alternative 1 of the proposed distribution line routing and connection to the proposed collector hub maintains all infrastructure above the 1600 m amsl contour. However, Alternative 2 of the proposed distribution line routing and connection to the proposed Eskom Nuwerust Substation traverses points below this contour as it progresses in an easterly direction. However, despite Alternative 2 having a longer route than Alternative 1, it effectively avoids traversing steeper ridges and scarps. As noted above, the proposed service road will follow the same route of the distribution line; however a small portion of the service road for Alternative 2 deviates and follows the route of an existing unused farm track to avoid impacts on the steeper ridges and scarps. From a terrestrial ecological point of view both Alternative 1 and Alternative 2 of the distribution line routing and connection to the third party substation are considered to be suitable and there are no fatal flaws associated with them.

5.2. Aquatic Ecology (Freshwater) Environmental Features and Sensitivities

The Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) identified three main rivers, with associated riparian characteristics, within the investigation area. These include the Riet, Vanwyks and Juk Rivers, along with their associated tributaries and their applicable riparian zones. In addition, unnamed tributaries of the Portugal's River were identified in the western portion of the investigation area, although the Portugal's River itself is not located within the investigation area. In addition, several smaller, ephemeral drainage lines without riparian vegetation were also identified; however, these features were not assessed as they do not have any true riparian characteristics (i.e. vegetation of the terrestrial zone does not differ from that of the vegetation found within the adjacent terrestrial areas) and thus from an ecological point of view cannot be defined as watercourses as defined by the National Water Act (Act 36 of 1998) (NWA).

The Riet River as well as an unnamed tributary of the Riet River traverse both alternatives of the distribution line (west), with the Riet River also located within the proposed collector hub development envelope. The Vanwyks River and the Juk River traverses the Alternative 2 distribution line routing (east), while the Beerfontein se Laagte River is indicated to rise within the western portion of the investigation area, and as such within 500 m of both distribution line alternatives. All of these rivers are considered to be in an unmodified, natural or largely natural with few modification ecological condition (RIVCON AB), with the exception of the Riet River which is considered to be in a largely natural with few modification ecological condition (RIVCON B).

Additionally, the headwaters of several smaller systems were found to be located to the south of the distribution line, within the investigation area. However, due to the topography of the area, it was not possible to access these headwaters during the specialist site visit, and thus they were not assessed. However, the locality of these features should be taken into consideration during the final planning stages of the project. In addition, a large depression-type feature associated with the floodplain of an unnamed tributary of the Riet River was identified approximately 200 m west of Alternative 1 of the distribution line. Figure 5 illustrates the rivers associated with the study area.

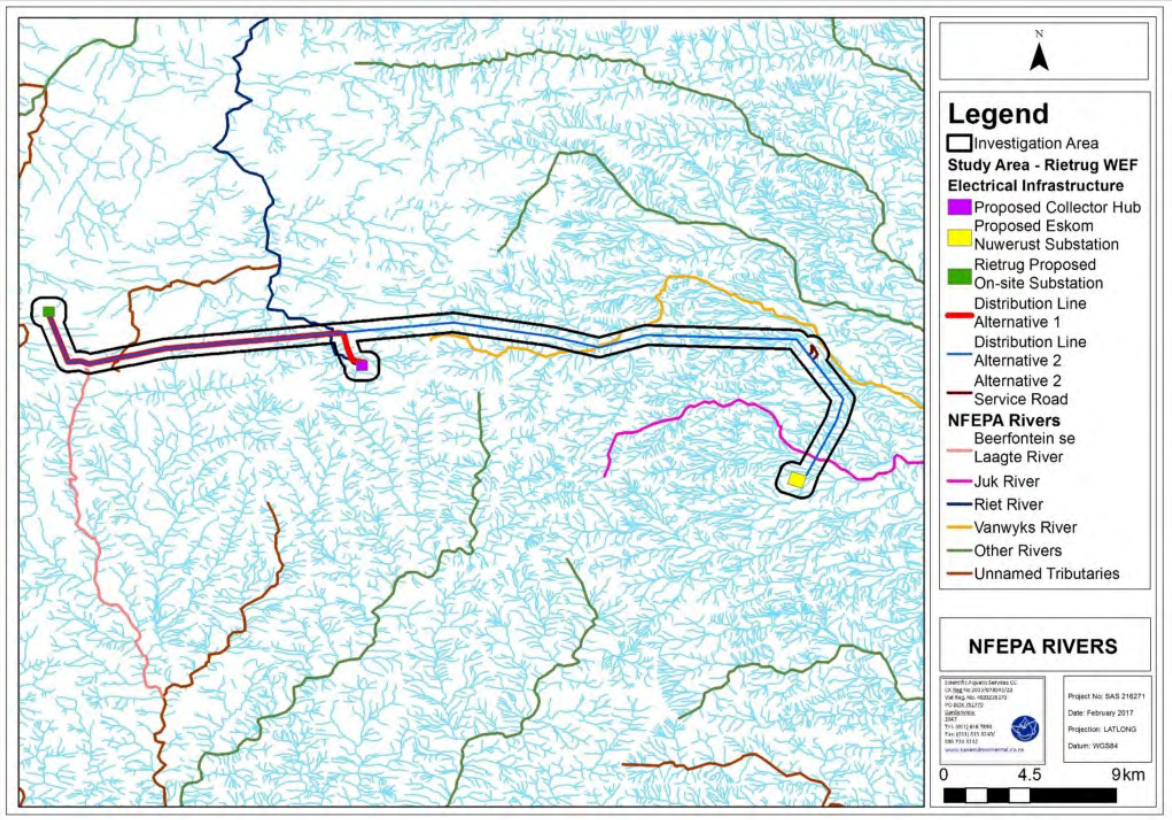


Figure 5: Rivers associated with the study area according to the National Freshwater Ecosystems Protected Areas (NFEPA) database (2011).

In terms of determining suitable buffer zones and regulated zones of activity for the freshwater resources present within the investigation area, the legislative requirements of the 2014 NEMA EIA Regulations (as amended) and GN509 of 2016 as it relates to the NWA were considered. Thus, a 32 m regulated zone is prescribed to all the freshwater features as stipulated by the 2014 NEMA EIA Regulations (as amended). Should any infrastructure need to be placed directly within the active channel of any freshwater resource, a Water Use Licence (WUL) will be required and must be applied for by the proponent.

Whilst it is not practical to implement a buffer around the freshwater resources during construction of linear developments such as the distribution lines or service roads, as much as feasible,

construction activities should be excluded from the NEMA EIA Regulations 32 m zone of regulation. The sensitive watercourses are shown in Figures 6 and 7 below. However, the 32 m zone of regulation around the freshwater features must be adhered to in the vicinity of the substations, and in this regard, no activity may be permitted within the 32 m zone of regulation or any watercourse without obtaining the necessary authorisations from the respective authorities.

Wherever possible, it is highly recommended that the linear development spans the relevant watercourse, and every effort should be made to prevent placement of monopoles within the riparian zone or associated 32m zone of regulation. If this is not avoidable, the monopoles should be placed as far from the active channel of the watercourse as possible.

Nonetheless, suitable mitigation measures have been provided in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), to address any crossings of rivers or work within the 32 m zone of regulation around freshwater resources. Overall, the specialist report recommends that no unnecessary activities (e.g. placement of contractor laydown areas) should take place within the 32 m zone of regulation, which should be applied and enforced as much as practicably possible.

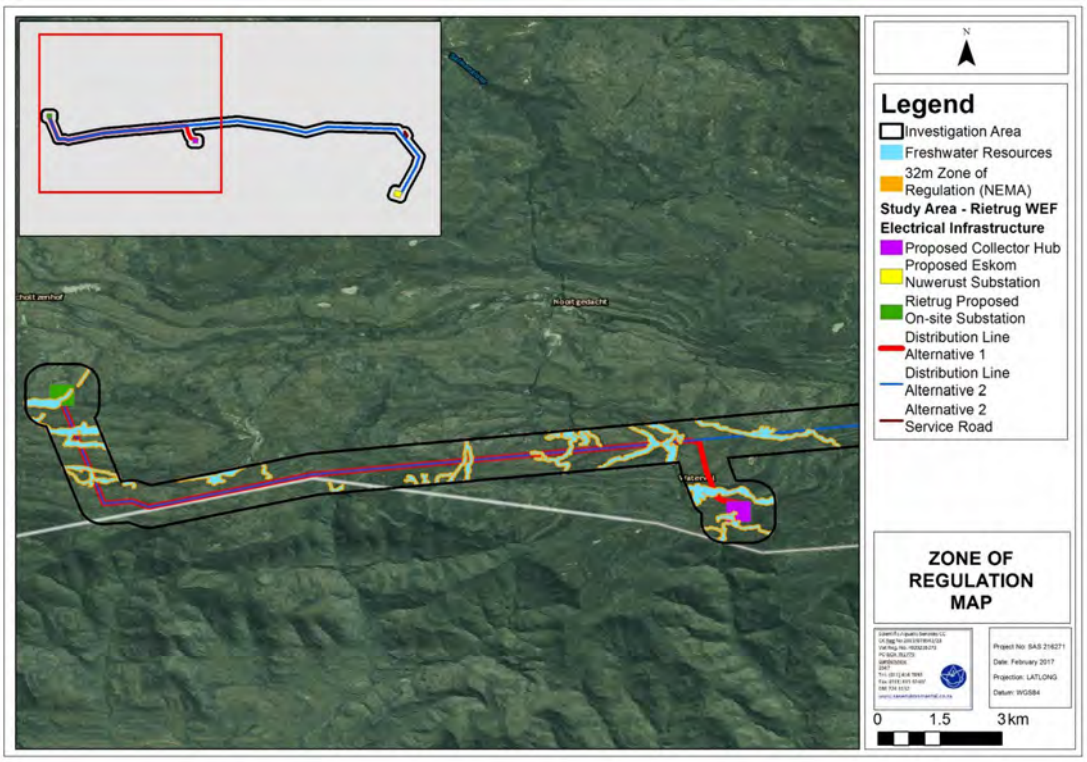


Figure 6: Conceptual presentation of the freshwater resources associated with the western portion of the study area, and the associated 32m zone of regulation as stipulated by NEMA.

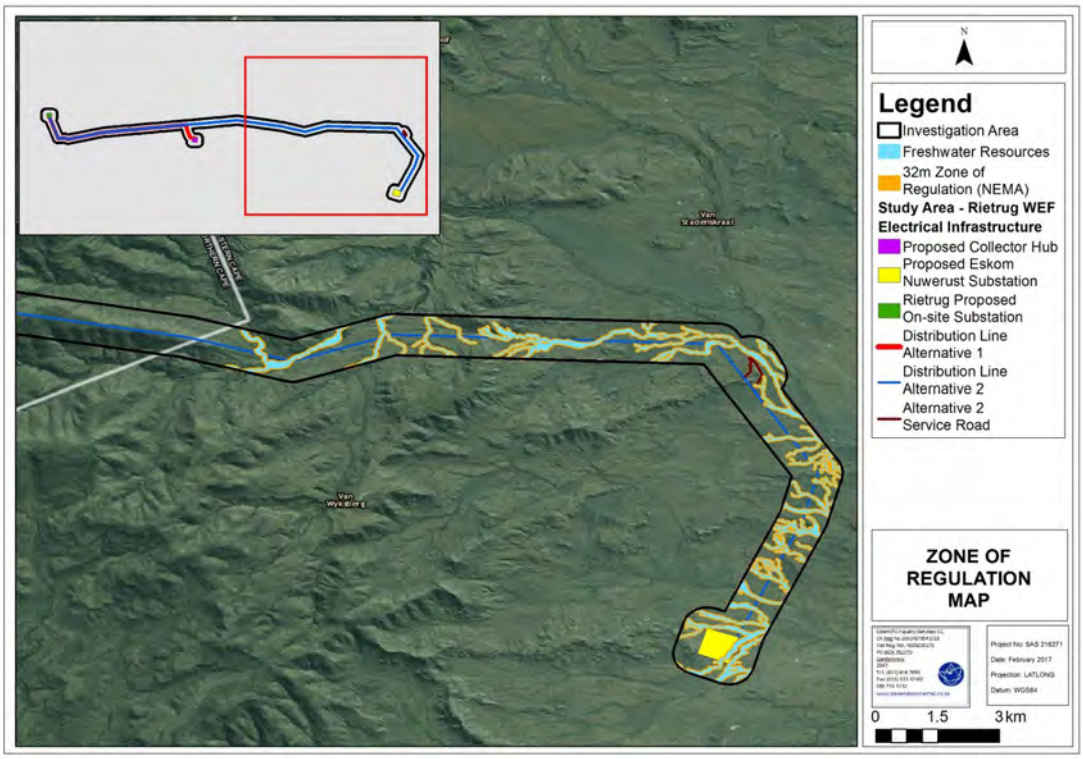


Figure 7: Conceptual presentation of the freshwater resources associated with the eastern portion of the study area, and the associated 32m zone of regulation as stipulated by NEMA.

5.3. Visual Environmental Features and Sensitivities

The Visual Impact Assessment (Appendix D.3 of this BA Report) explains that the 132 kV distribution lines along the proposed routes are unlikely to be more than moderately intrusive on existing views unless they are exposed above the skyline since there are similar structures in the surrounding landscape (e.g. distribution and transmission lines, fences (particularly game fences) and roads). The mottled background of vegetation and rocks in the region will do much to reduce visibility of the power lines. Power lines and pylons are likely to be exposed against the skyline where they are in close proximity to visual receptors as well as where they cross highly visible ridges. The map in Figure 8 shows sensitive areas on the farms hosting the proposed development. The map indicates areas of high-moderate-low visibility in the landscape (e.g. ridges are often moderately to highly visible in the landscape) as well as areas around farmsteads and buildings which should be avoided. There are no guidelines for set-back distances from power lines other than for health reasons, but studies have shown that proximity to power lines can lower property prices (indicating negative visual impact). A distance of 100 m from farm buildings is indicated as highly sensitive and 200 m as moderately sensitive. The routes avoid highly visible ridges and do not pass within 200 m of any buildings. It is therefore unlikely that the overhead lines will be exposed above the skyline for most visual receptors in the region. The proposed distribution line routes mainly pass through areas of low sensitivity, and the proposed Rietrug on-site substation site falls within an area of low sensitivity, as shown in Figure 8 below.

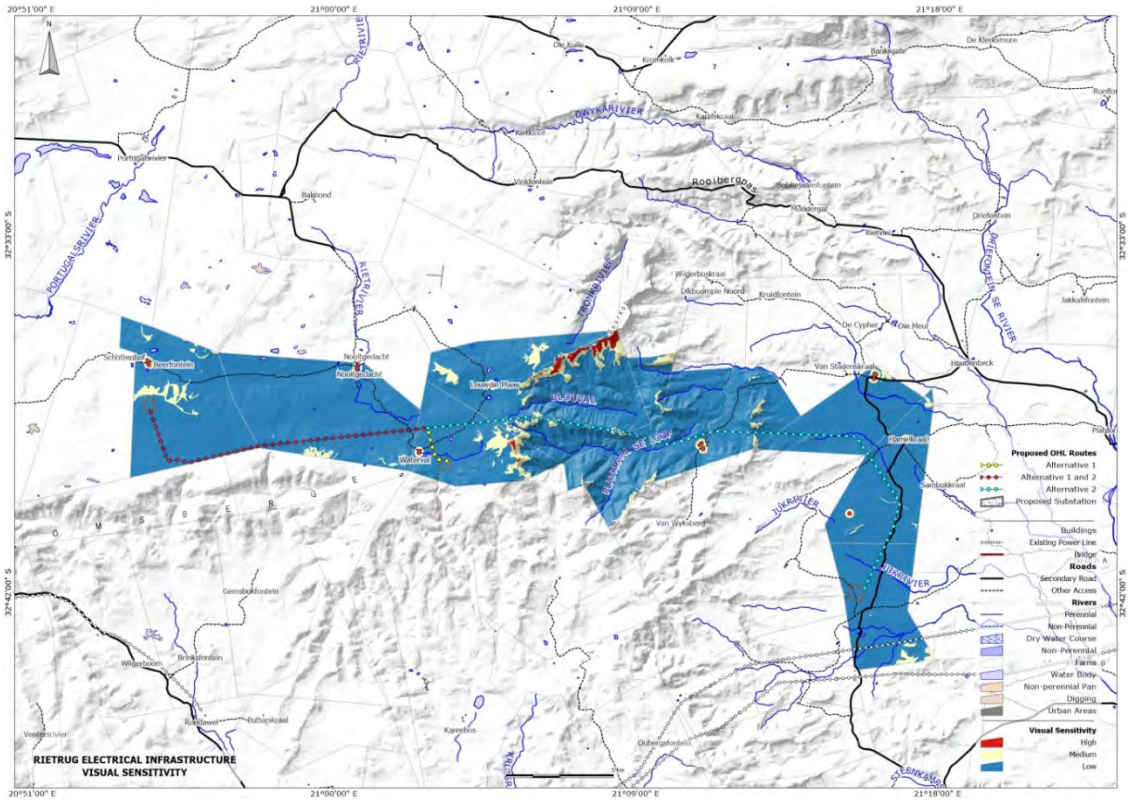


Figure 8: Visual Sensitivity Map of the properties hosting the proposed electrical infrastructure for the Rietrug WEF Electrical Grid Infrastructure Project

5.4. Heritage Environmental Features and Sensitivities

Palaeontology:

The Palaeontology Impact Assessment is included as an appendix to the Heritage Impact Assessment (Appendix D of this BA Report). The Palaeontology Impact Assessment explains that most of the fossil occurrences found during the specialist site visit were found to be of limited palaeontological value and lie well away from the proposed electrical infrastructure footprint and do not warrant mitigation. However, only one highly-sensitive "no-go" area was identified within the Rietrug WEF electrical grid infrastructure study area, however it lies outside of the proposed development footprint. This specifically includes an extensive surface scatter of petrified wood blocks (Figure 9), some of which are well-preserved, and occasional bone fragments, which was found on Farm Hamel Kraal 16 on either side of a farm track. This fossil scatter is located approximately 500 m away from the Alternative 2 distribution line routing. A 30 m wide peripheral buffer zone is required around the fossil scatter. No significant fossil remains were recorded at the proposed on-site substation and third-party substation sites. The overall palaeontological sensitivity of the electrical grid infrastructure study area is rated as low. A partially embedded, articulated post-cranial skeleton of a large tetrapod was also found on the Beeren Valley Farm 150, and it is of heritage conservation significance; however it will not be impacted on by the proposed project, as it lies outside of the project footprint.

Figure 9: Location of an extensive surface scatter of petrified wood plus occasional bone fragments on either side of a farm track on Farm Hamel Kraal 16. The yellow polygon outlines a proposed 30 m wide peripheral buffer zone around the fossil scatter, and the black line approximately 500 m to the northeast shows Alternative 2 of the distribution line routing.

Archaeology:

The Heritage Impact Assessment (Appendix D.4 of this BA Report) explains that significant archaeological sites (especially the two ruined complexes found around waypoints 498 and 614, as described below) should be identified on project maps and regarded as no-go zones with buffers of at least 30 m around all associated features. The exception to the 30 m buffer is the service road diversion which is routed within 20 m of a rock art site (at waypoint 492); however the service road uses an existing farm track. There are a number of archaeological sites along both alternatives, as shown in Figures 10 to 12 below. The relevant waypoints to be avoided with buffers of at least 30 m around all associated features are noted below:

- Waypoint 575 comprises a small piled stone structure of approximately 1.5 m by 3 m built along the edge of a small scarp.
- Waypoint 576 includes a small piled stone oval structure (historical ruin) of about 1.5 m by 3 m, standing in the open away from any landscape features. Two unburnt and one burnt bone fragments were the only associated materials present. This site is located within the development envelope of the proposed Sutherland on-site substation (subject of a separate assessment), and it is not significant enough to warrant mitigation but should be avoided if possible.
- Waypoint 524 includes a small stone structure in a small, steep-sided river valley. The Heritage Impact Assessment notes that it is more intact than many other historical finds. This point does not lie within the proposed distribution line alignments.
- Waypoint 546 is a pre-colonial kraal complex with numerous enclosures and stone-walled features (about 27 or 29 in total) scattered around and on top of a low rocky outcrop. A few Stone Age artefacts were found as well as a number of fragments of ostrich eggshell. It should be noted that waypoints 528 to 553 inclusive were all at this kraal complex but waypoint 546 is taken as an approximately central location for the site. This complex does not lie along the proposed distribution line alignment but, importantly, is bisected by one of the farm access roads in the area. This road (passing through the kraal complex) may not be widened towards the east and should preferably not be widened at all.
- Waypoint 527 is a stone house ruin. The Heritage Impact Assessment notes that the occupants of the house had at some point tried to rescue the walls from caving in by building extra

walling up on the outside. The house ruin is not occupied and does not lie within the proposed distribution line alignment.

- Waypoint 614 is part of a single historical farm complex (2.5 m x 5 m), comprising a small, rectangular stone one-roomed house of blocks, with a door, window and a small 'muurkas' (more of a shelf) in each end wall. There is a cleared area around the house with stones pushed loosely to the edge. There are various loose piles of stones or 'features' around the edge of the cleared area. This complex is noted as a sensitive historical ruin lying approximately 310 m from Alternative 2 of the distribution line alignment.
- Waypoint 498 includes a small one-roomed stone house complex. This complex is noted as a sensitive historical ruin lying approximately 150 m from Alternative 2 of the distribution line alignment.
- Waypoint 492 includes a geometric rock art site with eight finger-painted vertical stripes applied to three different 'canvases' (small faces on a very irregular surface). No associated artefacts were seen and no proper rock shelter exists.

Figure 10: Two archaeological sites at waypoints 575 and 576 (red shaded polygons) that should be avoided at the western end of the study area. Note that the northern one (at waypoint 575) includes waypoints recorded by Halkett & Webley (2011), while the southern one lies within the development envelope for the proposed Sutherland on-site substation (assessed in a separate report, at waypoint 576).

Figure 11: Three archaeological sites (waypoints 524, 546, and 527) that should be avoided near the eastern end of Alternative 1.

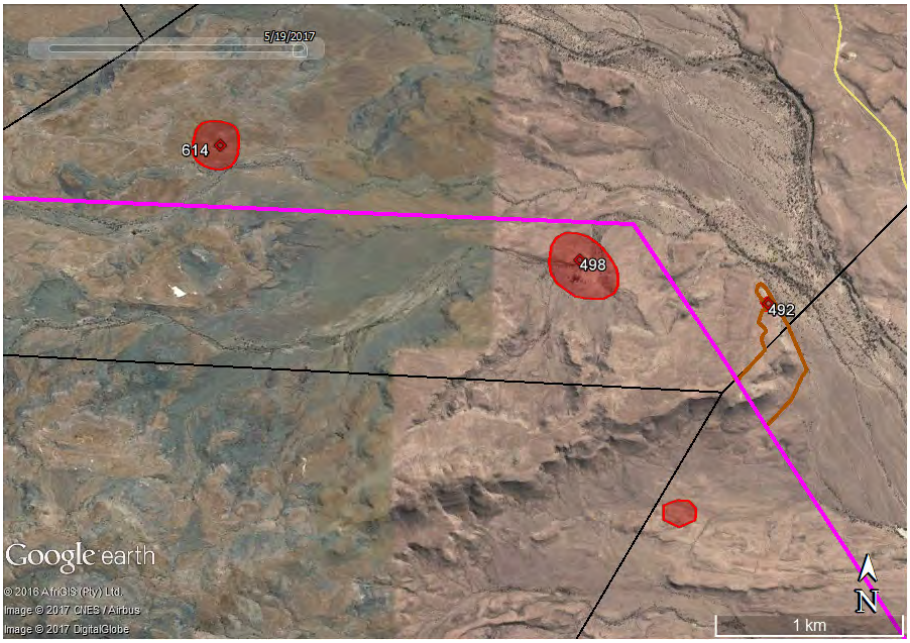


Figure 12: Three archaeological sites (waypoints 614, 498, and 492), and one palaeontological site (red shaded polygons) that must be avoided in the north-eastern part of Alternative 2. The palaeontological site is the southernmost polygon. The brown line shows the route that must be followed by the service road in that area.

The site at waypoint 546 will not be completely avoidable (i.e. a current access road passes through waypoint 546); however special care should be taken within the bounds of all three sites to ensure that no damage is done.

5.5. Avifauna Sensitivities:

The following environmental sensitivities have been identified from an avifaunal perspective (as noted in the Avifauna Impact Assessment (Appendix D.5 of this BA Report), as shown in Figure 13 below:

- No-go areas: These are areas in close proximity to known active Verreaux's Eagle nests, where the construction of the proposed distribution line and associated infrastructure will constitute a disturbance risk. **No such areas are expected to be impacted by any of the proposed alignments**.
- High sensitivity: These include areas within 300 m of small waterbodies, and within 500 m of large waterbodies (both artificial dams and natural pans), where the proposed distribution line will constitute a collision risk. **The Avifaunal Specialist Study explains that these high sensitivity areas should ideally be avoided, or if this is not possible, there should be adequate mitigation implemented to reduce the risks materially.** Red Data species that could be impacted through collisions with the proposed distribution line due to being attracted to the surface water include Greater Flamingo, Black Stork and raptors such as Martial Eagle and Verreaux's Eagle. Many non-Red Data species could also be attracted to surface water and be at risk of collisions e.g. various species of raptors, ducks, herons, grebes and waders. Ephemeral drainage lines and their immediate environments are also included in this category. When these ephemeral drainage lines contain water they serve as flyways for waterbirds, and may temporarily attract Red Data species such as Black Stork, while standing pools of water could attract raptors for purposes of drinking and bathing, e.g. Red Data Martial Eagle and Verreaux's Eagle as well as non-Red Data raptors. **These areas should likewise ideally be avoided, or if this is not possible, there should be adequate mitigation implemented to reduce the risks materially, e.g. marking with anti-collision devices.** Only a few of these high sensitivity buffered areas are traversed as a result of the proposed electrical grid infrastructure; however as confirmed by the Avifauna Specialist, this is not considered a fatal flaw, and it is important to note that the recommended mitigation measures will be adhered to by the Applicant to ensure that the risks to avifauna are reduced. These mitigation measures are detailed in Section D of this BA Report and Section 7 of the Avifauna Impact Assessment in Appendix D.5 of this BA Report. These mitigation measures have also been incorporated into the EMPr to ensure that they are implemented as required.
- Medium sensitivity: The entire study area can be classified as medium-sensitive. The area is largely untransformed and the natural habitat supports a number of Red Data powerline sensitive species, notably Ludwig's Bustard and Karoo Korhaan. Ludwig's Bustard in particular is known to be highly susceptible to powerline collisions.

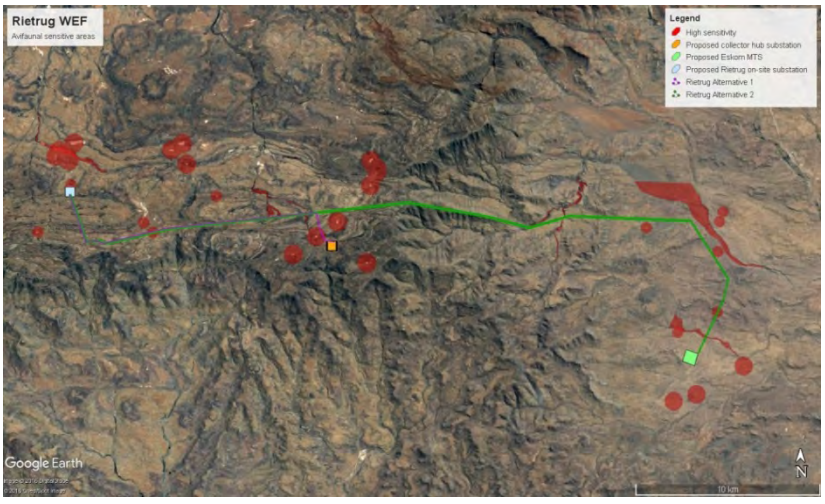


Figure 13: Sensitive areas from an avifaunal impact perspective for the proposed Rietrug WEF Electrical Grid Infrastructure BA

Therefore, overall, the proposed project infrastructure does not intersect with any no-go areas identified by the specialists, and where areas of high sensitivity will be traversed by the proposed project components, relevant mitigation measures have been recommended to reduce the significance of the potential impacts. It is important to note that the specialists have not identified any fatal flaws associated with the proposed project.

Based on the boundaries of the development envelope and the constraints of the environmental features and sensitivities as noted above, the preferred location for the proposed on-site substation (including the O&M Building and laydown area), will be determined by Mainstream. However, micro-siting of the final location of these structures can only be undertaken during the detailed engineering phase, if preferred bidder status is obtained by Mainstream. However, it must be re-iterated that the proposed on-site substation (including the O&M Building and laydown area) will only be constructed within the boundaries of the assessed development envelope.

It is important to note that should the preferred location of the proposed on-site substation, O&M Building and laydown area change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout/location or revisions thereto occurring within the boundaries of the development envelope would not be regarded as a change to the scope of work or the findings of the impact assessments undertaken during the BA Phase. This is based on the understanding that the specialists have assessed the larger area and have identified sensitivities, which will largely be avoided in the final siting of the proposed infrastructure.

In addition, the proposed specific locations of the pylon structures will be confirmed and determined by Mainstream during the detailed engineering phase, taking into consideration the environmental sensitivities and features identified as part of this BA Process, as described above.

6. MAPPING AND SITE PHOTOGRAPHS

Refer to Appendix A.1 of this BA Report for a project Locality Map which provides an accurate indication of the proposed project site and alternatives, as well as existing access roads and the closest town. Appendix A.2 of this BA Report includes a Layout/Route Map of the proposed infrastructure, including property boundaries. Appendix A.3 of this BA Report includes an Environmental Features Map, which shows the relevant environmental features identified on site by the specialists. In addition, Appendix A.4 of this BA Report includes a Sensitivity Map, which shows those environmental features, and areas that are considered to be of high sensitivity and no-go areas. Both the Environmental Features and Sensitivity Maps also indicate the proposed project infrastructure.

In terms of site photographs, five photograph points which best represent the proposed project area were selected. Photographs were taken in the eight major compass directions at each photograph point. The co-ordinates of the photograph points are shown below:

- Photograph Point 1 - 32° 36' 18.76" S and 21° 0' 41.63" E
- Photograph Point 2 - 32° 35' 24.40" S and 21° 2' 53.87" E
- Photograph Point 3 - 32° 42' 7.90" S and 21° 16' 7.13" E
- Photograph Point 4 - 32° 40' 34.66" S and 21° 16' 30.84" E
- Photograph Point 5 - 32° 38' 32.13" S and 21° 15' 57.73" E

Additional photographs were also taken and shown in the relevant specialist studies in Appendix D of this BA Report. All photographs are included in Appendix B of this BA Report. In addition, Appendix C of this BA Report includes **indicative** drawings of the proposed pylon structures being considered for the proposed 132 kV distribution line and the indicative layout of the proposed on-site substation. As noted above, specifications may change during the detailed engineering phase.

7. DESCRIPTION OF THE LISTED ACTIVITIES ASSOCIATED WITH THE PROPOSED PROJECT

Section 24(1) of the NEMA states: "In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant environmental authorization." The reference to "listed activities" in Section 24 of the NEMA relates to the regulations promulgated in GN R326, R327, R325 and R324, dated 7 April 2017. The relevant GN published in terms of the NEMA collectively comprise the NEMA EIA Regulations listed activities that require either a BA, or Scoping and EIA be conducted. As noted above, the proposed project requires a BA Process.

As noted above, the Application for EA for this BA Process will be submitted to the DEA together with this BA Report, which makes reference to all relevant listed activities forming part of the proposed development. A copy of the Application for EA will be included in the finalised BA Report, which will be submitted to the National DEA for decision-making.

Table 4 below provides a list of the applicable listed activities associated for the proposed project in terms of Listing Notice 1 (GN R 327) and Listing Notice 3 (GN R324) in terms of the 2014 NEMA EIA Regulations (as amended).

Table 4: Applicable Listed Activities

Listed Activity (GN R327 and R324)	Description of Project Activity that triggers Listed Activity
GN R327	
GN R327: Activity 11 (i) The development of facilities or infrastructure for the transmission and distribution of electricity: ▪ (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	The proposed project will entail the construction and installation of an overhead 132 kV distribution line, as well as an on-site substation towards the western end of the line. The proposed distribution line will connect to a third party substation (either Alternative 1, the proposed collector hub, or Alternative 2, the proposed Eskom Nuwerust Substation) in order to facilitate connection to the National Grid. The proposed collector hub and Eskom Nuwerust Substation are not considered as part of this BA Process. The proposed project will take place outside of an urban area.
GN R327: Activity 12 (ii) The development of – ▪ (ii) infrastructure or structures with a physical footprint of 100 square metres or more; ▪ (a) within a watercourse; ▪ (b) in front of a development setback; or ▪ (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding: ▪ (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; ▪ (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing	The proposed project will entail the construction and installation of an overhead 132 kV distribution line, as well as an on-site substation towards the western end of the line. The proposed distribution line will connect to a third party substation (either Alternative 1, the proposed collector hub, or Alternative 2, the proposed Eskom Nuwerust Substation) in order to facilitate connection to the National Grid. The proposed collector hub and Eskom Nuwerust Substation are not considered as part of this BA Process. The on-site substation (which will include a laydown area and an O&M Building) will cover an approximate area less than 20 ha. Foundations for the pylons and towers of the distribution line will also be constructed. A gravel service road will also be constructed below the distribution line. For Alternative 1 of the proposed distribution line routing, the service road will extend approximately 4 – 6 m wide and 17 km long. For Alternative 2, routed to the proposed Eskom Nuwerust Substation, the proposed service road will extend approximately 4 – 6 m wide and 46 km long.

Listed Activity (GN R327 and R324)	Description of Project Activity that triggers Listed Activity
Notice 2 of 2014 applies; ▪ (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; ▪ (dd) where such development occurs within an urban area; ▪ (ee) where such development occurs within existing roads, road reserves or railway line reserves; or ▪ (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.	This constitutes infrastructure and structures with a physical footprint of more than 100 m^2 that could possibly be constructed within or within 32 m of watercourses found on site. The Aquatic Ecology (Freshwater) Impact Assessment that has been undertaken as part of the BA Process identified three main rivers, with associated riparian characteristics, within the investigation area. These include the Riet, Vanwyks and Juk Rivers, along with their associated tributaries and their applicable riparian zones. In addition, unnamed tributaries of the Portugal's River were identified in the western portion of the investigation area, although the Portugal's River itself is not located within the investigation area. As shown in Figures 5, 6 and 7 of this BA Report, infrastructure associated with the proposed project could possibly be constructed within or within 32 m of the Riet, Vanwyks and Juk Rivers, along with their associated tributaries and their applicable riparian zones.
GN R327: Activity 19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving - ▪ (a) will occur behind a development setback; ▪ (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; ▪ (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; ▪ (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or ▪ (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	The proposed project may entail the excavation, removal and moving of possibly more than 10 m^3 of soil, sand, pebbles or rock from the nearby watercourses. The proposed project may also entail the infilling or depositing of more than 10 m^3 of material into the nearby watercourses. This infilling and excavation of the material will occur as a result of the proposed construction of the distribution line, on-site substation, service road, laydown area and O&M Building. The Aquatic Ecology (Freshwater) Impact Assessment that has been undertaken as part of the BA Process identified three main rivers, with associated riparian characteristics, within the investigation area. These include the Riet, Vanwyks and Juk Rivers, along with their associated tributaries and their applicable riparian zones. In addition, unnamed tributaries of the Portugal's River were identified in the western portion of the investigation area, although the Portugal's River itself is not located within the investigation area. As shown in Figures 5, 6 and 7 of this BA Report, infilling of material or excavating of material could possibly occur from the Riet, Vanwyks and Juk Rivers, along with their associated tributaries and their applicable riparian zones. Details of the infilling of material or excavating of material will be confirmed during the detailed design phase.
GN R327: Activity 27 The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for: ▪ the undertaking of a linear activity; or ▪ maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed project will entail the construction of an on-site substation (including a laydown area and O&M Building), which will cover an approximate area of less than 20 ha. As a result, more than 1 ha of indigenous vegetation could possibly be removed for the construction of these structures. The presence of indigenous vegetation on site, as well as legislative requirements surrounding its potential removal, is determined in the Terrestrial Ecology Impact Assessment that has been undertaken as part of

Listed Activity (GN R327 and R324)	Description of Project Activity that triggers Listed Activity
	this BA Process. According to the assessment, site clearance for the commencement of construction will be required, particularly within and around the area required for the proposed on-site substation, laydown area, O&M Building, service road, and at the towers along the powerline. This will entail the clearance of primarily indigenous vegetation. The Terrestrial Ecology Impact Assessment further explains that much of the study area falls within Roggeveld Shale Renosterveld and as a general low relief plateau, this area comprises primarily of low, shrub like vegetation interspersed across shallow soils and regular although random, shale and sometimes doleritic rock exposures. Much of the area relating to the proposed on-site substation and distribution line comprises of a uniform vegetation form on the plateau.
GN R327: Activity 28 (ii) Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes, or afforestation on or after 01 April 1998 and where such development: ▪ (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	As noted above, the proposed project will take place outside of an urban area, on several farm portions within the Northern Cape (Alternative 1 and Alternative 2) and Western Cape (Alternative 2). It is understood that the land is currently used for agricultural purposes. The proposed project, which is considered to be a commercial/industrial development, will entail the construction of an on-site substation, distribution line (including towers and pylons), service road, laydown area and an O&M Building. This will constitute infrastructure with a physical footprint of more than 1 ha.
GN R324	
GN R324: Activity 4 The development of a road wider than 4 metres with a reserve less than 13,5 metres. ▪ (g) **Northern Cape**: ▪ ii. Outside urban areas, in: ▪ (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ▪ (i) **Western Cape**: ▪ ii. Areas outside urban areas; in: ▪ (aa) Areas containing indigenous vegetation	As noted above, the proposed project will take place outside of an urban area, on several farm portions within the Northern Cape (Alternative 1 and Alternative 2) and Western Cape (Alternative 2). A gravel service road will also be constructed below the distribution line. For Alternative 1 of the proposed distribution line routing, the service road will extend approximately 4 – 6 m wide and 17 km long. For Alternative 2, routed to the proposed Eskom Nuwerust Substation, the proposed service road will extend approximately 4 – 6 m wide and 46 km long. As noted in the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report), there is a definitive variation in vegetation and habitat between the upper level terrain associated with the plateau and vegetation in areas located below the plateau. According to the Terrestrial Ecology Impact Assessment, which is based on the South African National Biodiversity Institute (SANBI) data, in the Northern Cape, the proposed project falls within a corridor, which forms part of a Critical Biodiversity Area. In the Western Cape, the Aquatic Ecology (Freshwater) Impact Assessment and Terrestrial Impact Assessment note that in terms of the Western Cape Biodiversity Spatial Plan (WCBSP) (2017); both distribution line alternatives traverse areas considered to be Terrestrial

Listed Activity (GN R327 and R324)	Description of Project Activity that triggers Listed Activity
	Critical Biodiversity Areas 1. However, the Terrestrial Ecology Impact Assessment explains that only a minor expanse (approximately 850 m) of Critical Biodiversity Area (which is more likely to be associated with riparian habitat) is traversed by the proposed infrastructure, and it can be ostensibly spanned by the proposed distribution line. In terms of dimensions, approximately 3 400 m^2 to 5 100 m^2 of Critical Biodiversity Area could possibly be encroached on as a result of the proposed service road. However, these dimensions will be confirmed during the detailed engineering phase. Furthermore, in terms of Ecological Support Areas, the Aquatic Ecology (Freshwater) Impact Assessment explains that the eastern section of Alternative 2 of the distribution line, the service road, as well as the proposed Eskom Nuwerust substation, traverses several areas considered to be Aquatic Ecological Support Areas 1. In addition, the eastern section of Alternative 2 of the distribution line, the service road, as well as the proposed Eskom Nuwerust substation further traverses several areas considered to be Ecological Support Areas 2. The presence of indigenous vegetation on site, as well as legislative requirements surrounding its potential removal, is determined in the Terrestrial Ecology Impact Assessment. According to the assessment, site clearance for the commencement of construction will be required, particularly within and around the area required for the proposed on-site substation, laydown area, O&M Building, service road, and at the towers along the powerline. This will entail the clearance of primarily indigenous vegetation. The Terrestrial Ecology Impact Assessment explains that much of the study area falls within Roggeveld Shale Renosterveld and as a general low relief plateau, this area comprises primarily of low, shrub like vegetation interspersed across shallow soils and regular although random, shale and sometimes doleritic rock exposures. Much of the area relating to the proposed on-site substation and distribution line comprises of a uniform vegetation form on the plateau. However, it should be noted that no fatal flaws have been identified by the specialists for the proposed project, and relevant mitigation measures have been recommended to reduce the significance of impacts on the surrounding environment.
GN R324: Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. ▪ (g) **Northern Cape**:	The proposed project will entail the construction of an on-site substation, distribution line (including towers and pylons), service road, laydown area and an O&M Building. As a result, more than 300 m^2 of indigenous vegetation could possibly be removed for the construction of these structures. As noted in the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report), there is a definitive variation in vegetation and habitat between the upper

Listed Activity (GN R327 and R324)	Description of Project Activity that triggers Listed Activity
▪ ii. Within critical biodiversity areas identified in bioregional plans ▪ (i) **Western Cape**: ▪ ii. Within critical biodiversity areas identified in bioregional plans.	level terrain associated with the plateau and vegetation in areas located below the plateau. According to the Terrestrial Ecology Impact Assessment, which is based on SANBI data, in the Northern Cape, the proposed project falls within a corridor, which forms part of a Critical Biodiversity Area. In the Western Cape, the Aquatic Ecology (Freshwater) Impact Assessment and Terrestrial Ecology Impact Assessment note that in terms of the WCBSP (2017), both distribution line alternatives traverse areas considered to be Terrestrial Critical Biodiversity Areas 1. However, the Terrestrial Ecology Impact Assessment explains that only a minor expanse (approximately 850 m) of Critical Biodiversity Area (which is more likely to be associated with riparian habitat) is traversed by the proposed infrastructure, and it can be ostensibly spanned by the proposed distribution line. In terms of dimensions, approximately 3 400 m^2 to 5 100 m^2 of Critical Biodiversity Area could possibly be encroached on as a result of the proposed service road. However, these dimensions will be confirmed during the detailed engineering phase. Furthermore, in terms of Ecological Support Areas, the Aquatic Ecology (Freshwater) Impact Assessment explains that the eastern section of Alternative 2 of the distribution line, the service road, as well as the proposed Eskom Nuwerust substation, traverses several areas considered to be Aquatic Ecological Support Areas 1. In addition, the eastern section of Alternative 2 of the distribution line, the service road, as well as the proposed Eskom Nuwerust substation further traverses several areas considered to be Ecological Support Areas 2. However, it should be noted that no fatal flaws have been identified by the specialists for the proposed project, and relevant mitigation measures have been recommended to reduce the significance of impacts on the surrounding environment.
GN R324: Activity 14 The development of - ▪ (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs – ▪ within a watercourse; ▪ in front of a development setback; or ▪ if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will	The proposed project will entail the construction and installation of an overhead 132 kV distribution line, as well as an on-site substation towards the western end of the line. The proposed distribution line will connect to a third party substation (either Alternative 1, the proposed collector hub, or Alternative 2, the proposed Eskom Nuwerust Substation) in order to facilitate connection to the National Grid. The proposed collector hub and Eskom Nuwerust Substation are not considered as part of this BA Process. The on-site substation (which will include a laydown area and an O&M Building) will cover an approximate area less than 20 ha. Foundations for the pylons and towers of the distribution line will also be constructed.

Listed Activity (GN R327 and R324)	Description of Project Activity that triggers Listed Activity
not increase the development footprint of the port or harbour: ▪ (g) **Northern Cape**: ▪ ii. Outside urban areas, in: ▪ (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ▪ (i) **Western Cape**: ▪ i. Outside urban areas, in: ▪ (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	A gravel service road will also be constructed below the distribution line. For Alternative 1 of the proposed distribution line routing, the service road will extend approximately 4 – 6 m wide and 17 km long. For Alternative 2, routed to the proposed Eskom Nuwerust Substation, the proposed service road will extend approximately 4 – 6 m wide and 46 km long. This constitutes infrastructure and structures with a physical footprint of more than 10 m^2 that could possibly be constructed within or within 32 m of watercourses found on site. The Aquatic Ecology (Freshwater) Impact Assessment that has been undertaken as part of the BA Process identified three main rivers, with associated riparian characteristics, within the investigation area. These include the Riet, Vanwyks and Juk Rivers, along with their associated tributaries and their applicable riparian zones. In addition, unnamed tributaries of the Portugal's River were identified in the western portion of the investigation area, although the Portugal's River itself is not located within the investigation area. As shown in Figures 5, 6 and 7 of this BA Report, infrastructure associated with the proposed project could possibly be constructed within or within 32 m of the Riet, Vanwyks and Juk Rivers, along with their associated tributaries and their applicable riparian zones. As noted above, the proposed projects will take place outside of an urban area, on several farm portions within the Northern and Western Cape Provinces. As noted in the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report), there is a definitive variation in vegetation and habitat between the upper level terrain associated with the plateau and vegetation in areas located below the plateau. According to the Terrestrial Ecology Impact Assessment, which is based on SANBI data, in the Northern Cape, the proposed project falls within a corridor, which forms part of a Critical Biodiversity Area. In the Western Cape, the Aquatic Ecology (Freshwater) Impact Assessment and Terrestrial Impact Assessment note that in terms of the WCBSP (2017), both distribution line alternatives traverse areas considered to be Terrestrial Critical Biodiversity Areas 1. However, the Terrestrial Ecology Impact Assessment explains that only a minor expanse (approximately 850 m) of Critical Biodiversity Area (which is more likely to be associated with riparian habitat) is traversed by the proposed infrastructure, and it can be ostensibly spanned by the proposed distribution line. In terms of dimensions, approximately 3 400 m^2 to 5 100 m^2 of Critical Biodiversity Area could possibly be encroached on as a result of the proposed service road. However, these dimensions will be confirmed during the detailed

Listed Activity (GN R327 and R324)	Description of Project Activity that triggers Listed Activity
	engineering phase. Furthermore, in terms of Ecological Support Areas, the Aquatic Ecology (Freshwater) Impact Assessment explains that the eastern section of Alternative 2 of the distribution line, the service road, as well as the proposed Eskom Nuwerust substation, traverses several areas considered to be Aquatic Ecological Support Areas 1. In addition, the eastern section of Alternative 2 of the distribution line, the service road, as well as the proposed Eskom Nuwerust substation further traverses several areas considered to be Ecological Support Areas 2. However, it should be noted that no fatal flaws have been identified by the specialists for the proposed project, and relevant mitigation measures have been recommended to reduce the significance of impacts on the surrounding environment.

It must be noted that the above listed activities have been identified in line with the following:

- It is proposed that less than 30 m^3 of dangerous goods (such as petrol and diesel) will be temporarily stored on site during the construction phase. Furthermore, no infrastructure or structures are planned to be specifically constructed for the aforementioned temporary storage. Recommendations for the temporary storage of petrol and diesel on site during the construction phase have been provided in the EMPr (Appendix G of this BA Report).

8. DESCRIPTION OF ALTERNATIVES

This section discusses the alternatives that have been considered as part of the BA Process. Sections 24(4) (b) (i) and 24(4A) of the NEMA require an Environmental Assessment to include investigation and assessment of impacts associated with alternatives to the proposed project. In addition, Section 24O (1)(b)(iv) also requires that the Competent Authority, when considering an application for EA, takes into account "where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment".

Therefore, the assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the reasonable and feasible alternatives; and
- Providing a methodology for the elimination of an alternative.

Compliance with Regulation 3 (1) (h) (i) of Appendix 1 of the 2014 NEMA EIA Regulations (as amended) is discussed below. Regulation 2 (e) of Appendix 1 of the 2014 NEMA EIA Regulations (as amended) states:

- The objective of the basic assessment process is to, through a consultative process, and through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to (i) identify and motivate a preferred site, activity and technology alternative; (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and (iii) identify residual risks that need to be managed and monitored.

8.1. Property or Location Alternatives (i.e. Site Alternatives)

It is important to note that the location of the proposed distribution line and service road, as well as the other associated infrastructure, is dictated by and dependent on the location of the proposed and authorised Rietrug WEF and the third party substation (i.e. either Alternative 1 (proposed collector hub) or Alternative 2 (proposed Eskom Nuwerust Substation)), and therefore certain alternatives are not applicable or feasible, as discussed and motivated further below.

Therefore, the main factors that determined the location of the proposed 132 kV distribution line and supporting infrastructure are indicated below and discussed within this section:

- Location of the proposed and authorised Rietrug WEF that will be connected to the National Grid via the proposed supporting electrical infrastructure;
- Location of the third party substation (i.e. either Alternative 1 (proposed collector hub) or Alternative 2 (proposed Eskom Nuwerust Substation));
- Cooperative landowners;
- Environmental sensitivities identified by the specialists; and
- The most cost-effective route and distance between the proposed and authorised Rietrug WEF and third party substation (i.e. Alternative 1 or Alternative 2).

As discussed previously, the overall aim of this proposed project is to provide the necessary electrical infrastructure to ensure that the proposed Rietrug WEF is equipped and enabled to transmit the generated electricity (from the WEF) to the third party substation. The determination of the location and properties over which the proposed distribution line and associated supporting electrical infrastructure will be constructed was therefore largely dependent on the location of the WEF, as approved as part of a previous EA (DEA Reference Number: 12/12/20/1782/3), as well as the location of the proposed third party substation (both Alternatives 1 and 2). In turn, the best routing of the proposed distribution line from the proposed WEF site to the third party substation was based on economic feasibility (shortest route between the two points), as well as environmental sensitivities, and the willingness of landowners to provide consent for the construction of the proposed electrical grid infrastructure on their land. Therefore, alternative routing options for the proposed distribution line were considered to determine the most acceptable and preferred routing. In addition, where applicable, an estimated 500 m buffer area on either side of the proposed distribution line has been assessed by the specialists in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed distribution line and service road. The sensitive areas identified by the specialists have been largely taken into consideration in determining the routing of the proposed distribution line and service road, which is indicated in Appendix A of this BA Report.

The approximate centre-point location of the proposed Rietrug on-site substation is located at 32° 37' 16.845" S and 20° 54' 29.880" E.

Based on the above, site alternatives for this proposed BA project are not applicable, however routing options of the proposed distribution line are applicable as described above. These routing options, in relation to linear activities, are described below.

Both Alternative 1 and Alternative 2 of the distribution line routing exceed 500 m in length, and as such, the co-ordinates taken every 250 m along the routes are included in Appendix A of this BA Report. The co-ordinates of the corner points of the development envelope for the on-site substation, O&M Building and laydown area are also included in Appendix A of this report. The co-ordinates of the start, middle and end points of Alternatives 1 and 2 of the proposed distribution line are indicated in Table 5 below.

Table 5: Start, Middle and End Point of Alternatives 1 and 2 of the Proposed Distribution Line and Connection to the proposed Third Party Substation

	Latitude (S)	Longitude (E)
Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape		
Start Point	32° 38' 41.289" S	21° 3' 23.376" E
Middle Point	32° 38' 12.716" S	20° 58' 48.597" E
End Point	32° 37' 20.671" S	20° 54' 29.410" E
Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape		
Start Point	32° 41' 52.506" S	21° 15' 48.325" E
Middle Point	32° 38' 0.894" S	21° 14' 15.437" E
End Point	32° 37' 20.671" S	20° 54' 29.410" E

For the Rietrug WEF – Electrical Grid Infrastructure BA Project, one option was put forward and considered for the Alternative 1 distribution line routing to the proposed collector hub. This routing option is referred to as Alternative 1, as described above. On the other hand, five options were considered for the Alternative 2 distribution line routing from the proposed Rietrug on-site substation to the proposed Eskom Nuwerust Substation. These five routing options are noted below and shown in Figure 14 below.

- Option A - This is the preferred routing option and it was recommended by the specialists on the BA Team, in consultation with Mainstream, taking into consideration the constraints on site in terms of sensitive environmental and topographical features.
- Option B - This is the routing that was indicated in the Background Information Document, which was made available for public comment from 9 December 2016 to 1 February 2017. This routing was recommended by Mainstream based on environmental constraints and feasibility from a construction point of view.
- Option C - This is a routing option that was recommended by the specialists on the BA Team, in consultation with Mainstream, taking into consideration the constraints on site in terms of sensitive environmental and topographical features.
- Option D - This routing option was recommended by Mainstream based on environmental sensitivities, landowner willingness and feasibility from a construction point of view.
- Option E - The section of the routing extending from the proposed collector hub on the Remaining Extent of Hartebeeste Fontein Farm 147 in the Northern Cape, has been assessed as part of the separate Moyeng Energy (PTY) Ltd Suurplaat WEF EIA, which received EA on 5 April 2011 (DEA Reference Number: 12/12/20/1583). It was referred to as Alternative C in the Moyeng Energy (PTY) Ltd Suurplaat WEF EIA and it was selected as the preferred alternative due to its short length. Therefore, this section of the distribution line routing was not considered by the specialists on this BA Team.

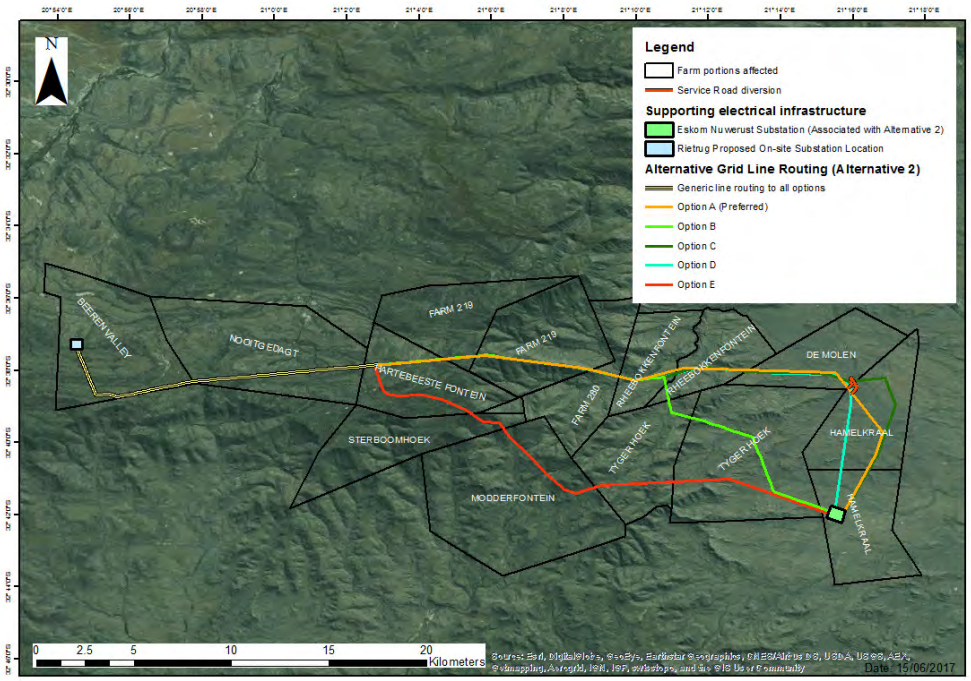


Figure 14: Five Options considered for the Routing of the proposed Distribution Line from the Rietrug on-site substation to the Eskom Nuwerust Substation (i.e. for Alternative 2).

Options A to D, and the section of Option E that extends from the proposed Rietrug on-site substation to the proposed collector hub, as noted above, were considered by the specialists on this BA Team. Option E (specifically the section that extends from the proposed collector hub to the proposed Eskom Nuwerust Substation) was assessed as part of the separate Suurplaat WEF EIA (DEA Reference Number: 12/12/20/1583), and is therefore not considered in this BA project. It is shown in Figure 14 above that all routing options (A to E) for Alternative 2 follow a common route up until a certain point on the Remaining Extent of Hartebeeste Fontein Farm 147 in the Northern Cape, and from this point, it splits into five separate route options.

Option A was determined by the specialists as the preferred distribution line routing option for Alternative 2, and it is referred to as "Alternative 2 – Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape". It is important to reiterate that the proposed service road will be constructed below the proposed distribution line and will therefore follow the same route as the line, except for a small section in the Alternative 2 preferred route, where the service road will follow an unused farm track to avoid the actual service road being constructed across a scarp, which has terrestrial ecological value. Table 6 below provides a summary of the ranking and assessment of the different routing options that were considered for the Alternative 2 of the proposed distribution line and service road.

Table 6: Summary of Ranking and Assessment of Routing Options considered for Alternative 2 of the Proposed Distribution Line and Service Road

Alternative 2 Distribution Line Routing Options	Specialist Assessment Feedback
▪ Option A	Terrestrial Ecology Specialist: ▪ The topography along the distribution line routing Option A is quite mild comparative to Options B, C and D, and the vegetation is sparse. There are some ephemeral features but these can be generally avoided. The sensitive scarp will not be crossed by the proposed service road associated with Option A, and the scarp is crossed by the proposed electrical infrastructure as a result of Option B and D. Overall, Option A is preferred from a terrestrial ecology perspective. Aquatic Ecology Specialist: ▪ From a watercourse perspective, the horizontal (i.e. west to east) alignment of the distribution line routing, both Options A and D traverse ephemeral drainage lines, and mitigation will therefore be applicable regardless. However, the vertical (i.e. north to south) alignment of Option A of the distribution line routing results in fewer drainage line crossings than both Options C and D. Overall, therefore, Option A is preferred from water course perspective. Archaeology Specialist: ▪ Option A of the distribution line routing avoids scarps and large rivers, maximises road access in the south, provides a wider buffer for the farm complexes at Rheebokkenfontein Farm 4 and it minimises bends (which is costly from a construction perspective), with careful placement of corners. The major scarp towards the north minimises the amount of routing flexibility. However, considering that the proposed service road will cause greater impacts to the scarp (if traversed) than the proposed distribution line, it is recommended to align the service road along an unused farm road that borders the scarp. This makes use of the existing roads, and avoids the service road from traversing the scarp. Overall, Option A is preferred from an archaeology perspective. Palaeontology Specialist: ▪ There are no preferences on palaeontological heritage grounds for any particular distribution line routing options under consideration. Visual Specialist: ▪ Distribution line routing Option A is better than routing Option C as it avoids the homestead at Farm Hamelkraal 16 and it is seems to be better than routing Option D because it aligns with the road at a section where there are many power lines already in view (i.e. lower visual intrusion). There are very few visual receptors in the area so the differences between these alternatives are minimal. Therefore, in order of preference based on visual considerations: Routing Option A, Option D and Option C. **Therefore, based on the above feedback from the Terrestrial Ecology, Aquatic Ecology, Archaeology, Palaeontology and Visual Specialists, Option A of the distribution line routing is preferred over Options B, C, D and E.**
▪ Option B	▪ As noted above, this option was included in the Background Information Document as Alternative 2 of the distribution line routing to the Eskom Nuwerust Substation. However, based on further discussions and interactions between Mainstream and certain landowners along this routing option, it is now evident that Option B of the distribution line routing is **no longer feasible or preferred from a technical and economic perspective (as well as landowner willingness)**.
▪ Option C	Terrestrial Ecology Specialist: ▪ The Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report)

Alternative 2 Distribution Line Routing Options	Specialist Assessment Feedback
	recommends that steep scarps are avoided as they have a high ecological significance due to topographic variation. The specialist study also explains that topographic features, such as scarps should be given specific consideration, primarily on account of the fact that these areas offer significant faunal refugia. Option C avoids most of the steep scarps and is largely aligned with an existing road way. However, this could result in additional towers. Aquatic Ecology Specialist: ▪ From a watercourse perspective, the vertical (i.e. north to south) alignment of Option C of the distribution line routing traverses more drainage lines than Option A. Archaeology Specialist: ▪ Distribution line routing Option C requires more refinement and crosses a watercourse twice, as well as traverses through and close to significant heritage features (i.e. farm complexes on Farm De Molen 5), which should be avoided. Palaeontology Specialist: ▪ There are no preferences on palaeontological heritage grounds for any particular distribution line routing options under consideration. Visual Specialist: ▪ Distribution line routing Option C passes within 200 m of the Hamelkraal Farm 16 farmstead. The existing views (of the occupiers of the farmstead) to the west and south will therefore be affected more by routing Option C than routing Option D. These views include relatively scenic views of the mountains which the occupiers of the farmstead may value. There are very few visual receptors in the area so the differences between these alternatives are minimal. Therefore, in order of preference based on visual considerations: Routing Option A, Option D and Option C. **Therefore, based on the above feedback from the Terrestrial Ecology, Aquatic Ecology, Archaeology, Palaeontology and Visual Specialists, Option C of the distribution line routing is not preferred.**
▪ Option D	Terrestrial Ecology Specialist: ▪ The Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) recommends that steep scarps are avoided as they have a high ecological significance due to topographic variation. The specialist study also explains that topographic features, such as scarps should be given specific consideration, primarily on account of the fact that these areas offer significant faunal refugia. Option D does not avoid most of the steep scarps. Aquatic Ecology Specialist: ▪ From a watercourse perspective, the horizontal (i.e. west to east) alignment of the distribution line routing, both Options A and D traverse ephemeral drainage lines, and mitigation will therefore be applicable regardless. However, the vertical (i.e. north to south) alignment of Option D of the distribution line routing results in more drainage line crossings than both Option A. Archaeology Specialist: ▪ Distribution line routing Option D traverses through and close to significant heritage features (i.e. farm complexes on Farm De Molen 5), which should be avoided. Palaeontology Specialist: ▪ There are no preferences on palaeontological heritage grounds for any particular distribution line routing options under consideration.

Alternative 2 Distribution Line Routing Options	Specialist Assessment Feedback
	Visual Specialist: ▪ The routing Option D is marginally better than Option C mainly because Option D does not pass within 200 m of the Hamelkraal Farm 16 farmstead. There are very few visual receptors in the area so the differences between these alternatives are minimal. Therefore, in order of preference based on visual considerations: Routing Option A, Option D and Option C. **Therefore, based on the above feedback from the Terrestrial Ecology, Aquatic Ecology, Archaeology, Palaeontology and Visual Specialists, Option D of the distribution line routing is not preferred.**
▪ Option E	▪ Mainstream has initiated discussions with Moyeng Energy (PTY) Ltd, who is the Applicant for the proposed Suurplaat WEF. Moyeng Energy (PTY) Ltd confirmed that this **routing option (i.e. Option E) to the Eskom Nuwerust Substation is no longer feasible or preferred from a technical and economic perspective**. Option E was therefore not considered or assessed as part of this BA Process.

Therefore, the specialists have considered Options A to D of the distribution line routing from the proposed on-site substation to the proposed Eskom Nuwerust Substation (i.e. Alternative 2). Based on sensitivities identified with each option of the distribution line routing and the possible impacts, the preferred routing option for Alternative 2 has been determined (i.e. Option A).

As also noted above, both Alternatives 1 and 2 of the proposed distribution line routing have been assessed as part of this BA Process, based on the precautionary principle to allow for the WEF to connect to either Alternative 1 or Alternative 2 of the third party substation, should either one not be constructed; however only one alternative third party substation and distribution line routing and connection thereto will be included in the EA (should such an authorisation be granted by the DEA). Refer to Section D of this BA Report for an assessment of both Alternatives 1 and 2 of the proposed distribution line routing and third party substation, as well as feedback based on the specialist studies regarding the preference for each alternative.

8.2. Type of Activity Alternatives

In terms of the alternatives considered for the type of activity to be undertaken, this is also entirely dependent on the activity associated with the proposed Rietrug WEF (where the activity associated with the WEF is generation of electricity). Essentially, the Rietrug WEF governs the type of activity associated with the proposed project. The activity to be undertaken is therefore the transmission of electricity that will be generated by the proposed Rietrug WEF. Therefore, as a result, alternatives for the type of activity for this proposed BA project are **not applicable**. The only feasible method of transmitting the electricity that is generated by the proposed WEF to the third party substation is via an overhead distribution line. Underground cabling is not deemed technically feasible as the voltage is considered to be too high. It is also important to note that the implementation of a WEF at the proposed project site was determined to be more favourable and feasible than other alternative energy facilities (such as Biomass, Hydro Energy and Solar Energy) for generating 20 MW or more of electricity from a renewable resource. Based on the preliminary investigations undertaken by the Project Applicant, no other renewable energy technologies were deemed to be appropriate for the site.

8.3. Design or Layout of the Activity Alternatives

The Rochdale Envelope Approach[1] was applied to determine the placement of the proposed on-site substation, O&M Building and laydown area within the development envelope, during the detailed engineering phase. The Rochdale Envelope approach is named after two legal cases relating to a proposed business park in Rochdale in the United Kingdom. These cases considered applications for

[1] Infrastructure Planning Commission (IPC), Using the 'Rochdale Envelope'. February 2011

outline planning consent in the context of preparing an EIA. The goal of the Rochdale Envelope approach is to allow for an EIA to be undertaken, based on the "worst case scenario", whereby the Competent Authority granting the EA will then decide whether, based on this "worst case scenario", the environmental impacts are acceptable.

This approach is very useful since normally an EIA or BA is undertaken prior to the technical assessment of the site which would consider the exact placement of, for example, the wind turbines and associated infrastructure. The main principle behind this approach is that, should the development fall within the parameters set within this "envelope", as determined by the BA Process, the placement of the different components could be determined at a later stage provided that the components fall within the parameters of the envelope. This approach therefore allows for flexibility to the developer during the detailed design phase in terms of engineering, design and construction parameters.

As discussed above, as part of the BA, a 25 ha development envelope was considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed on-site substation, O&M Building and laydown area, which can only be undertaken during the detailed engineering phase (as noted above). Based on the findings of the specialist studies, an environmental sensitivity map has been produced (and included in Appendix A.4 of this BA Report, as well as the EMPr included in Appendix G of this BA Report). The environmental sensitivities are also shown in Section A (5) of this BA Report.

It is important to note that should the preferred location change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout or revisions thereto within the boundaries of the development envelope would not be regarded as a change to the scope of work or to the findings of the impact assessments undertaken during the BA Phase. This is based on the understanding that the specialists have assessed the larger area and have identified sensitivities, which will be avoided in the siting of the proposed infrastructure. The 25 ha development envelope is considered to be a "box" in which the project components can be constructed at whichever location (within its boundaries) without requiring an additional assessment or change in impact significance. Any changes to the layout within the boundaries of the development envelope following the issuing of the EA (should it be granted), will therefore be considered to be non-substantive. However, if any changes to the layout occur outside of the boundaries of the development envelope following the issuing of the EA (should it be granted), it will need to be undertaken as part of a separate EA Amendment process and will be considered as substantive.

8.4. Technology Alternatives

The technology that is proposed for the construction and operation of the proposed distribution line and electrical infrastructure will be guided by national standards and best practice. The technology options and operational aspects are also governed by Eskom's requirements and building specifications. This therefore limits the amount of variability in terms of the technology and operational processes. The type of technology used will relate to the infrastructure being installed and constructed, such as the type of conductors, pylon structures and design, use of Bird Flight Diverters, and building structures for the on-site substation and O&M Building. Other technology options for this project relate to the construction equipment and vehicles used during the construction phase, such as portable fire-fighting equipment (if necessary), stormwater management and spill contingency.

8.5. Alternatives: Operational Aspects of the Activity

It should be noted that no other alternatives are being considered for the proposed project. Refer to the explanations provided above regarding the alternative process.

8.6. No-go Option

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed Rietrug WEF – Electrical Grid Infrastructure BA Project. This alternative would result in no environmental impacts on the site or surrounding local area (as identified in Section D of this BA Report). It provides the baseline against which other alternatives are compared and considered throughout the report.

The following implications will occur if the "no-go" alternative is implemented (i.e. if the proposed Rietrug WEF – Electrical Grid Infrastructure BA Project is not constructed):

- There will be negative implications for the proposed Rietrug WEF, as there will be no dedicated and fundamental electrical infrastructure to allow the proposed WEF to connect to the third party substation and the national grid. This could possibly result in non-realisation of the benefits, such as economic spin offs and electricity generation associated with the proposed Rietrug WEF. This could also result in additional costs and expenditure, as well as additional timeframes required, due to the potential re-design of the proposed Rietrug WEF to align with an alternative third party substation within the region. Using an alternative third party substation within the region (dependent on capacity requirements) could result in longer power lines and associated service roads, which could, in turn, cause additional negative impacts to the surrounding environment. If re-design is not financially and technically feasible, then the proposed Rietrug WEF will not be able to be constructed as it will not have fundamental infrastructure to link it to the national grid. If the proposed Rietrug WEF cannot be constructed as a result of the no-go of the proposed Rietrug WEF – Electrical Grid Infrastructure BA Project, this could, in turn, result in the following implications:

    - The landowners of the various farm portions on which the proposed infrastructure will be constructed will not be able to derive benefits from the implementation of an additional land-use;
    - No additional power will be generated or supplied through means of renewable energy resources by this project at this location;
    - There will be no contributions and assistance to the government in achieving its proposed renewable energy target of 17 800 MW by 2030;
    - No additional power will be provided via the Eskom grid, with approximately 90% coal-based power generation with associated high levels of CO_2 emissions and water consumption;
    - Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified;
    - Local communities will continue their dependence on agriculture production and government subsidies. The local municipality's vulnerability to economic downturns will increase because of limited access to capital;
    - The positive socio-economic impacts likely to result from the project such as increased local spending, skills transfer and education/training of local communities, and the creation of local employment opportunities will not be realised; and
    - The local economic benefits associated with the REIPPPP will not be realised, and socio-economic contribution payments into the local community trust will not be realised.

Converse to the above, the following benefits could occur if the "no-go" alternative is implemented:

- There will be no development of electrical infrastructure that is associated with WEFs at the proposed location;
- The agricultural land use will remain only;
- No threatened vegetation will be removed or disturbed during the development of the electrical infrastructure;

- No potential impact to avifauna present in the area;
- No change to the current landscape will occur; and
- No additional water use and waste generation during the construction phase.

It is important to take into account that the country is facing serious power and water shortages due to its heavy dependency on fossil fuels such as coal. There is therefore a need for additional electricity generation options to be developed throughout the country. The purpose of the proposed Rietrug WEF – Electrical Grid Infrastructure BA Project, is to transmit electricity generated by a renewable energy resource into the national electricity grid. Many other socio-economic and environmental benefits will result from the development of this project such as development of renewable energy resources in the country and contribution to the increase of energy security, employment creation and local economic development (as noted above). The impact assessment undertaken and discussed within Section D of this BA Report, shows that no significant residual impacts or risks (high significant impacts), would occur following the implementation of the required mitigation measures.

Hence, the "no-go" alternative will result in both positive and negative implications, by not going ahead with the project. In addition, by not constructing the proposed electrical grid infrastructure, any positive community development or socio-economic benefits associated with the WEF would not be realised. Since the WEF has already received EA (dated 10 November 2016, which is currently being amended), it is deemed that the impacts associated with the WEF are acceptable in terms of still ensuring environmental sustainability and ecological functioning. Hence the "no-go" alternative is not a preferred alternative.

8.7. Concluding Statement for Alternatives

Appendix 1 of the 2014 NEMA EIA Regulations (as amended) has certain requirements in terms of alternatives. Table 7 below indicates these requirements and also includes a response from the EAP showing how the requirements of the 2014 NEMA EIA Regulations (as amended) have been addressed in this report.

Table 7: Requirements of Appendix 1 of the 2014 NEMA EIA Regulations (as amended) in terms of Alternatives

Requirements for a BA Report (in terms of alternatives) in terms of Appendix 1 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
Regulation 3 (1) (h): A full description of the process followed to reach the proposed preferred alternative within the site, including: ▪ (i) details of all the alternatives considered;	Refer to Section A (8) i.e. this section of the BA Report for a description of the alternatives considered, and a justification for the inapplicability of certain alternatives. Overall, Alternative 1 of the proposed distribution line routing and connection to the proposed collector hub, and Alternative 2 of the proposed distribution line routing and connection to the proposed Eskom Nuwerust Substation have been assessed in this BA Report. Five different options were also considered for the routing of the proposed distribution line to the proposed Eskom Nuwerust Substation, in order to select the most appropriate Alternative 2 routing.
▪ (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Refer to Section C of this BA Report for a description of the PPP undertaken.
▪ (iii) a summary of the issues raised by interested and affected parties (I&APs), and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Refer to Section C and Appendix E of this BA Report for a description of the issues raised by I&APs during the PPP.
▪ (iv) the environmental attributes associated	Refer to Section A (8) i.e. this section of the BA

Requirements for a BA Report (in terms of alternatives) in terms of Appendix 1 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Report for a description of the alternatives considered and their corresponding environmental attributes. Site alternatives are not applicable as the location of the proposed electrical grid infrastructure is dependent on the location of the proposed WEF, third party substation, landowner willingness, feasibility and environmental sensitivity. However, five routing options of the proposed distribution line to the proposed Eskom Nuwerust Substation (for Alternative 2) have been considered, as described above. Sections A (5), A (8) and Section B of this BA Report, as well as the specialist studies included in Appendix D provide a description of the affected environment.
▪ (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Refer to Section A (8) i.e. this section of the BA Report for a description of the alternatives and routing options considered, and a justification for the inapplicability of certain alternatives. Note that a complete impact assessment is included in Section D of this BA Report for both Alternatives 1 and 2 of the proposed distribution line routing and third party substation. Section D of this BA Report details the impacts and risks identified, and Appendix F includes the complete impact assessment (which is also included in the respective specialist studies in Appendix D of this BA Report), which includes the nature, significance, consequence, extent, duration, probability, reversibility, and irreplaceability of the impacts. The methodology used in the impact assessment is also noted in Section D of this report. As noted above, site alternatives are not applicable as the location of the proposed electrical grid infrastructure is dependent on the location of the proposed WEF, third party substation, landowner willingness, feasibility and environmental sensitivity. However, five routing options of the proposed distribution line to the Eskom Nuwerust Substation (for Alternative 2) have been considered, as described above, in order to determine the best Alternative 2 routing. In addition, both Alternatives 1 and 2 of the proposed distribution line routing have been assessed as part of this BA Process, based on the precautionary principle to allow for the WEF to connect to either Alternative 1 or Alternative 2 of the third party substation, should either one not be constructed. Where applicable, the specialists assessed the worst case by studying a larger buffer and investigation area, whilst the proposed electrical grid infrastructure will only be constructed within a portion thereof. Essentially, the sensitivities identified by the specialists within the buffer and investigation area have enabled the determination of the preferred routing of the distribution line for both Alternatives 1 and 2 by way of avoidance.
▪ (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	
▪ (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
▪ (viii) the possible mitigation measures that could be applied and level of residual risk;	
▪ (ix) the outcome of the site selection matrix;	
▪ (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	
▪ (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	Based on the aspects considered in this section, the following concluding statement has been provided in terms of the preferred alternatives that have been

Requirements for a BA Report (in terms of alternatives) in terms of Appendix 1 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
	considered in the BA Phase: ▪ Development of the Rietrug WEF – Electrical Grid Infrastructure Project, using various technological alternatives relating to the design and construction of the pylon structures on the following preferred sites for **Alternative 1** of the proposed distribution line (Remaining Extent of Hartebeeste Fontein Farm 147; Remaining Extent of Nooitgedacht Farm 148; and Remaining Extent of Beeren Valley Farm 150) and **Alternative 2** of the proposed distribution line (Remaining Extent of Hartebeeste Fontein Farm 147; Remaining Extent of Nooitgedacht Farm 148; Remaining Extent of Beeren Valley Farm 150; Portion 1 of Farm 219; Remaining Extent of Farm 219; Farm 280; Portion 1 of Rheebokkenfontein Farm 4; Portion 2 of Rheebokkenfontein Farm 4; Portion 2 of Farm De Molen 5; Portion 6 of Farm Hamelkraal 16; and Portion 7 of Farm Hamelkraal 16) is mainly dependent on the location of the proposed Rietrug WEF and the third party substations. The layout of the distribution line, on-site substation, O&M building, laydown area, and service road has been informed by specialist studies during the BA Phase to avoid environmental sensitivities as far as possible, as well as feasibility and landowner willingness.

9. NEEDS AND DESIRABILITY

It is an important requirement in the BA Process to review the need and desirability of the proposed project. Draft guidelines on Need and Desirability were published in the Government Gazette of 5 October 2012, for comment. These draft guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a project and assists in explaining that need and desirability at the provincial and local context. In addition, the Western Cape Department of Environmental Affairs and Development Planning (DEADP) also published a Guideline on Need and Desirability in 2010. The DEADP Guideline (2010) states that the essential aim of investigating the need and desirability of a proposed project revolves around determining suitability (i.e. is the activity proposed in the right location for the suggested land-use/activity) and timing (i.e. is it the right time to develop a given activity?). DEADP describes need and desirability as components of the "wise use of land", where need refers to time, and desirability to place. In other words, need and desirability answer the question of whether the activity is being proposed at the right time and in the right place.

Table 8 below includes a combination of questions based on the DEADP 2010 Guideline, as well as recommendations of the National DEA, to determine the need and desirability of the proposed project.

Table 8: List of Questions to determine the Need and Desirability of the Proposed Project

1. Is the activity permitted in terms of the property's existing land use rights?	YES	NO ✓

As noted above, Alternative 1 of the proposed distribution line for the Rietrug WEF Electrical Grid Infrastructure Project will traverse the following farm portions located in the Northern Cape:

- Remaining Extent of Hartebeeste Fontein Farm 147;
- Remaining Extent of Nooitgedacht Farm 148; and
- Remaining Extent of Beeren Valley Farm 150.

Alternative 2 of the proposed distribution line for the Rietrug WEF Electrical Grid Infrastructure Project will traverse the following farm portions located in the Northern Cape, as well as the Western Cape:

- Remaining Extent of Hartebeeste Fontein Farm 147;
- Remaining Extent of Nooitgedacht Farm 148;
- Remaining Extent of Beeren Valley Farm 150;
- Portion 1 of Farm 219;
- Remaining Extent of Farm 219;
- Farm 280;
- Portion 1 of Rheebokkenfontein Farm 4;
- Portion 2 of Rheebokkenfontein Farm 4;
- Portion 2 of Farm De Molen 5;
- Portion 6 of Farm Hamelkraal 16; and
- Portion 7 of Farm Hamelkraal 16.

According to the Final EIA Report undertaken by ERM (2011) for the proposed Mainstream Sutherland REF (which has now been spilt into the three separate Sutherland, Sutherland 2 and Rietrug WEFs), the primary land use in the area is agriculture (cultivation and grazing), and the proposed WEFs will have a low significance impact on the loss of agricultural land (with the implementation of mitigation measures). The Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) explains that the proposed Electrical Grid Infrastructure will have limited impact on the prevailing land use, primarily because of the expansive nature of grazing and the nature of the prevailing habitat.

The Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) explains that the farms forming the **Rietrug** WEF study area have been subjected to grazing for a significant period of time, predominantly by sheep, resulting in altered vegetation communities; and observations made during the site assessment undertaken in November 2016 confirmed this to be the case, although, vegetation within the watercourses is considered to be more dense, and was observed to have marginally higher species diversity than the surrounding terrestrial areas.

In addition, due to the limited development footprint of the proposed Electrical Grid Infrastructure in comparison to the large extent of the affected farms, it is not expected that this will threaten the agricultural activities present on site. Therefore, should the proposed projects (i.e. the Sutherland, Sutherland 2 and Rietrug WEF Electrical Grid Infrastructure), and ultimately Sutherland, Sutherland 2 and Rietrug WEFs proceed, it is not expected that this will threaten the land use rights of the affected properties.

2. Will the activity be in line with the following?		
(a) Provincial Spatial Development Framework (PSDF)	YES ✓	NO

As noted above, the proposed development of the supporting Electrical Grid Infrastructure will occur solely within the Northern Cape for Alternative 1 of the distribution line routing and third party substation connection. Alternative 2 of the distribution line routing and third party substation connection largely occurs in the Northern Cape; however it also extends into the Western Cape.

The Northern Cape Provincial Spatial Development Framework (PSDF) states that one of the energy objectives is to promote renewable energy, which is considered to be a priority in the province (Northern Cape Government, 2012). Poverty levels and levels of unemployment are also a major concern, as noted in the Northern Cape PSDF (Northern Cape Government, 2012). The Western Cape PSDF states that one of the provincial spatial policies is to support emergent IPPs and promote renewable energy (Western Cape Government, 2014). The Western Cape PSDF (Western Cape Government, 2014, pg. 23) also lists the following spatial challenges within the province: lack of jobs and skills; education and poverty; inequality

and social unrest; and unsustainable settlement patterns and resource use.

In line with the above, the revised Integrated Development Plan (IDP) 2016 - 2017 of the Namakwa District Municipality (Northern Cape Government, 2016a), states that some of the main challenges within the municipality are unemployment, ineffective economic infrastructure, and poor public services. The IDP (2016 – 2017) states that the objective to resolve this issue is to create empowerment through job creation, improving education, capacity building and skills development. The 2012 – 2017 IDP of the Central Karoo District Municipality (Western Cape Government, 2012) includes similar challenges and objectives as that of the Northern Cape.

Even though the proposed Sutherland, Sutherland 2 and Rietrug WEFs (which have been subjected to separate EIA Processes, as noted above) will not provide electricity to the municipality directly, the energy produced by the facilities will feed into the National Grid as a result of the proposed Electrical Grid Infrastructure projects (i.e. this specific Rietrug WEF Electrical Grid Infrastructure Project will assist and enable the proposed Rietrug WEF to feed the generated electricity to the National Grid). In addition, on a local level, the proposed project will contribute towards job creation and economic spin offs during the construction phase (if an EA is granted by the DEA). It is estimated that approximately 130 employment opportunities will be created during the construction phase. It should however be noted that employment during the construction phase will be temporary. The proposed project will also play a role in providing advanced skills transfer and training to the local communities during the construction phase, as applicable.

In addition, in 2013 the National DEA commissioned the Strategic Environmental Assessment (SEA) for Wind and Solar PV development (Phase 1), which aims to identify strategic geographical areas best suited for the roll-out of large scale wind and solar PV energy projects, referred to as Renewable Energy Development Zones (REDZs). Eight REDZs have been identified and assessed in the SEA, namely: REDZ 1: Overberg; REDZ 2: Komsberg; REDZ 3: Cookhouse; REDZ 4: Stormberg; REDZ 5: Kimberley; REDZ 6: Vryburg; REDZ 7: Upington; and REDZ 8: Springbok (CSIR, 2015a). The proposed Rietrug WEF Electrical Grid Infrastructure Project, which will fundamentally support the proposed Rietrug WEF, falls within REDZ 2: Komsberg, as shown in Figure 15 below. The SEA Process is currently in the gazetting phase.

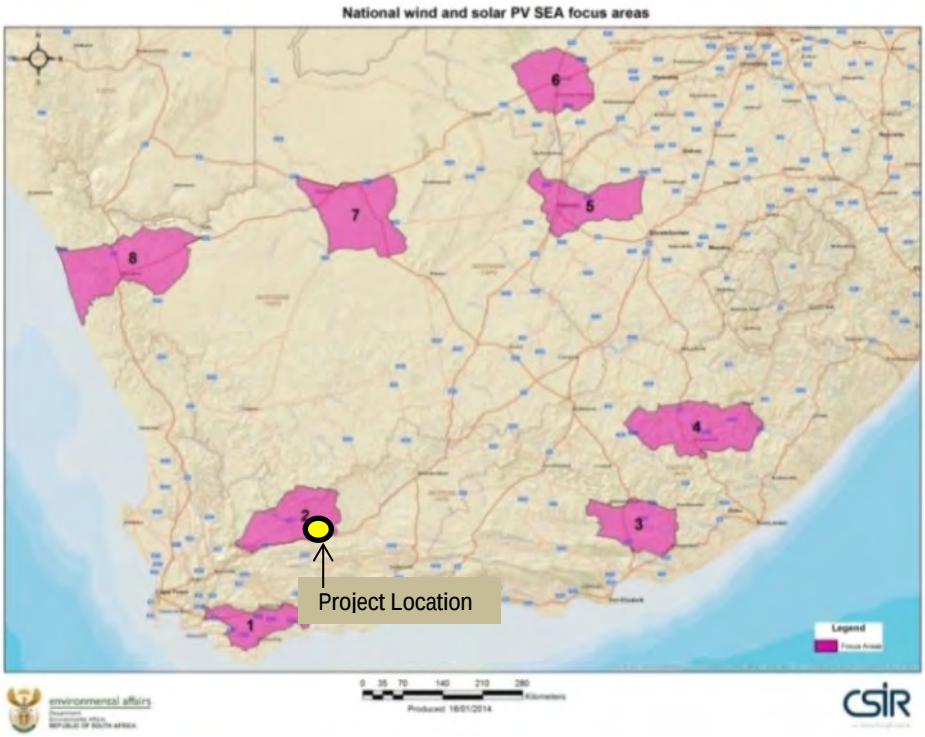


Figure 15: REDZ identified in the SEA (the proposed project falls within the REDZ 2: Komsberg (REDZ 1: Overberg; REDZ 2: Komsberg; REDZ 3: Cookhouse; REDZ 4: Stormberg; REDZ5: Kimberley; REDZ 6: Vryburg; REDZ 7: Upington; REDZ 8: Springbok)) (CSIR, 2015a).

The DEA also commissioned an SEA for Electrical Grid Infrastructure to assist Eskom with identifying priority corridors and to improve environmental regulatory processes inside the corridors in support of Strategic

Infrastructure Project (SIP) 10. As part of the Electrical Grid Infrastructure SEA, five preliminary corridors were identified, namely the central, eastern, international, northern and western corridor. The preliminary corridors were later refined as part of the SEA process and final corridors have been put forward. Figure 16 below shows the preliminary and final corridors assessed as part of the Electrical Grid Infrastructure SEA. The proposed Rietrug WEF Electrical Grid Infrastructure Project forms part of the Central Corridor included in the Electrical Grid Infrastructure SEA.

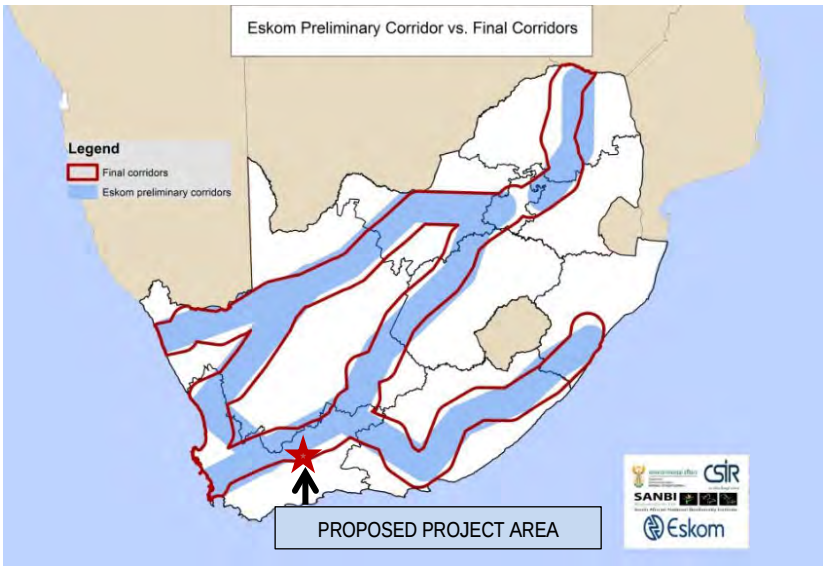


Figure 16: Eskom Preliminary and Final Corridors assessed as part of the Electrical Grid Infrastructure SEA (CSIR, 2015b)

Therefore, should the REDZ be established and renewable projects operate within these areas, Eskom may be able to unlock funding to proactively construct grid infrastructure (as outlined in the Electrical Grid Infrastructure SEA) to facilitate generation capacity from these areas. This will mean that the municipality will also benefit from these upgrades and potentially alleviate the electrification backlogs present in the area.

Overall, the implementation of the proposed projects will contribute to the objectives of the PSDF and IDP through the distribution of electricity to be generated through renewable sources; the creation of employment opportunities during the construction phase of the development and local socio-economic development.

(b) Urban edge / Edge of Built environment for the area	YES	NO ✓

As noted above, the proposed project falls approximately 23 km south of Sutherland and 50 km north of Laingsburg within the Karoo Hoogland Local Municipality (Northern Cape Province) and Laingsburg Local Municipality (Western Cape Province). The proposed project falls within a rural, natural landscape and outside the urban edge.

(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	YES ✓	NO

The proposed activity does not compromise any of the objectives set within the Laingsburg Local Municipality IDP (2012 – 2017, Page 74) (Laingsburg Local Municipality, 2012), which states that one of the objectives for economic development is to create employment opportunities and alleviate poverty in order to achieve community empowerment. Promoting renewable energy and infrastructure development is listed a strategy within the Laingsburg Local Municipality IDP (2012 – 2017) (Laingsburg Local Municipality, 2012). In addition, the Karoo Hoogland Local Municipality revised IDP (2016 – 2017), approved in 2016 (Karoo Hoogland Local Municipality, 2016), states that the vision for the municipality is to be an economical growth node in the Northern Cape, in an environment that will enhance economic development by focusing on poverty alleviation and the creation of job opportunities.

Therefore, the proposed project will be supportive of the IDP's objective of creating more job opportunities and promoting renewable energy. The proposed project will also create economic spin offs during the

construction phase (if an EA is granted by the DEA). It is estimated that approximately 130 employment opportunities will be created during the construction phase. As previously stated, the proposed project will also provide fundamental infrastructure to ensure that the proposed Rietrug WEF is able to operate and transmit the electricity that it will generate. Therefore, through the development of this project, the WEF can be developed which in turn, will lead to an increased opportunity for temporary and permanent jobs.

(d) Approved Structure Plan of the Municipality	YES ✓	NO

It is not expected that the approval of the proposed project would compromise the integrity of the existing plans for the area. Furthermore, mitigation measures have been recommended as part of the BA Process to manage potential negative environmental impacts that may occur during the construction, operational and potential decommissioning phases. To this end, an EMPr, which is included as Appendix G of this BA Report, has been compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced.

Furthermore, the municipality is aware of the approved Rietrug WEF and is also included on the I&AP database for this Rietrug WEF Electrical Grid Infrastructure Project. The various municipalities will also be consulted with during the PPP, to ensure that any concerns and issues are recorded and addressed, where possible and applicable, in the BA Process. This will play a role in ensuring that the objectives of the proposed project are aligned with the future plans and approved structure plan of the municipalities.

(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	YES ***Refer to the explanation below***	NO

The Northern Cape PSDF (Northern Cape Government, 2012) states that the Provincial Environmental Management Framework (EMF) is listed as Sectoral Strategy 16 and it needs to be prepared and applied as part of the PSDF (once approved). The Northern Cape PSDF is to be facilitated by the Northern Cape Department of Environment and Nature Conservation.

However, no EMF has been found for either the Namakwa District Municipality or the Central Karoo District Municipality. Nevertheless, it is not expected that the approval of the proposed project would compromise the integrity of the existing plans and environmental priorities for the area. Furthermore, mitigation measures have been recommended as part of the BA Process to manage potential negative environmental impacts that may occur during the construction, operational and potential decommissioning phases. To this end, an EMPr, which is included as Appendix G of this BA Report, has been compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced.

(f) Any other Plans (e.g. Guide Plan)	YES¤✓	NO

The Northern Cape Environmental Implementation Plan (EIP), Third Edition, 2015 – 2020, was compiled by the Northern Cape Department of Environment and Nature Conservation and published under PN 173 on 20 November 2015. The EIP aims to regulate and co-ordinate environmental policies, plans and programmes within the Northern Cape, as well as to promote a sustainable environment. The proposed project is aligned with the EIP as it addresses environmental issues via the BA Process and EMPr (Appendix G of this BA Report) implementation.

3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	YES ✓	NO

Even though the proposed Sutherland, Sutherland 2 and Rietrug WEFs (which have been subjected to separate EIA Processes, as noted above) will not provide electricity to the municipality directly, the energy produced by the facilities will feed into the National Grid as a result of the proposed Electrical Grid Infrastructure projects. In other words, this specific Rietrug WEF Electrical Grid Infrastructure Project will enable the proposed Rietrug WEF to function optimally and connect to and feed the generated electricity to the National Grid. The proposed project is also aligned with the REDZ identified as part of the SEA for Wind and Solar PV development (Phase 1) (CSIR, 2015a) and the corridors identified in the SEA for Electrical Grid Infrastructure (CSIR, 2015b).

Overall, the implementation of the proposed projects will contribute to the objectives of the Western Cape and Northern Cape PSDF and IDP through the distribution of electricity to be generated through renewable sources; the creation of employment opportunities during the construction and operational phases of the development and local socio-economic development.

4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES ✓	NO
As noted above, at a national level, the DOE has set the target of having 17 800 MW of electricity generated from Renewable Energy sources contributing to the national grid by 2030 to ensure the continued uninterrupted supply of electricity. As noted above, Mainstream intends to submit the approved Sutherland WEF, Sutherland 2 WEF, and Rietrug WEF (EA issued on 10 November 2016, and currently undergoing substantive amendment) for the next round of the REIPPPP and this project (i.e. Rietrug WEF Electrical Grid Infrastructure) can therefore contribute to the Independent Power Producer (IPP) goals and feed into the national grid, which results in this project having national importance. Furthermore, the proposed electrical grid infrastructure project will ensure that the proposed and approved Sutherland WEF, Sutherland 2 WEF, and Rietrug WEF are viable for submission as part of the REIPPPP as it will ensure fundamental connection to the national grid. Should the proposed Rietrug WEF receive preferred bidder status, the social responsibility requirements in terms of the REIPPPP will be implemented and the positive impacts will therefore be realised. As stated above, the implementation of the proposed project will ensure and facilitate connection of the WEF to the national grid, create employment opportunities during the construction and operational phases of the development, and enhance local socio-economic development.		
5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	YES ***Refer to the explanation below***	NO
Minimal existing municipal services for the handling of waste, provision of water and sewage handling are expected to be required for the proposed project. Where possible, the local municipalities will be contacted during the 30-day review of the BA Report in order to seek confirmation of the availability of the services. However, as noted previously, should the municipality not have adequate handling of waste, provision of water and sewage handling provisions available; then the Applicant will make use of private contractors to ensure that the services are provided. The Applicant will also ensure that adequate waste disposal measures are implemented and waste disposal waybills will be obtained when waste is removed from site (in line with the EMPr (including in Appendix G of the BA Report)).		
6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?	YES	NO ✓
There is no anticipated negative impact on municipal infrastructure planning (no clash of priority, and/or placement) as the proposed project will be developed by Mainstream, a private developer. In addition, any additional infrastructure required to maintain the proposed electrical infrastructure would be provided and maintained by the Applicant or Eskom (as explained above). The activity is furthermore proposed on agricultural land with little or no existing and planned infrastructure. The opportunity cost of constructing the proposed project might increase the viability of agricultural productivity due to financial advantage (i.e. farmers will receive payments for lease of the property per quarter or year). The opportunity cost of not constructing the proposed electrical infrastructure to service the proposed Rietrug WEF would be the maintenance of the current status quo, which is marginal agriculture and grazing.		
7. Is this project part of a national programme to address an issue of national concern or importance?	YES ✓	NO
The National Integrated Resource Plan for Electricity (IRP2) (2011) suggests that 42% of national energy supply must come from renewable energy sources between 2010 and 2030. Therefore, this project will provide the necessary infrastructure to fundamentally support the proposed Rietrug WEF, which is aligned with the government's plan to increase renewable energy sources.		
8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	YES ✓	NO
The wind resource levels within the Sutherland area are good, which makes it a very favourable location for the approved Sutherland WEF, Sutherland 2 WEF, and Rietrug WEF (EA issued on 10 November 2016, and currently undergoing substantive amendment). As highlighted in Section A (8) of this BA Report, the location of the proposed Rietrug WEF Electrical Grid Infrastructure) project is therefore highly dependent on the location of the proposed Rietrug WEF and the third party substation (both Alternatives 1 and 2). The location of the proposed Rietrug WEF Electrical Grid Infrastructure) project is also dependent on cost effectiveness, feasibility, environmental sensitivities and landowner willingness. If the proposed Rietrug WEF cannot		

connect to the third party substation (either Alternative 1 or Alternative 2), this could result in additional costs and expenditure, as well as additional timeframes required, as a result of the potential re-design of the Rietrug WEF to align with an alternative substation within the region. Using an alternative substation within the region (dependent on capacity requirements) could result in longer distribution lines and associated service roads. This could result in additional negative impacts to the surrounding environment. Due to the presence of the proposed third party substation (both Alternatives 1 and 2), the land use is favoured from an electrical landscape perspective.

Overall, the location of the proposed project is considered to be feasible and suitable based on the environmental and technical issues taken into consideration. Refer to Appendix D of this BA Report (which includes the various specialist studies) for a detailed description of the location of the study area.

9. Is the development the best practicable environmental option for this land/site?	YES ✓	NO

Based on the findings of this BA, the proposed project would not have a significant ("high") negative impact on the receiving environment, with the implementation of suitable mitigation measures. It is also important to point out that the proposed project will be designed according to relevant national specifications and standards which are regarded as best practice in the renewable energy sector. Therefore, the construction of the proposed project is the best practicable option for the land. In addition, the construction the proposed electrical infrastructure (and ultimately the proposed WEF) would have a positive socio-economic impact on the area. Overall, the location of the proposed project is considered to be feasible and suitable based on the environmental and technical issues taken into consideration. Refer to Appendix D of this BA Report (which includes the various specialist studies) for a detailed description of the location of the study area.

10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES ✓	NO

Based on the findings of this BA, the proposed project would not have a significant ("high") negative impact on the receiving environment, with the implementation of suitable mitigation measures. In addition, the construction the proposed electrical infrastructure (and ultimately the proposed WEF) would have a positive socio-economic impact on the area and it will align with the various provincial and national policies and plans (as described above). The proposed project will also facilitate connection of the authorised WEF to the national grid. Therefore, the predicted benefits of the proposed development are expected to outweigh the negative impacts of it. None of the negative impacts are rated with a high significance with the implementation measures, and no fatal flaws have been identified by the specialists. Refer to Appendix D of this BA Report (which includes the various specialist studies) for a detailed impact assessment for the proposed project.

11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	YES ✓	NO

Various other renewable energy facilities and electrical power lines have been proposed in the immediate area. The proposed project is associated with the authorised Rietrug WEF. Various other WEFs and solar energy facilities are proposed within 50 km of the WEF, of which all would require supporting infrastructure. The main aspect that will lead to more projects being developed in the area is the presence of Eskom Substations that have available grid capacity that could evacuate the electricity generated from n renewable source into the national grid.

12. Will any person's rights be negatively affected by the proposed activity/ies?	YES	NO ✓

No negative impacts of a high significance (with the implementation of mitigation measures) have been identified as part of the BA.

The impacts on health and wellbeing are expected to be minimal as the proposed project is taking place within a sparsely populated region. Dust may be generated during the construction phase; however it is expected to be of a short-term duration and of low significance. However, where applicable, mitigation measures relating to potential impacts on the health and wellbeing of people (such as landowners, farm workers, and construction staff) have been included in the EMPr (Appendix G of the BA Report). Odours will be minimal during the construction phase and non-existent during the operational phase.

During the construction phase, noise may be generated as a result of the operation of equipment, vehicles and machinery, the transportation of construction materials and staff to and from site, the establishment of site construction areas, as well as general construction activities. However, the noise levels and impacts will be short-term and are not expected to be significant during the construction phase. During the operational phase, the proposed distribution line will not generate any noise. Mitigation measures (where applicable) have been included in the EMPr (Appendix G of the BA Report) to reduce the negative noise impacts during

the construction phase.

In terms of visual character and sense place, there are very few visual receptors in the area. Additional information is provided in the Visual Impact Assessment (Appendix D.3 of this BA Report).

Notwithstanding the above, the socio-economic benefits likely to result from the proposed project (e.g. capital via leasing of the land to Mainstream, creation of jobs and regional economic development) would most likely outweigh the issues mentioned above.

13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	YES	NO ✓

As noted above, the proposed project falls approximately 23 km south of Sutherland and 50 km north of Laingsburg within the Karoo Hoogland Local Municipality (Northern Cape Province) and Laingsburg Local Municipality (Western Cape Province). The proposed project falls within a rural, natural landscape and outside the urban edge.

14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	YES	NO ✓

The proposed project itself is not part of any of the SIPS. However, the proposed project will directly support the objectives of SIP 8: Green energy in support of the South African economy (support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP) 2010).

The energy produced by the proposed Sutherland, Sutherland 2 and Rietrug WEFs (which have been subjected to separate EIA Processes, as noted above) will feed into the National Grid as a result of the proposed Electrical Grid Infrastructure projects (i.e. this specific Rietrug WEF Electrical Grid Infrastructure Project will assist and enable the proposed Rietrug WEF to feed the generated electricity to the National Grid). In addition, on a local level, the proposed project will contribute towards job creation and economic spin offs during the construction phase (if an EA is granted by the DEA). The proposed project will also play a role in providing advanced skills transfer and training to the local communities during the construction phase, as applicable. In addition, the proposed project is aligned with the REDZ identified as part of the SEA for Wind and Solar PV development (Phase 1) (CSIR, 2015a) and the corridors identified in the SEA for Electrical Grid Infrastructure (CSIR, 2015b).

15. What will the benefits be to society in general and to the local communities?

The socio-economic benefits likely to result from the proposed project (e.g. creation of jobs and regional economic development) would most likely outweigh the minor issues noted above, such as dust generation, noise, impacts to the visual landscape, and odour emissions.

16. Any other need and desirability considerations related to the proposed activity?

The need and desirability considerations have been described above.

17. How does the project fit into the National Development Plan for 2030?

The National Development Plan (National Planning Commission, 2011, p.10) proposes to create 11 million jobs by 2030 by:

- "Realising an environment for sustainable employment and inclusive economic growth;
- Promoting employment in labour-absorbing industries;
- Raising exports and competitiveness;
- Strengthening government's capacity to give leadership to economic development; and
- Mobilising all sectors of society around a national vision".

Approval of this BA project will enable and facilitate the construction of a larger suite of WEF projects (i.e. Sutherland WEF, Sutherland 2 WEF and Rietrug) proposed by Mainstream, which will play a role in enhancing employment and economic growth objectives by creating employment opportunities and contributing to economic growth.

18. Describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.

The general objectives of Integrated Environmental Management set out in Section 23 of the NEMA and how these objectives have been taken into account in this BA Process is provided below.

Section 23 in NEMA:	***How it has been addressed in this BA Process:***
(2) The general objective of integrated environmental management is to:	Discussed in Question 19 below.

(a) promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment;	
(b) identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2;	Potential impacts on the environment, society, the economy and cultural heritage, occurring as a result of the proposed project, have been identified and assessed in Section D of this BA Report (as well as in Appendix D of this BA Report). Mitigation measures to minimise potential negative impacts and enhancement measures to maximise positive impacts have also been suggested in Section D of this BA Report, as well as Appendix G (EMPr).
(c) ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;	Assessing the potential impacts of the proposed project (as noted in Section D and Appendix D of this BA Report) warrants that all effects associated with the proposed project have received adequate consideration prior to any action relating to these activities being undertaken.
(d) ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;	Appropriate public participation has been undertaken for the proposed project, in compliance with the 2014 NEMA EIA Regulations (as amended). The PPP is described in Section C of this BA Report.
(e) ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment; and	The specialist studies undertaken as part of the BA Process and included in Appendix D of this BA Report assisted in the identification and description of environmental attributes and significant environmental impacts, which are indicated and assessed in Section D of this BA Report as well. Mitigation measures have also been suggested in Section D of this BA Report, as well as Appendix G (EMPr).
(f) identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2.	The EMPr (included in Appendix G of this BA Report) includes mitigation measures to minimise negative environmental impacts, as well as mitigation objectives and management.

19. Describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.

The principles of NEMA have been considered in this assessment through:

- Compliance with the requirements of relevant legislation in undertaking the assessment of potential impacts;
- Implementation of the principle of sustainable development where appropriate mitigation measures have been recommended for impacts which cannot be avoided;
- Ensuring that the successful implementation and appropriate management of this project will aid in achieving the principle of minimisation of pollution and environmental degradation;
- Undertaking the BA Process in an inclusive and transparent manner; and
- Making great efforts to involve I&APs, stakeholders and relevant Organs of State in the process such that an informed decision regarding the project can be made by the Competent Authority.

10. APPLICABLE LEGISLATION

The scope and content of this BA Report has been informed by the following legislation, guidelines and information series documents (Table 9). It is important to note that the specialist studies included in Appendix D of this BA Report also include a description of the relevant applicable legislation.

Table 9: Legislation Applicable to the Proposed Project

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
NEMA (Act 107 of 1998, as amended)	The proposed project will require the implementation of appropriate environmental management practices.	National DEA	19 November 1998
NEMA EIA Regulations published in GN R982, R983, R984 and R985, and as amended on 7 April 2017 in GN R326, R327, R325 and R324	These Regulations provide the procedures that need to be followed for the BA Process.	National DEA	8 December 2014
NEMA EIA Regulations published in Government Notice R983 and R985, and as amended on 7 April 2017 in GN R327 and R324	These Regulations contain the relevant listed activities that are triggered, thus requiring a BA. Please refer to Section A (7) of this BA Report for the complete list of listed activities.	National DEA	8 December 2014 and amended on 7 April 2017
National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA)	General and hazardous waste will be generated during the construction phase, which will require proper management.	National DEA	6 March 2009
National Environmental Management: Waste Amendment Act (Act 26 of 2014)	General and hazardous waste will be generated during the construction phase, which will require proper management.	National DEA	2 June 2014
National Environmental Management: Air Quality Act (Act 39 of 2004)	The proposed stockpiling activities, including earthworks, may result in the unsettling of, and temporary exposure to, dust. Appropriate dust control methods will need to be applied.	National DEA	19 February 2005
Water Services Act (Act 108 of 1997)	Water will be required during the construction and decommissioning phases of the proposed project, for consumption purposes, earthworks and grassing etc.	National Department of Water Affairs	1997
Hazardous Substances Act (Act 15 of 1973)	During the proposed project, fuel and diesel will be utilised to power vehicles and equipment. In addition, potential spills of hazardous materials could occur during the construction and decommissioning phases.	Department of Health	1973
Environmental Conservation Act (ECA) (Act 73 of 1989 Amendment Notice No.1183 of 1997)	ECA was promulgated prior to the NEMA, and was the main piece of legislation in dealing with environmental issues in South Africa. The ECA has largely been repealed and replaced with NEMA.	National DEA	1997
National Forests Act (Act 84 of 1998)	As noted in Appendix D.1 of this BA Report (Terrestrial Ecology Impact Assessment), the National Forest Act (Act 84 of 1998) governs the removal, disturbance, cutting or damage and destruction of identified "protected trees". If any protected species are found on site during the search and rescue or construction phase, the Provincial Department of Agriculture, Forestry and Fisheries (DAFF) will be contacted to discuss the permitting requirements. It is not unlikely that any listed trees will be encountered during the construction of the proposed infrastructure, nor would the clearing of "natural forest", as defined within the Act, be required on the site.	DAFF	1998
National Water Act (NWA) (Act	The need for a WUL will be confirmed	Department of	1998

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
36 of 1998)	with the Department of Water and Sanitation (DWS) during the 30 day review of the BA Report. Consultation with the DWS will also ensure that the relevant legislative requirements are complied with. However, it is important to note that the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) states that a 32 m regulated zone has been prescribed to all the freshwater features found within the investigation area, as stipulated by the 2014 NEMA EIA Regulations (as amended). Should any infrastructure need to be placed directly within an active channel of any freshwater resource, a WUL will be required and must be applied for by the proponent. In terms of Section 21 (c) and (i) of the NWA the relevant authorisation must be obtained from the DWS for any and all any activities that take place within the watercourses. In addition, the regulated area of a watercourse in terms of Regulation 509 of 2016 must be considered, and it is recommended that the Risk Assessment Protocol as advocated by the DWS be applied in order to ascertain the significance of perceived impacts to the receiving environment, and enable informed decision-making by the proponent and the relevant authorities. In addition, some ephemeral drainage lines were not defined as having riparian vegetation during the aquatic specialist site visit, and therefore were not defined as true watercourses from an ecological point of view. For these features, the zone of regulation in terms of GN509 of 2016 as it relates to the NWA is the 1:100 year floodline, which needs to be determined by a suitably qualified hydrologist. It is recommended in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) that a surface water baseline study should be undertaken as part of the WUL Application Process in consultation with the DWS.	Water Affairs	
Integrated Environmental Management (IEM) guideline series published by the DEA (various documents dated from 2002 to present)	The IEM Guideline series provides guidance on conducting and managing all phases and components of the required BA and PPP, such that all associated tasks are performed in the most suitable manner.	National DEA	2002 - present
National Heritage Resources Act (Act 25 of 1999)	The proposed project may require a permit in terms of the National Heritage Resources Act (Act 25 of 1999) prior to	National Department of Arts and	1999

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
	any fossils or artefacts being removed by professional palaeontologists and archaeologists. Additional information regarding this is provided in the Heritage Impact Assessment (Appendix D.4).	Culture	
Conservation of Agricultural Resources Act (Act 43 of 1983)	The Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983) has categorised a large number of invasive plants together with associated obligations of the land owner. Invasive plant species that should be removed or maintained only under certain commercial situations are identified in terms of the CARA. This Act will be applicable to the project if and where such plants arise within or adjacent to the project area. Notably most listed alien invasive species are propagated and driven by the disturbance of land during and following construction. The Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) explains that given the harsh environment prevalent within the area, the propensity for alien exotic plant species to establish in the area is limited and allows for ease of management, should exotic weed species be identified.	National Department of Agriculture	1983
Northern Cape Nature Conservation Act (Act 9 of 2009)	All species listed by the Northern Cape Nature Conservation Act (Act 9 of 2009) will require removal permits should they be impacted upon by the construction activities. The Northern Cape Conservation Act under its pertinent regulation, governs the disturbance of species listed in the Terrestrial Ecology Impact Assessment (included in Appendix D.1 of this BA Report), or possibly other species not yet identified on the site. As noted above, a permit from the Provincial Department of Environment and Nature Conservation will be required in order to disturb or translocate such species. Species likely to require relocation include the padlopers (*Homopsus* sp) and possibly *Opisthophthalmus* spp, which may be encountered at points subject to clearance. The absence or presence of these species will be confirmed as part of the plant rescue and protection plan and should any species be present and determined that they will be impacted on, permits will be obtained from Department of Environment and Nature Conservation in this regard.	Northern Cape Department of Environment and Nature Conservation	2009
Western Cape Nature and Environmental Ordinance 19 of 1974 (amended by the Western Cape Nature Conservation Laws	The Western Cape Nature and Environmental Ordinance 19 of 1974 (amended by the Western Cape Nature Conservation Laws Amendment Act (Act 3	Cape Nature	2000

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
Amendment Act (Act 3 of 2000))	of 2000)) provides protection status for plants. The removal or relocation of protected plant species requires a permit from Cape Nature. According to Section 63(1) of the Western Cape Nature Conservation Laws Amendment Act (Act 3 of 2000), no person shall a) uproot the plant in the process of picking the flower of any flora; (b) without a permit (i) pick any endangered or protected flora, or (ii) pick any flora on a public road or on the land on either side of such road within a distance of ninety metres from the centre of such road, or (c) pick any protected or indigenous unprotected flora on land of which he or she is not the owner, without the permission of the owner of such land or of any person authorised by such owner to grant such permission. The absence or presence of these species will be confirmed as part of the plant rescue and protection plan and should any species be present and determined that they will be impacted on, permits will be obtained from Cape Nature in this regard.		
National Environmental Management: Biodiversity Act (Act 10 of 2004)	This Act serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. The proposed development, taking place in the identified Roggeveld Shale Renosterveld (FRs3) habitats, may not necessitate any particular application for a change in land use from an ecological perspective, however the effective disturbance and removal of species identified in Table 1 of the Terrestrial Ecology Impact Assessment (included in Appendix D.1 of this BA Report), as well as possible other species (i.e. TOPS species), will require specific permission from the applicable authorities. In addition, the planting and management of exotic plant species on route, if and where required, will be governed by the Alien and Invasive Species (AIS) regulations, which were gazetted in 2014. These regulations compel landowners to manage exotic weeds on land under their jurisdiction and control.	National DEA	September 2004
Astronomy Geographic Advantage (Act 21 of 2007)	The Astronomy Geographic Advantage (Act 21 of 2007) aims is to provide for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy; to provide for intergovernmental co-operation and public consultation on	Department of Science and Technology	2007

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
	matters concerning nationally significant astronomy advantage areas; and to provide for matters connected therewith. The overall purpose of the Act is to preserve the geographic advantage areas that attract investment in astronomy. The entire Northern Cape Province, excluding the Sol Plaatjie Municipality, has been declared an Astronomy Advantage Area. The South African MeerKAT radio telescope is currently being constructed about 90 km north-west of Carnarvon in the Northern Cape Province. The MeerKAT radio telescope is a precursor to the SKA telescope and will be integrated into the SKA Phase 1 (SKA South Africa, 2014). However, it should be noted that the proposed project does not fall within the SKA buffer area. As noted in the Visual Impact Assessment (Appendix D.3 of this BA Report), the South African Astronomical Observatory is located approximately 30 km from the proposed distribution line routes and viewers are highly unlikely to notice a 132 kV power line over this distance.		
Subdivision of Agricultural Land Act (Act 70 of 1970)	An application for the change of land use (re-zoning) for the development on agricultural land will be lodged by the Applicant for approval in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA) as required. A servitude for the proposed distribution line will need to be registered on the affected farm portions. Servitude requirements also need to be discussed between the Applicant and Eskom.	Republic of South Africa	1970

SECTION B: DESCRIPTION OF THE AFFECTED ENVIRONMENT

As noted above, Alternative 1 and Alternative 2 of the proposed distribution line routing and third party substation have been assessed in this BA Report. As such, the relevant sections below have been completed separately for each alternative, to show the varying environmental conditions. The information presented in this section has been derived from the specialist studies that are included in Appendix D of this BA Report. The specialist declarations of interest are included in Appendix I of this BA Report.

1. PROPERTY DETAILS

Table 10 below provides the details of the affected property for both Alternative 1 and Alternative 2 of the proposed distribution line routing and third party substation.

Table 10: Details of the Affected Properties

	Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape	Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape
Province	Northern Cape	Western Cape
District Municipality	Namakwa District Municipality	Central Karoo District Municipality
Local Municipality	Karoo Hoogland Local Municipality	Laingsburg Local Municipality
Ward Number(s)	Not Applicable	Not Applicable
Farm name and number	1. Remaining Extent of Hartebeeste Fontein Farm 147 2. Remaining Extent of Nooitgedacht Farm 148 3. Remaining Extent of Beeren Valley Farm 150	1. Remaining Extent of Hartebeeste Fontein Farm 147 2. Remaining Extent of Nooitgedacht Farm 148 3. Remaining Extent of Beeren Valley Farm 150 4. Portion 1 of Farm 219 5. Remaining Extent of Farm 219 6. Farm 280 7. Portion 1 of Rheebokkenfontein Farm 4 8. Portion 2 of Rheebokkenfontein Farm 4 9. Portion 2 of Farm De Molen 5 10. Portion 6 of Farm Hamelkraal 16 11. Portion 7 of Farm Hamelkraal 16
Portion number	1. Remaining Extent of Hartebeeste Fontein Farm 147 – Portion 0 2. Remaining Extent of Nooitgedacht Farm 148 – Portion 0 3. Remaining Extent of Beeren Valley Farm 150 – Portion 0	1. Remaining Extent of Hartebeeste Fontein Farm 147 – Portion 0 2. Remaining Extent of Nooitgedacht Farm 148 – Portion 0 3. Remaining Extent of Beeren Valley Farm 150 – Portion 0 4. Portion 1 of Farm 219 – Portion 1 5. Remaining Extent of Farm 219 – Portion 0 6. Farm 280 – Portion 0 7. Portion 1 of Rheebokkenfontein Farm 4 – Portion 1 8. Portion 2 of Rheebokkenfontein Farm 4 – Portion 2 9. Portion 2 of Farm De Molen 5 – Portion 2 10. Portion 6 of Farm Hamelkraal 16 – Portion 6 11. Portion 7 of Farm Hamelkraal 16 – Portion 7

	Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape	Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape
SG Code	1. C07200000000014700000 2. C07200000000014800000 3. C07200000000015000000	1. C07200000000014700000 2. C07200000000014800000 3. C07200000000015000000 4. C07200000000021900001 5. C07200000000021900000 6. C04300000000028000000 7. C04300000000000400001 8. C04300000000000400002 9. C04300000000000500002 10. C04300000000001600006 11. C04300000000001600007
Current land-use zoning	Agricultural land-use - mainly livestock grazing. A servitude for the proposed distribution line will need to be registered on the affected farm portions. Servitude requirements also need to be discussed between the Applicant and Eskom.	

2. GRADIENT OF THE SITE

Based on the elevation profiles derived from Google Earth (2017), as well as the findings of the specialists during site work and the topographical profiles included in the Visual Impact Assessment (Appendix D.3 of this BA Report), the gradient along Alternative 1 of the distribution line route varies, however the gradient at the proposed Rietrug WEF on-site substation and the proposed collector hub is fairly flat. The gradient along the proposed Alternative 1 route varies from flat to 1:7.5, whereas Alternative 2 varies from flat to steeper than 1:5. The Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) notes that the study area lies at an altitude of approximately 1600 m above mean sea level (amsl), on the top of a steep escarpment that rises from the lower plains associated with the coastal lowlands of the Cape, that lie to the south. The Visual Impact Assessment (Appendix D.3 of this BA Report) explains that the difference in elevation between the top of the escarpment and the base is roughly 800 m. The Visual Impact Assessment further explains that rivers, such as the Dwyka, Tronk and Blouval, create steeply incised valleys in the plateau above the escarpment, although in general the plateau itself is open with gently rolling hills.

3. LOCATION IN LANDSCAPE

The general site, including Alternative 1 and Alternative 2 of the proposed distribution line routing to the proposed third party substation sites, is best described by the following landscape or landforms:

- Ridgeline;
- Plateau;
- Side slope of mountain;
- Closed valley;
- Open valley; and
- Undulating plain.

Refer to the explanation provided in Section B (2) above regarding the topography of the region, based on input from the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) and Visual Impact Assessment (Appendix D.3 of this BA Report). A detailed description of the affected environment is provided in all the specialists studies included in Appendix D of this BA Report.

4. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

In terms of the groundwater, soil and geological stability of the site, the general site, including Alternatives 1 and 2 of the proposed distribution line routing occurs on steep slopes with loose soil. The Visual Impact Assessment (Appendix D.3 if this BA Report) and Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape) (Appendix D.4 of this BA Report) also include a description of the geology of the area.

5. GROUNDCOVER

In terms of ground cover, both Alternatives 1 and 2 of the proposed distribution line routing and the proposed project area includes natural veld with scattered aliens. As noted above, a detailed Terrestrial Ecology Impact Assessment is included in Appendix D.1 of this BA Report, which provides a detailed description of the groundcover in terms of terrestrial vegetation. The Terrestrial Ecology Impact Assessment explains that the vegetation within the region is driven primarily by the prevailing climate, while the rugged topography and fractured geology of the area establishes a number of niche and micro-environments that support specific floral species and act as refugia for a number of faunal species. Therefore, eco-geomorphological features are of significant habitat importance within the study area. The information presented below has been summarised from the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report).

The assessment also notes that the proposed Rietrug WEF on-site substation lies primarily within the Roggeveld Shale Renosterveld (FRs3) vegetation type, while the proposed Alternative 1 distribution line routing will traverse mainly within FRs3, with some possible incursion into Central Mountain Shale Renosterveld vegetation form. The proposed Alternative 2 distribution line routing will traverse the Central Mountain Shale Renosterveld and Gamka Karoo vegetation types. A map illustrating the broad vegetation types of the study area is shown in Figure 17 below.

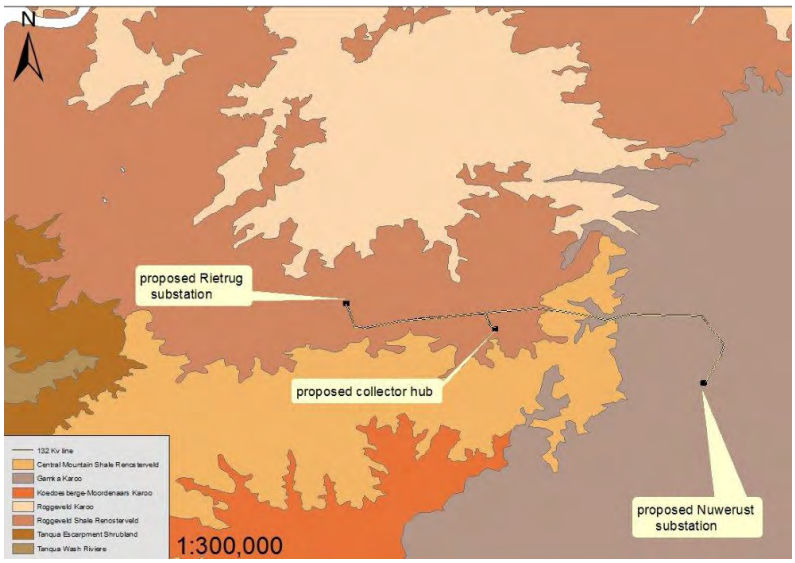


Figure 17: Broad Vegetation Types associated with the proposed project infrastructure.

Roggeveld Shale Renosterveld is typified by vegetation communities dominated by *Elytropappus rhinocerotis* and *Euryops laterifolius*, as well as *Lyceum cinereum*. While these species dominate within the Roggeveld, a number of endemic geophytes are to be found in the region, particularly in association with dolerite geology. The vegetation type is considered to be "least threatened" from a conservation perspective, with the impact of livestock being the most significant threat to this habitat type.

Roggeveld Karoo is a shrub dominated vegetation form dominated by *Lyceum cinereum*, as well as *Salsola glabrescens* and *S tuberculata*. The veld type is considered to be "least threatened" from a conservation perspective.

Central Mountain Shale Renosterveld (FRs5) lies primarily along the steeper slopes and along the lower elevations of the Great Escarpment, below the WEFs, while the Gamka Karoo vegetation type, a typical karroid vegetation form, is dominated by Karoo dwarf shrubs and occasional low trees. These vegetation types are all considered to be "least threatened" from a conservation perspective.

Consideration of the broader vegetation communities across the proposed electrical grid infrastructure sites indicates that much of the area comprises of a uniform vegetation form on the plateau. To the east of the study area, species such as *Lyceum cinereum* are more dominant, with evidence of more woody species including *Carissa bispinosa* and *Euclea undulata* being noted.

The Terrestrial Ecology Impact Assessment also notes that given the harsh environment prevalent within the area, the propensity for alien exotic plant species to establish in the area is limited and allows for ease of management, should exotic weed species be identified.

Overall, the Terrestrial Ecosystems on site are classed as Least Threatened in terms of Ecosystem Threat Status as per the National Environmental Management: Biodiversity Act (Act 10 of 2004).

6. SURFACE WATER

In terms of surface water, a detailed Aquatic Ecology (Freshwater) Impact Assessment is included in Appendix D.2 of this BA Report, which provides information on the surface water systems (including no-perennial rivers and wetlands) and aquatic ecology. The information provided below has been extracted from the Aquatic Ecology (Freshwater) Impact Assessment. Information regarding the sensitive freshwater features is also described in Section A (5) of this BA Report.

In order to identify all potential freshwater resources that may potentially be impacted by the proposed development, a 500 m zone of investigation around the proposed distribution line, service road and substations was used as a guide in which to assess possible sensitivities of the receiving environment. This area is referred to as the "Investigation Area".

Three main rivers, with associated riparian characteristics, were identified within the investigation area; and these include the Riet, Vanwyks and Juk Rivers, along with their associated tributaries and their applicable riparian zones. In addition, unnamed tributaries of the Portugal's River were identified in the western portion of the investigation area, although the Portugal's River itself is not located within the investigation area. In addition, several smaller, ephemeral drainage lines without riparian vegetation were also identified; however, these features were not assessed as they do not have any true riparian characteristics (however floodlines may be applicable). In addition, the headwaters of the Beerfontein se Laagte River rise in the western portion of the investigation area, approximately 300 m away from the proposed distribution line alternatives. The rivers associated with the study area are shown in Figure 5.

The Riet River and the tributaries of the Riet River and Portugal's River have a largely natural to moderately modified Present Ecological State (PES). Both the Juk River and Vanwyks River have a moderately modified PES.

As noted in Section A (5) of this report, all of the above rivers are considered to be in an unmodified, natural or largely natural with few modifications ecological condition (RIVCON AB), with the exception of the Riet River which is considered to be in a largely natural with few modifications ecological condition (RIVCON B).

Due to the relatively remote nature of the terrain, and minimal anthropogenic activity within the study area and greater catchment of these resources, few impacts have occurred. Modifications to

these systems are primarily as a result of agriculture (livestock farming) such as overgrazing, fences and roads traversing systems, and impoundment of larger systems. Due to the ephemeral nature of most of the river systems in the area, abstraction of water is not prevalent. Very little alien vegetation was observed during the specialist site assessments, and where alien invasive flora was observed, the encroachment was not considered to be severe at this time.

In terms of wetlands, according to the NFEPA Database there are no wetlands associated with the study area; however an artificial channelled valley bottom wetland is indicated to be located within the 500 m investigation area of the eastern portion of Alternative 2 of the distribution line routing. A second seep wetland, considered to be predominantly artificial is also indicated within 500 m of the eastern portion of Alternative 1 of the distribution line routing and the proposed collector hub (Figure 18). Both these wetlands are considered to be in heavily to critically modified ecological condition, with less than 25% natural vegetation cover (WETCON Z3). A third natural depression is situated just outside of the investigation area, and is considered to be in a natural/ good ecological condition, with natural land cover 75% or more (WETCON AB).

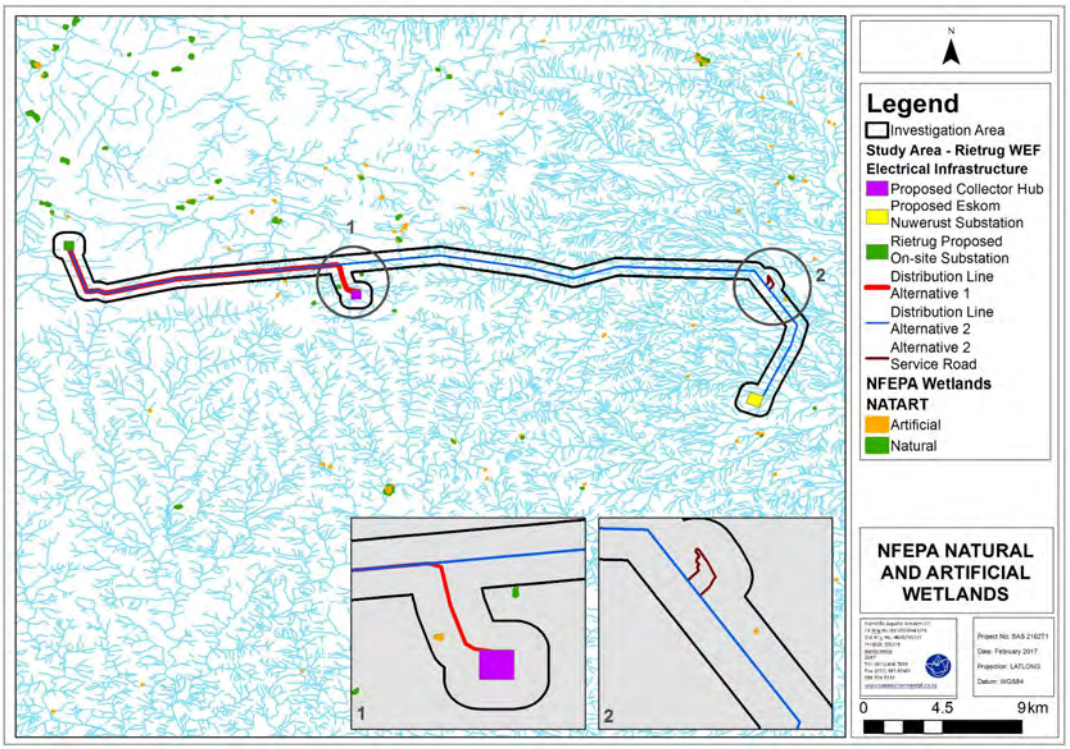


Figure 18: Natural and artificial wetlands located within the investigation area according to the NFEPA Database (2011).

Overall, as far as could be ascertained, no true wetlands that meet the definition of a wetland as per the NWA, were identified during the specialist site assessment. As noted above, and in the Aquatic Ecology (Freshwater) Impact Assessment, all features which were identified within the infrastructure footprint were classified as rivers, with associated riparian zones.

7. BIODIVERSITY

Refer to the respective Terrestrial Ecology Impact Assessment and Aquatic Ecology (Freshwater) Impact Assessment in Appendix D.1 and Appendix D.2 of this BA Report for a complete description of the biodiversity occurring on the site and associated potential impacts of the proposed project activities.

7.1. Biodiversity Planning Categories

In terms of Biodiversity Planning Categories, the proposed project areas fall within a Critical Biodiversity Area (CBA), Ecological Support Area (ESA), and Other Natural Area (ONA). The proposed project site falls within the planning domain of the Western Cape and Northern Cape.

As noted above, a detailed Terrestrial Ecology Impact Assessment is included in Appendix D.1 of this BA Report, which provides a detailed description of the terrestrial ecology (flora and fauna) associated with the proposed project area.

Northern Cape:

The Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) notes that the Critical Biodiversity Area (CBA) designation is related to a "terrestrial fauna corridor", based on the information obtained from the SANBI Biodiversity Geographic Information System (BGIS), as illustrated in Figure 19 below. However, the specialist notes that the CBA designation does not appear to be based on topography, elevation, geology or similar determinants. On the other hand, the assessment identified sites of ecological value or sensitivity using eco-geomorphological parameters. Topography or eco-geomorphology is a significant factor in determining the functional value of the region. Therefore, it could be derived that the CBA designation (terrestrial fauna corridor) may be more of a "buffer" than an actual determination of areas of high biodiversity value.

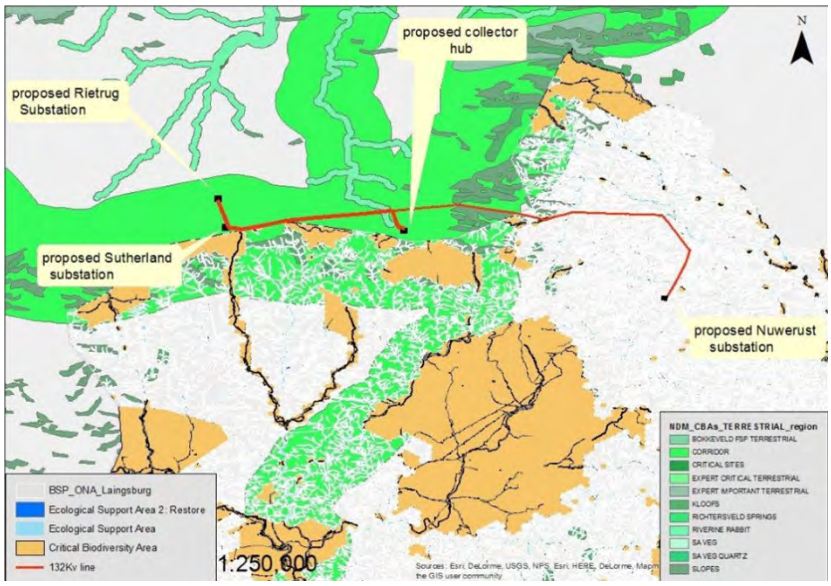


Figure 19: Terrestrial Corridors in the Northern Cape and CBA and ESA in the Western Cape in relation to the proposed project.

The Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) notes that in terms of the Northern Cape PSDF (NPSDF, 2012), the study area is situated within the Hantam Roggeveld Centre of Endemism. This centre is largely congruent with Acock's Western Mountain Karoo veld type and its enclaves of Mountain Renosterveld. This vegetation type is dominated by

low-growing perennial microphyllous bushes up to 0.5m tall. This is the most significant centre of plant endemism within the Great Karoo due to the number of endemics and taxonomic isolation of some of its taxa. The vegetation of this centre is poorly conserved and there is a great need for the establishment of more conservation areas within this area.

Western Cape:

The Terrestrial Ecology Impact Assessment and Aquatic Ecology (Freshwater) Impact Assessment note that in terms of the WCBSP (2017), both distribution line alternatives traverse areas considered to be Terrestrial CBAs 1, as shown in Figures 19 and 20. However, despite the WCBSP (2017) allocating the CBA as Terrestrial CBA 1, the Terrestrial Ecology specialist explains that due to the proximity of a small section of CBA to drainage features, this specific area is riparian in nature or associated with riparian habitat, and from a terrestrial ecology perspective, the proposed infrastructure traverses areas of limited ecological significance. The Terrestrial Ecology Impact Assessment explains that only a minor expanse (approximately 850 m) of CBA is traversed by the proposed infrastructure, and it can be ostensibly spanned by the proposed distribution line.

Terrestrial CBAs 1 are areas in a natural condition required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure. These areas should be maintained in a natural or near natural state, with no further loss of natural habitat. Areas that are degraded should be rehabilitated, and only low-impact, biodiversity sensitive land uses are appropriate. However, it should be noted that no fatal flaws have been identified by the specialists and the potential impacts identified have been rated with a very low to moderate significance with the implementation of mitigation measures. Furthermore, the proposed construction, operation and decommissioning phases will occur with strict compliance with the EMPr.

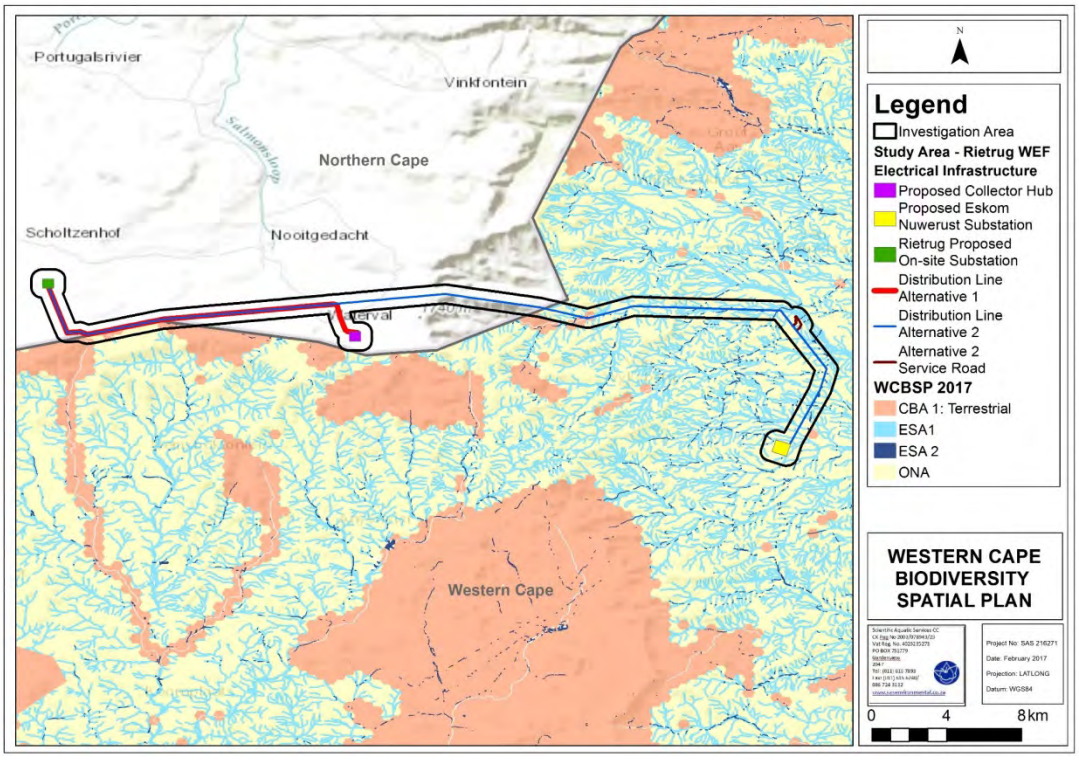


Figure 20: CBA and ESA associated with the study area and investigation area (WCBSP, 2017).

In terms of ESAs, the Aquatic Ecology (Freshwater) Impact Assessment explains that the eastern section of Alternative 2 of the distribution line, the service road, as well as the proposed Eskom Nuwerust substation, traverses several areas considered to be Aquatic ESAs 1. These areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning

of Protected Areas or CBAs, and are often vital in delivering ecosystem services. These features should be maintained in a functional, near natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.

In addition, the eastern section of Alternative 2 of the distribution line, the service road, as well as the proposed Eskom Nuwerust substation further traverses several areas considered to be ESAs 2. These areas should be restored from other land uses. These areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning of Protected Areas or CBAs, and are often vital in delivering ecosystem services. Restore and/or manage to minimise impact on ecological processes and ecological infrastructure functioning, especially soil and water related services, and to allow for faunal movement.

The remaining areas of the study area located within the Western Cape Province are considered to be ONAs. These areas are not currently identified as a priority, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions.

7.2. Habitat Condition

This section provides a description of the habitat condition on site, as well as an estimated percentage of habitat condition class and a description (Table 11).

Table 11: Habitat Condition on Site

Habitat Condition	Percentage of habitat condition class	Description
Natural	More than 90%	Much of the area aligns with the identified Roggeveld Shale Renosterveld, Roggeveld Karoo, Central Mountain Shale Renosterveld and Gamka Karoo vegetation types. Although the site is considered to be overgrazed to some extent.
Near Natural	Approximately 5%	Some portions of the surrounding area have been subject to alteration primarily on account of extensive grazing and other agricultural activities. The Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) explains that very little alien vegetation was observed during the site assessments, and where alien invasive flora was observed, the encroachment was not considered to be severe at that time. The Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) confirms a similar situation in respect of terrestrial environments where the severe climate within the region limits exotic vegetation in the region.
Degraded	0%	
Transformed	Approximately 5%	Minor portions of the land in and around the subject sites have been transformed to accommodate infrastructure such as roadways and farm homesteads.

7.3. Description of Vegetation Type and Aquatic Ecosystems (including Biodiversity Features)

As noted above, the proposed substations and distribution line routing traverse primarily Roggeveld Shale Renosterveld; and Central Mountain Shale Renosterveld and Gamka Karoo for Alternative 2 of the distribution line routing (Figure 17). All these vegetation types are considered to be "least threatened" from a conservation perspective. Much of the study area falls within Roggeveld Shale Renosterveld and as a general low relief plateau, this area comprises primarily of low, shrub like vegetation interspersed across shallow soils and regular although random, shale and sometimes doleritic rock exposures. The area does however show significant eco-morphological features relating to rock scarps and features that act as refugia for smaller fauna and are typically associated with geophytic plant species within the region. It is generally geological features within the area that must be considered to be of ecological and biological importance.

As noted above, in terms of aquatic ecology and freshwater systems, the three major rivers found within the Investigation Area include the Riet, Vanwyk's and Juk Rivers, along with their associated unnamed tributaries, as well as unnamed tributaries of the Portugal's River. A summary of the PES, Ecological Importance and Sensitivity (EIS) and Recommended Ecological Category (REC) of each of the assessed freshwater resources is provided in Table 12 below.

Table 12: Summary of the Results of the Assessment of the Freshwater Resources

Resource	Vegetation Ecostatus and PES (VEGRAI)	Ecoservice Provision	EIS	REC
Riet River	B/C (largely natural to moderately modified)	Intermediate	A	B
Riet River: tributaries	B/C (largely natural to moderately modified)	Intermediate	A	B
Vanwyks River	C (Moderately modified)	Intermediate	B	C
Juk River	C (Moderately modified)	Intermediate	B	C
Portugal's River: tributaries	B/C (largely natural to moderately modified)	Intermediate	A	B

8. LAND USE CHARACTER OF SURROUNDING AREA

The following land uses and/or prominent features currently occur within a 500 m radius of the site:

- Natural area;
- Agriculture;
- River, Stream or Wetland;
- Mountain, Koppie or Ridge; and
- Archaeological Site (Refer to explanation and Section 9 below)

Provided below is a description of how the land uses and/or prominent features influence the proposed project or may be impacted upon by the proposed project.

As noted above, the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) explains that the proposed project will have limited impact on the prevailing land use, primarily because of the expansive nature of grazing and the nature of the prevailing habitat. The Terrestrial Ecology Impact Assessment also notes that the study area lies at an altitude of approximately 1600 m amsl, on the top of a steep escarpment. Refer to Section B (5) and Section B (7) of this BA Report for additional information regarding the vegetation cover on site (in terms of terrestrial ecology), as well as the Terrestrial Ecology Impact Assessment (Appendix D.1) of this BA Report.

The Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) states that the primary river systems traversed by the Rietrug WEF Electrical Grid Infrastructure project are the Riet, Vanwyks and Juk Rivers, as well as unnamed tributaries of these systems, as well as unnamed tributaries of the Portugal's River. Refer to Section B (6) of this BA Report for additional information regarding the freshwater systems found on site.

Farm households or farmsteads are located within 500 m of the proposed Rietrug WEF – Electrical Grid Infrastructure project. Additional information regarding this is provided in the Visual Impact Assessment (Appendix D.3 of this BA Report) and Heritage Impact Assessment (Appendix D.4 of this BA Report). Based on the Visual Impact Assessment, the farmsteads on the Remaining Extent of Hartebeeste Fontein Farm 147 and Portions 1 and 2 of Rheebokkenfontein Farm 4 are located within the 500 m radius of the project. Furthermore, other low, medium and high sensitivity areas were identified in the Visual Impact Assessment (Appendix D.3 of this BA Report). High sensitivity areas are highly visible ridge lines in the surrounding landscape and medium sensitivity areas are less visible ridge lines. The proposed Rietrug WEF – Electrical Grid Infrastructure project occurs

within 500 m of low and medium sensitivity areas (i.e. less visible ridge lines). No high sensitivity areas (i.e. highly visible ridge lines) are located within 500 m of the proposed Rietrug WEF – Electrical Grid Infrastructure project.

In terms of palaeontology, the extensive surface scatter of petrified wood and occasional bone fragments (Figure 9) is located close to the project (i.e. about 520 m to the south west). Additional information regarding this is provided in the Heritage Impact Assessment (Appendix D.4 of this BA Report).

In terms of archaeology and cultural landscape, the sensitive sites recorded are shown in Figures 10, 11 and 12 of this report. The following archaeological features are located with the 500 m radius of the proposed Rietrug WEF – Electrical Grid Infrastructure project, however they are not intersected by the proposed distribution line or associated infrastructure, with the exception of the service road diversion which is routed within 20 m of the rock art site (however the service road uses an existing farm track in this section):

- Small Stone Structure on the Remaining Extent of Beeren Valley Farm 150;
- Small Stone Structure on the Remaining Extent of Beeren Valley Farm 150 (in the development envelope of the Sutherland on-site substation (assessed as part of a separate BA));
- Small Stone Structure on the Remaining Extent of Nooitgedacht Farm 148;
- Pre-colonial Kraal Complex on the Remaining Extent of Nooitgedacht Farm 148;
- De Molen Farm Complex on Portion 2 of Farm De Molen 5;
- De Molen Farm Complex 2 on Portion 2 of Farm De Molen 5; and
- Rock Art on Portion 2 of Farm De Molen 5.

Additional information regarding the archaeology and cultural landscape is provided in the Heritage Impact Assessment (Appendix D.4 of this BA Report).

Overall, the specialist studies included in Appendix D of this BA Report provide a description of the prominent features that currently occur within a 500 m radius of the site and within the general area, and where applicable, the specialist studies give a description of how this influences the proposed project or how it may be impacted on by the proposed project. The Impact Assessment is also included in Section D of this BA Report.

9. CULTURAL/HISTORICAL FEATURES

As noted above, a Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape) has been undertaken as part of this BA Process and the complete study is included in Appendix D.4 of this BA Report. The information provided below has been extracted from the Heritage Impact Assessment. In addition, refer to Section A (5) and Section B (8) of this BA Report for a description of the sensitive archaeological and palaeontological material found on site.

As noted above, Alternative 1 of the proposed distribution line routing and connection to the third party substation will occur within the Northern Cape; however Alternative 2 will extend into both the Northern Cape and Western Cape. Therefore, both the South African Heritage Resources Agency (SAHRA) and Heritage Western Cape are required to provide comments on the proposed project for the Northern Cape and Western Cape, respectively. In line with this, a Notification of Intent to Develop (NID) was submitted to the Heritage Western Cape for the proposed projects on 7 February 2017. The Heritage Western Cape provided a response to the NIDs on 28 February 2017 and provided the following case numbers:

- Sutherland WEF – Electrical Grid Infrastructure (Case: 17020605AS0207E);
- Sutherland 2 WEF – Electrical Grid Infrastructure (Case: 17020606AS0207E); and
- Rietrug WEF – Electrical Grid Infrastructure (Case: 17020607AS0207E).

Heritage Western Cape explained that based on the information contained in the NIDs; there is reason to believe that the proposed development will impact on heritage resources. Accordingly,

Heritage Western Cape requires that a Heritage Impact Assessment, in accordance with provisions of Section 38 (3) of the National Heritage Resources Act (Act 25 of 1999) be submitted for approval, with specific reference to impacts on archaeological and palaeontological heritage resources, with an integrated set of recommendations.

As required by the Heritage Western Cape, the draft Heritage Impact Assessment has been made available to the Laingsburg Local Municipality for comment for a 30 day period, which concluded in June 2017. Once the comment period ends, any comments from the municipality will be addressed within the Heritage Impact Assessment (if and where applicable), and the Final Heritage Impact Assessment will be submitted to the Heritage Western Cape for decision making.

In terms of archaeology and cultural landscape, much of the study area is very remote and located on high ground close to the edge of the escarpment. Archaeological remains are generally scarce but are found throughout the area, and Stone Age material is rare in the landscape, but historical sites, especially stone-walled sites, are fairly common. Very little Stone Age material was found with only a kraal complex and a geometric rock art site recorded. Isolated stone artefacts were remarkably rare. The vast majority of archaeological remains found were historical and ranged from a ruined farm complex to small, isolated ruined structures and isolated individual artefacts. Alternative 2 has more significant sites in close proximity to it but, because the alignment was devised by the Heritage Specialist, and such it avoid these sites and thus significant impacts are not expected. A small ruined stone structure may be directly impacted as it lies within the development envelope of the proposed Sutherland on-site substation (i.e. subject of a separate assessment) but it will be avoided by the final layout. Some graveyards and buildings are present in the area but are located well away from the proposed power line alignments and no impacts are expected. The rural cultural landscape extends throughout the study area but, aside from fences and farm tracks, human interventions are generally very sparse.

Rare rock art sites also occur in the region with one small site found in the Western Cape part of the study area. Historical archaeology, on the other hand, is very commonly encountered although most is in areas relatively close to water.

In terms of palaeontology, the proposed project study area extends from the Roggeveld Plateau eastwards into the western Koup region at the foot of the Besemgoedberg Escarpment, to the west of Merweville. It is entirely underlain by continental sediments of the Abrahamskraal Formation (Lower Beaufort Group) of Middle Permian age. This fluvial and lacustrine succession is generally assigned a high palaeontological sensitivity due to its rich fossil biota including pareiasaur reptiles, a wide range of therapsids, fish, amphibians, petrified wood and other remains of the Glossopteris Flora as well as trace fossils and microfossils. The Palaeozoic sedimentary bedrocks are extensively covered by Late Caenozoic superficial sediments (e.g. scree, gravelly soils) that are usually unfossiliferous.

Fossil material recorded from the Abrahamskraal Formation during a six-day field-based survey of the broader study region between Sutherland and Merweville includes sparsely-scattered, and often highly weathered, bones of unidentified robust-bodied tetrapods with only one well-articulated post-cranial skeleton. Trace fossils include several tetrapod burrow casts, lungfish burrows and low-diversity invertebrate trace assemblages. An extensive surface scatter of petrified wood blocks, some of which are well-preserved, was located in the western Koup. As noted above, the well-articulated post-cranial skeleton (which does not fall within the study area for this BA project) and the extensive surface scatter of petrified wood blocks are of conservation importance, and therefore require a protection buffer zone of 30 m.

With the exception of the articulated skeleton and petrified wood scatter, most of these fossil occurrences are of limited palaeontological value and lie well away from the proposed electrical infrastructure footprint and do not warrant mitigation. Based on the findings of the Palaeontology Impact Assessment, it is concluded that the overall palaeontological sensitivity of the Rietrug WEF Electrical Grid Infrastructure study area is rated as low. The South African Heritage Resources Information System (SAHRIS) PalaeoSensitivity map indicates the entire study area with a very high

sensitivity. However, this is a provisional sensitivity assigned to the entire Lower Beaufort Group. The overall conclusion of the specialist study is based on the research and fieldwork studies.

Refer to the complete desktop Heritage Impact Assessment (included in Appendix D.4 of this BA Report) for a detailed description of the palaeontology, archaeology and cultural landscape in the region.

In terms of archaeological heritage, the National Heritage Resources Act (Act 25 of 1999) does not require the developer to obtain permits prior to construction. However, any archaeological mitigation work (i.e. test excavations, sampling etc.) that may be required (in the event of archaeological resources of significance being found within the development footprint during construction) would need to be conducted under a permit issued to, and in the name of, the appointed archaeologist. The permit application process allows the heritage authorities to ensure that a suitably qualified and experienced archaeologist undertakes the work and that the proposed excavation/sampling methodology is acceptable.

As explained above, in terms of palaeontological heritage, where palaeontological mitigation of a development project is required, the palaeontologist concerned with mitigation work (Phase 2) would need a valid fossil collection permit from the relevant heritage management authority, i.e. Heritage Western Cape (for the Western Cape) or SAHRA (for the Northern Cape), and any material collected would have to be curated in an approved depository (e.g. museum or university collection). All palaeontological fieldwork and reporting should meet the minimum standards outlined by Heritage Western Cape (2016) and SAHRA (2013).

10. SOCIO-ECONOMIC CHARACTER

The information presented in this section is based on the 2001 and 2011 Census and 2016 Community Survey carried out by Statistics South Africa (Statistics SA), as well as information included in the IDPs for the municipalities.

10.1. Local Municipality

Demographic Profile:

As stated above, Alternative 1 of the proposed distribution line will traverse farm portions located in the Northern Cape, approximately 23 km south of Sutherland and 50 km north of Laingsburg, under the jurisdiction of the Namakwa District Municipality and the Karoo Hoogland Local Municipality. Alternative 2 of the proposed distribution line will traverse farm portions located in the Northern Cape, as well as in the Western Cape, under the jurisdiction of the Central Karoo District Municipality and the Laingsburg Local Municipality.

Northern Cape: Namakwa District Municipality and Karoo Hoogland Local Municipality

The Namakwa District Municipality comprises six local municipalities, namely: Richtersveld, Nama Khoi, Kamiesberg, Hantam, Karoo Hoogland and Khâi-Ma. The revised IDP 2016 - 2017 of the Namakwa District Municipality (Northern Cape Government, 2016a) explains that it is the largest district geographically in South Africa. The Namakwa District Municipality is classified as a Category C municipality, which has municipal executive and legislative authority in an area that includes more than one municipality (Statistics SA, 2016a, Page 6 and 7). The Karoo Hoogland Local Municipality is categorised as a B3 municipality, which is regarded to have small towns, with relatively small populations and significant proportions of urban population (Statistics SA, 2016a, Page 6 and 7).

As stated in the Karoo Hoogland Local Municipality revised IDP (2016 – 2017), approved in 2016 (Karoo Hoogland Local Municipality, 2016), the Karoo Hoogland Local Municipality covers an area of approximately 32 274 km^2 (almost 25 % of the Namakwa District Municipality total geographical area).

In 2001, the Namakwa District Municipality contained a total population of 108 111 and in 2011 it contained a total population of 115 842 (Northern Cape Government, 2016a). For the 2016 Community Survey conducted by Statistics SA, the population of the Namakwa District Municipality decreased to 115 488 (Statistics SA, 2016b). For the Namakwa District Municipality, the age structure of the population in 2001 was 23.9 % for under 15 years of age, 64 % for ages between 16 and 64 and 6.7 % for 65 years and older (Northern Cape Government, 2016a). In 2011, the population of the working age demographic (i.e. 15 to 65 years) made up 66.1 % of the population, whereas those below 15 years of age comprised 25.8 % of the population, and the above 65 years age group made up 8.1 % of the population of the Namakwa District Municipality (Northern Cape Government, 2016a).

According to the 2001 and 2011 Census, the total population was respectively recorded as 10 512 and 12 588 for the Karoo Hoogland Local Municipality (Statistics SA, 2017). For the 2016 Community Survey, the population of the Karoo Hoogland Local Municipality increased to 13 069 (Statistics SA, 2016b). In 2001, 29.7 % of the population comprised the young age group (i.e. 0 - 14 years), 62.3 % comprised the working age (15 – 64 years) and 9.1 % comprised the elderly age group (i.e. 65 years and older) in the Karoo Hoogland Local Municipality, with a dependency ratio of 63.6 % (Statistics SA, 2017). In 2011, 27.7 % of the population comprised the young age group (i.e. 0 - 14 years), 62.3 % comprised the working age (15 – 64 years) and 10 % comprised the elderly age group (i.e. 65 years and older) in the Karoo Hoogland Local Municipality, with a dependency ratio of 60.6 % (Statistics SA, 2017).

Over the period of 2004 to 2014, the population density for the Namakwa District Municipality decreased from 0.92 to 0.91 people per square kilometre, and for the Karoo Hoogland Local Municipality it increased from 0.38 to 0.43 people per square kilometre (Northern Cape Government, 2016a). According to the revised IDP 2016 - 2017 of the Namakwa District Municipality (Northern Cape Government, 2016a), factors causing a decrease or increase in population density can relate to the relief of the environment, climate, resource availability and human factors (such as political stability, and social and economic conditions).

Afrikaans is the dominant language (90.2 %) and English is the second largest language (1.2 %) spoken in the Karoo Hoogland Local Municipality (Statistics SA, 2017). The population of the Karoo Hoogland Local Municipality is predominantly Coloured (78.9 %), followed by Whites (14.6 %) and Black Africans (5.5 %), as shown in Figure 21 (Statistics SA, 2017).

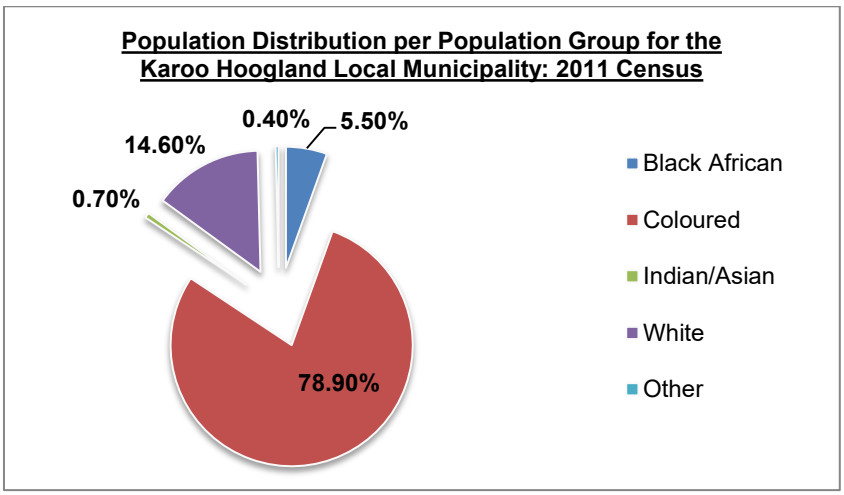


Figure 21: Percentage Distribution of Population per Population Group for the Karoo Hoogland Local Municipality in 2011 (Statistics SA, 2017).

A total of 2942 and 3842 households were recorded in the Karoo Hoogland Local Municipality in 2001 and 2011 respectively, with 30.6 % (in 2001) and 30.2 % (in 2011) of the households being

female headed (Statistics SA, 2017). During the 2016 Community Survey, the number of households in the Karoo Hoogland Local Municipality increased to 4654 (Statistics SA, 2016b). In addition, 94.5 % of formal dwellings were recorded in the Karoo Hoogland Local Municipality in 2001, and this increased to 96.9 % in 2011 (Statistics SA, 2017).

Western Cape: Central Karoo District Municipality and the Laingsburg Local Municipality

The Central Karoo District Municipality comprises three local municipalities, namely: Laingsburg, Prince Albert and Beaufort West. The Central Karoo District Municipality is classified as a Category C municipality and the Laingsburg Local Municipality is categorised as a B3 municipality (Statistics SA, 2016a). The Central Karoo District Municipality is one of five districts within the Western Cape. In terms of total population, the Central Karoo District Municipality is the smallest district within the Western Cape, however in terms of area; it is the largest (Western Cape Government, 2012). As stated in the Central Karoo District Municipality IDP (2012 – 2017), the district municipality covers a total area of approximately 38 853 km^2 (almost 30 % of the total geographical area of the Western Cape) (Western Cape Government, 2012).

In 2001 and 2007, the Central Karoo District Municipality contained a total population of 60 484 and 56 232 respectively, showing a declining trend (Western Cape Government, 2012). In 2011, the Central Karoo District Municipality contained a total population of 71 011, showing an increasing trend since 2007 (Statistics SA, 2016b). During the 2016 Community Survey, the population of the Central Karoo District Municipality increased to 74 247 (Statistics SA, 2016b).

According to the 2001 and 2011 Census, the total population was respectively recorded as 6680 and 8289 for the Laingsburg Local Municipality (Statistics SA, 2017). During the 2016 Community Survey, the population of the Laingsburg Local Municipality increased to 8895 (Statistics SA, 2016b). In 2001, 29.3 % of the population comprised the young age group (i.e. 0 - 14 years), 66.3 % comprised the working age (15 – 64 years) and 7.7 % comprised the elderly age group (i.e. 65 years and older) in the Laingsburg Local Municipality, with a dependency ratio of 58.7 % (Statistics SA, 2017). In 2011, 26.5 % of the population comprised the young age group (i.e. 0 - 14 years), 66.3 % comprised the working age (15 – 64 years) and 7.2 % comprised the elderly age group (i.e. 65 years and older) in the Laingsburg Local Municipality, with a dependency ratio of 50.9 % (Statistics SA, 2017).

In 2011, the population density for the Laingsburg Local Municipality was 1 person per square kilometre (Statistics SA, 2017), which is evidence of the low population density in the area. Afrikaans is the dominant language (90.1 %) and English is the second largest language (1.6 %) spoken in the Laingsburg Local Municipality (Statistics SA, 2017). The population of the Laingsburg Local Municipality is predominantly Coloured (79 %), followed by Whites (13.3 %) and Black Africans (7 %), as shown in Figure 22 (Statistics SA, 2017).

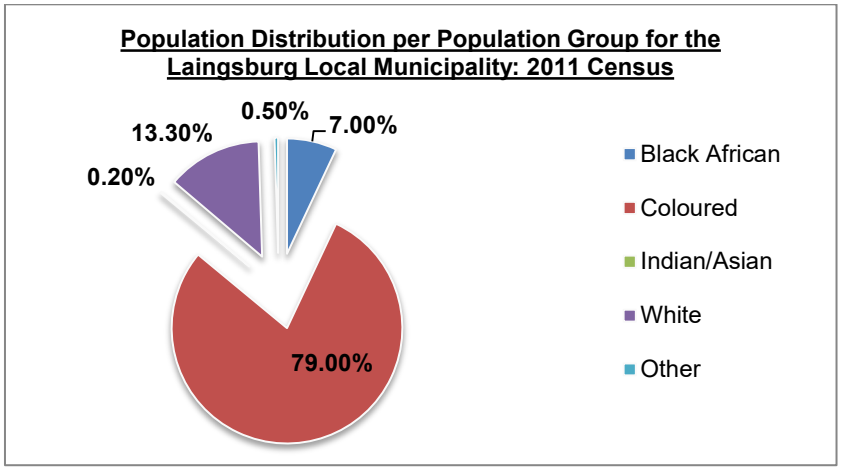


Figure 22: Percentage Distribution of Population per Population Group for the Laingsburg Local Municipality in 2011 (Statistics SA, 2017).

A total of 1922 and 2408 households were recorded in the Laingsburg Local Municipality in 2001 and 2011 respectively, with 30.4 % (in 2001) and 31 % (in 2011) of the households being female headed (Statistics SA, 2017). During the 2016 Community Survey, the number of households in the Laingsburg Local Municipality increased to 2862 (Statistics SA, 2016b). In addition, 96.6 % of formal dwellings were recorded in the Laingsburg Local Municipality in both 2001 and 2011 (Statistics SA, 2017).

10.2. Level of Unemployment

Northern Cape: Namakwa District Municipality and Karoo Hoogland Local Municipality

The 2001 and 2011 census indicates that the Karoo Hoogland Local Municipality had an unemployment rate of 28.6 % and 14.6 %, respectively (Statistics SA, 2017). The youth unemployment rate for the Karoo Hoogland Local Municipality was recorded as 40.3 % in 2001 and 20 % in 2011 (Statistics SA, 2017). Between 2001 and 2011, the unemployment rate therefore significantly decreased by 14 %, whilst the youth unemployment rate also significantly decreased by 20.3 %.

The 2011 Census data for the employment status of the working age of the population (15 - 64 years) of the Karoo Hoogland Local Municipality indicates that 3655 are employed, 623 are unemployed, 395 are classified as discouraged work-seekers, and 3170 are classed as not economically active (Statistics SA, 2017). This is indicated in Figure 23 below. In terms of the youth (aged 15 – 34 years), approximately 1 317 people are employed, 329 are unemployed, 218 are classified as discouraged work-seekers, and 1 433 are not economically active.

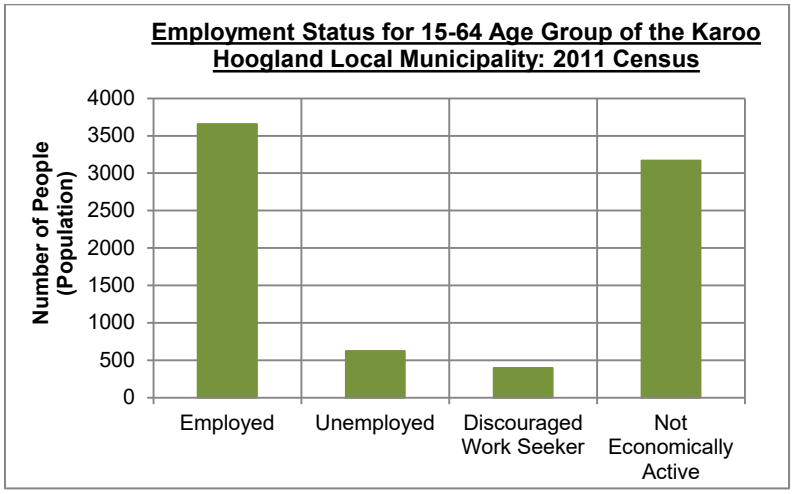


Figure 23: Employment Status for the 15 – 64 Age Group of the Karoo Hoogland Local Municipality based on the 2011 Census Data (Statistics SA, 2017).

According to the revised IDP 2016 - 2017 of the Namakwa District Municipality (Northern Cape Government, 2016a), the number of people unemployed in the Karoo Hoogland Local Municipality was 935 in 2004 and 800 in 2014, showing a decreasing trend. Conversely, 3165 people were employed in 2004, which increased to 3619 in 2014 for the Karoo Hoogland Local Municipality (Northern Cape Government, 2016a). Linked to this, in 2004 the unemployment rate was recorded as 22.8 % and in 2014 it was recorded as 18.1 % (Northern Cape Government, 2016a).

In 2004, the race and gender profile of unemployment within the Karoo Hoogland Local Municipality was recorded as 20.4 % African, 3.3 % White, 27.1 % Coloured and 57.8 % Asian; whilst 16.5 % of the unemployed population were males and 32.5 % were females (Northern Cape Government, 2016a). The race and gender profile of unemployment within the Karoo Hoogland Local Municipality as of 2014 stood at 12.6 % African, 4.0 % White, 20.8 % Coloured and 5.0 % Asian; whilst 15.8 % of the unemployed population were males and 21.8 % were females (Northern Cape Government, 2016a).

The revised IDP 2016 - 2017 of the Namakwa District Municipality (Northern Cape Government, 2016a), indicates that the largest employing industry within the Karoo Hoogland Local Municipality in 2014 was agriculture which employs close to 35 % of the working population, and the least being the electricity industry which employs just below 1%.

Western Cape: Central Karoo District Municipality and the Laingsburg Local Municipality

The 2001 and 2011 Census indicates that the Laingsburg Local Municipality had an unemployment rate of 26.3 % and 17.9 %, respectively (Statistics SA, 2017). The youth unemployment rate for the Laingsburg Local Municipality was recorded as 37 % in 2001 and 22 % in 2011 (Statistics SA, 2017). Between 2001 and 2011, the unemployment rate therefore significantly decreased by 8.4 %, whilst the youth unemployment rate also significantly decreased by 15 %.

The 2011 Census data for the employment status of the working age of the population (15 - 64 years) of the Laingsburg Local Municipality indicates that 2935 are employed, 638 are unemployed, 211 are classified as discouraged work-seekers, and 1708 are classed as not economically active (Statistics SA, 2017). This is indicated in Figure 24 below. There are 1544 economically active youth (i.e. those people aged between 15 - 34 that are employed or unemployed but looking for work) within the Laingsburg Local Municipality and 22 % of this value are unemployed (Statistics SA, 2017).

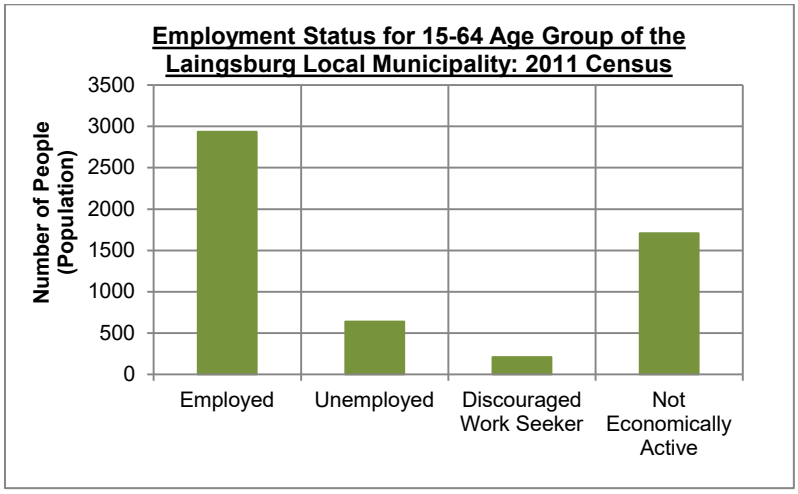


Figure 24: Employment Status for the 15 – 64 Age Group of the Laingsburg Local Municipality based on the 2011 Census Data (Statistics SA, 2017).

According to the 2012 – 2017 IDP of the Central Karoo District Municipality (Western Cape Government, 2012), the number of people unemployed in the district municipality was 6350 in 2007. In 2007, the race and gender profile of unemployment within the Central Karoo District Municipality was recorded as 45.0 % African, 2.6 % White, 33.4 % Coloured and 0 % Asian; whilst 24.0 % of the unemployed population were males and 38.3 % were females (Western Cape Government, 2012).

The 2012 – 2017 IDP of the Central Karoo District Municipality (Western Cape Government, 2012) explains that the majority of employment (22.6 % of the working population) in the Central Karoo District Municipality is within the agriculture sector. However, the agriculture sector is very dependent on export markets (Western Cape Government, 2012).

10.3. Economic Profile of Local Municipality

Northern Cape: Namakwa District Municipality and Karoo Hoogland Local Municipality

The Northern Cape Province has the third highest per capita income of all nine provinces; however, income distribution is extremely skewed, with a high percentage of the population living in extreme poverty. Based on the 2011 Census data, approximately 6.3 % of the households of the Karoo Hoogland Local Municipality had no income, whereas the majority of the households (i.e. 26.2 %) earned between the R 19 601 – R 38 200 income bracket, as shown in Figure 25 below, which shows the average household income distribution.

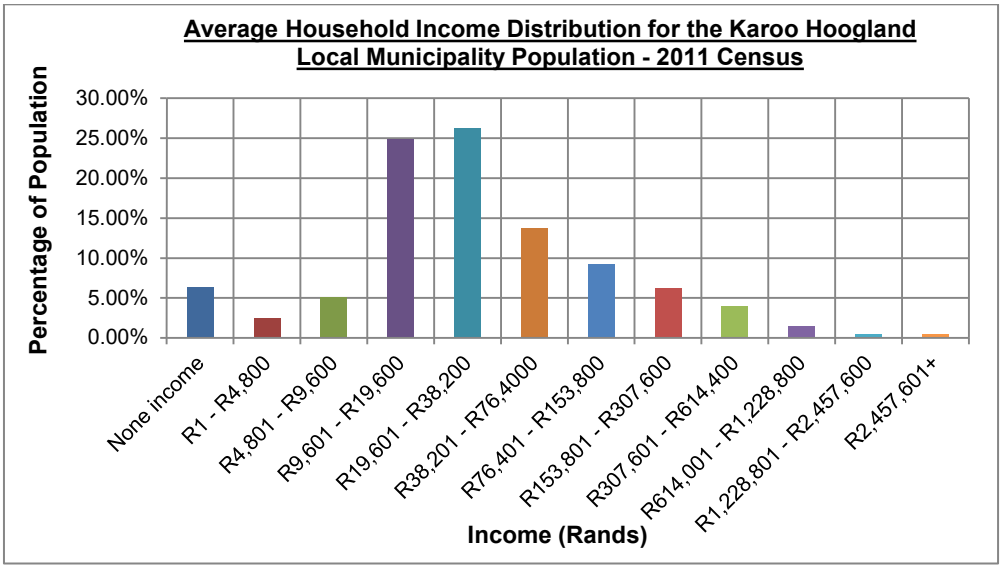


Figure 25: Average Household Income Distribution of the Karoo Hoogland Local Municipality in 2011 (Statistics SA, 2017).

Figure 26 below shows the annual income category of agricultural households within the Karoo Hoogland Local Municipality based on the 2011 Census data. It is evident in Figure 26 that 48 agricultural households had no income, and the majority of households (416) had an annual income of between R 4 801 and R 38 400 (Statistics SA, 2017).

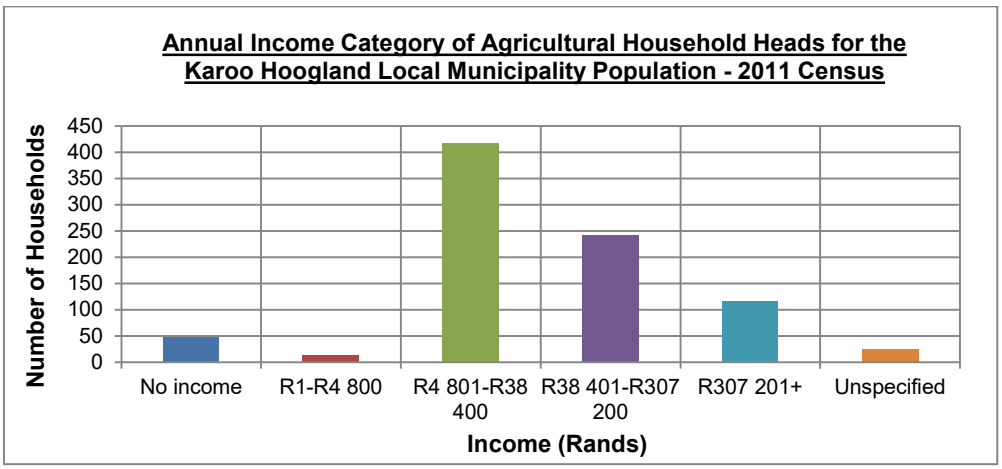


Figure 26: Annual Income Category of Agricultural Household Heads for the Karoo Hoogland Local Municipality in 2011 (Statistics SA, 2017).

Figure 27 below shows the number of agricultural households in relation to the type of agricultural activity within the Karoo Hoogland Local Municipality based on the 2011 Census data. It is evident in Figure 27 that the majority of households (534) are involved in livestock production, followed by 454 households for poultry production, 76 households for vegetable production and 31 households for production of other crops (Statistics SA, 2017).

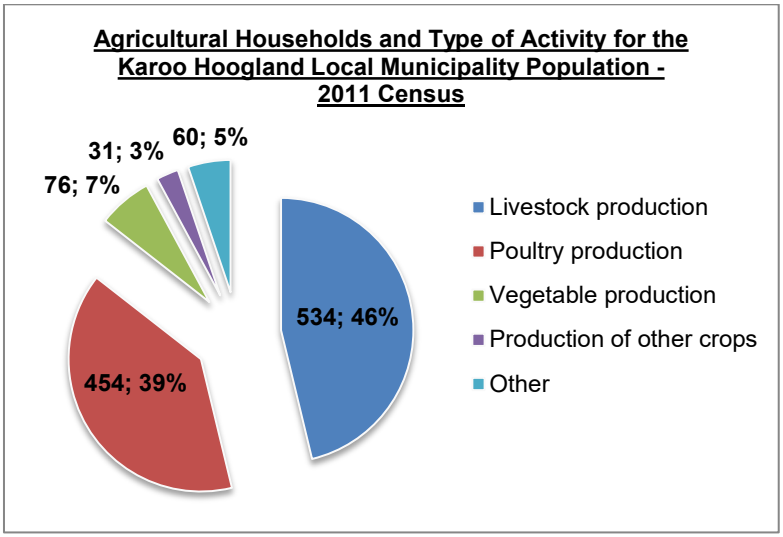


Figure 27: Agricultural Households and Type of Activity for the Karoo Hoogland Local Municipality in 2011 (Statistics SA, 2017).

The Karoo Hoogland Local Municipality is mainly dominated by the agriculture sector, and in 2014 the agriculture sector of both the Karoo Hoogland and Hantam Local Municipalities contributed the most towards the economic industry of the Namakwa District Municipality (Northern Cape Government, 2016a). In 2014, the agriculture industry contributed 46.4 % to the economic industry totals for the Namakwa District Municipality, followed by transport which contributed 29.4 %, construction at 28.6 %, Community Services at 25.8 %, Trade at 25.2 %, Electricity at 17.8 %, Finance at 14.5 %, Manufacturing at 14.2 % and Mining at 0.1 % (Northern Cape Government, 2016a). In 2014, the total economic contribution by the Karoo Hoogland Local Municipality to the economic industry of the Namakwa District Municipality was 17.9 %, the third highest in the Northern Cape (after Nama Khoi and Hantam Local Municipalities).

Western Cape: Central Karoo District Municipality and the Laingsburg Local Municipality

Based on the 2011 Census data, approximately 5.3 % of the households of the Laingsburg Local Municipality had no income, whereas the majority of the households (i.e. 25.4 %) earned between the R 19 601 – R 38 200 income bracket, as shown in Figure 28 below, which shows the average household income distribution.

Figure 29 below shows the annual income category of agricultural households within the Laingsburg Local Municipality based on the 2011 Census data. It is evident in Figure 29 that 23 agricultural households had no income, and the majority of households (287) had an annual income of between R 4 801 and R 38 400 (Statistics SA, 2017).

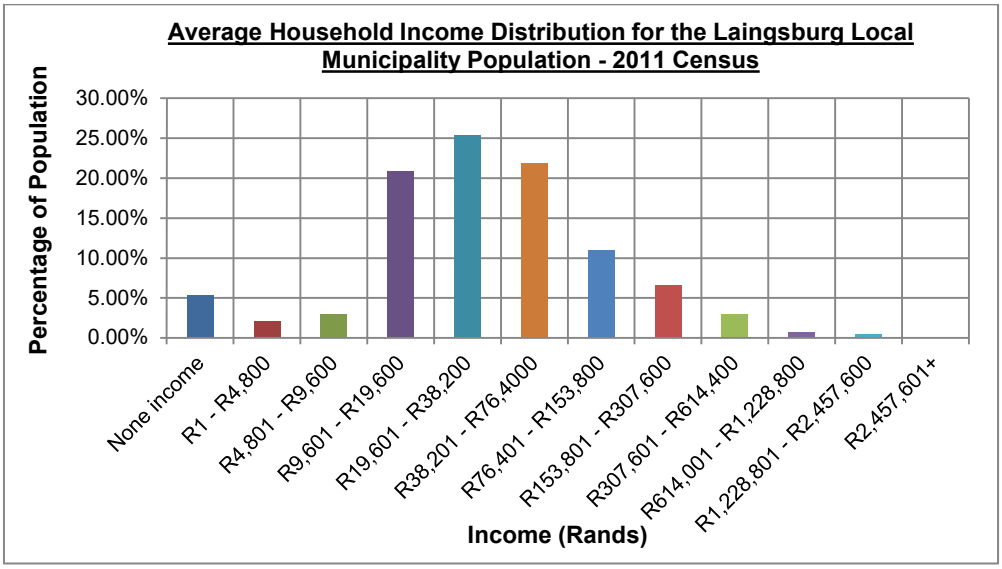


Figure 28: Average Household Income Distribution of the Laingsburg Local Municipality in 2011 (Statistics SA, 2017).

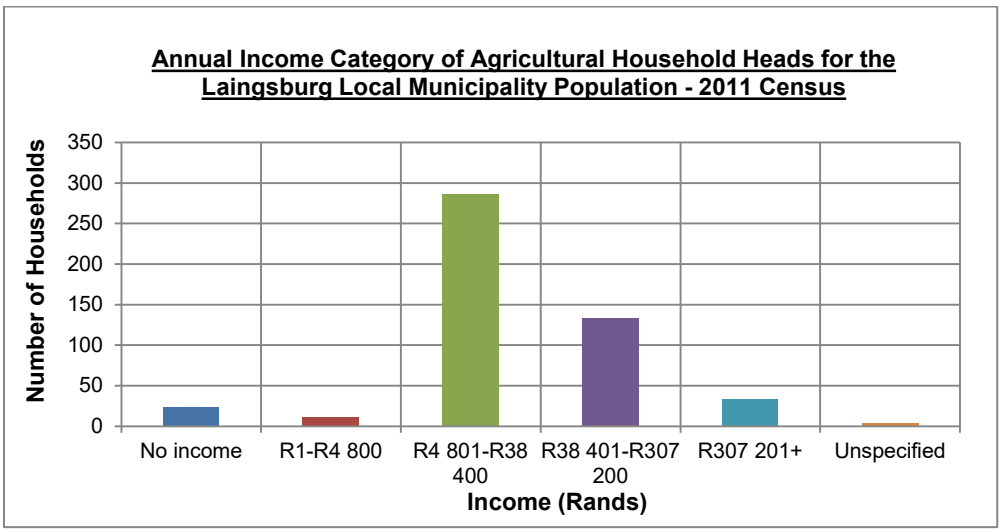


Figure 29: Annual Income Category of Agricultural Household Heads for the Laingsburg Local Municipality in 2011 (Statistics SA, 2017).

Figure 30 below shows the number of agricultural households in relation to the type of agricultural activity within the Laingsburg Local Municipality based on the 2011 Census data. It is evident in Figure 30 that the majority of households (345) were involved in livestock production, followed by 246 households for poultry production, 126 households for vegetable production and 102 households for production of other crops (Statistics SA, 2017).

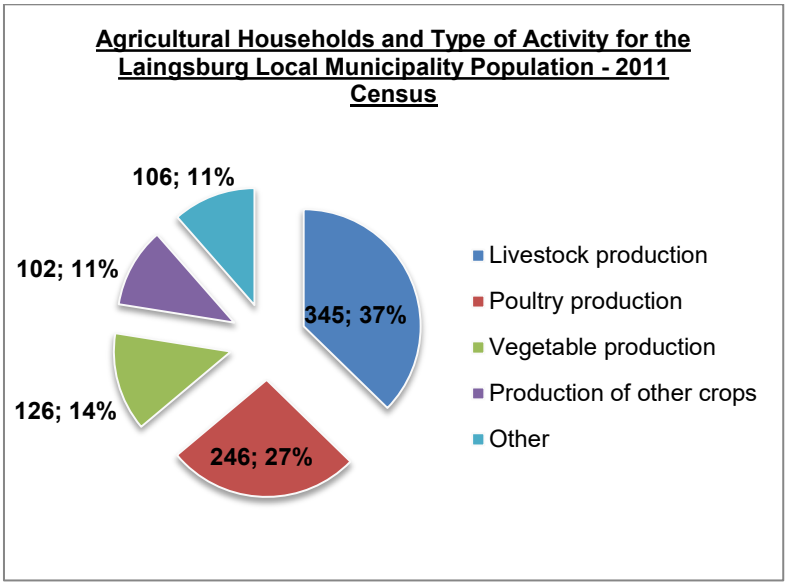


Figure 30: Agricultural Households and Type of Activity for the Laingsburg Local Municipality in 2011 (Statistics SA, 2017).

From the period of 1999 to 2009, the industries of mining, manufacturing, construction and finance displayed a significant contribution for the Central Karoo District Municipality. Within this period, the construction and manufacturing sectors in the Laingsburg Municipality displayed strong growth by 11.8 % and 9.7 %, respectively; however the agriculture, forestry and fishing sector declined by 1.52 % (Western Cape Government, 2012).

10.4. Level of Education

Northern Cape: Namakwa District Municipality and Karoo Hoogland Local Municipality

Based on the 2011 Census, in terms of education, 5.7 % of the population of the Karoo Hoogland Local Municipality was recorded as having no schooling, 48.1 % with some primary schooling, 7.7 % completed primary school, 24.2 % with some secondary education, 6.2 % completed secondary school and 0.6 % with higher education, as shown in Figure 31 below.

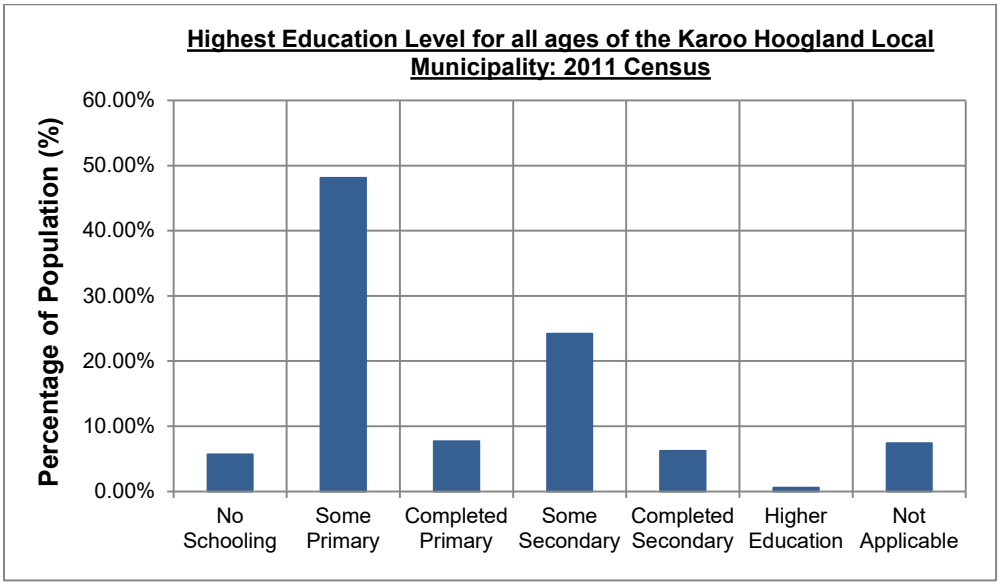


Figure 31: Education Levels of the Karoo Hoogland Local Municipality in 2011 (Statistics SA, 2017).

Western Cape: Central Karoo District Municipality and the Laingsburg Local Municipality

Based on the 2011 Census, in terms of education, 3.8 % of the population of the Laingsburg Local Municipality was recorded as having no schooling, 43.2 % with some primary schooling, 7.8 % completed primary school, 31.8 % has some secondary education, 7.8 % completed secondary school and 1.6 % has higher education, as shown in Figure 32 below.

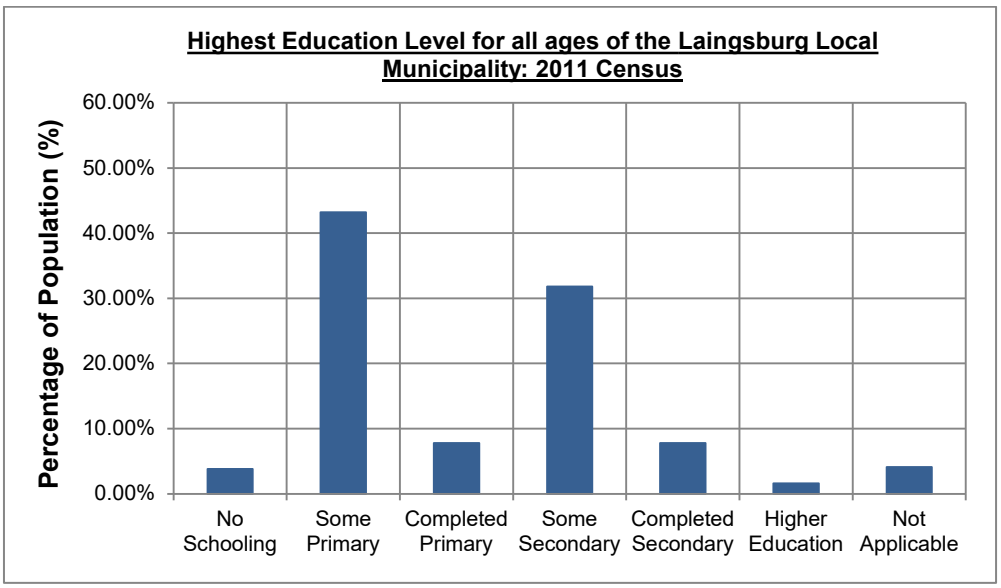


Figure 32: Education Levels of the Laingsburg Local Municipality in 2011 (Statistics SA, 2017).

10.5. Socio-Economic Value of the Proposed Project

Expected capital value of the proposed project on completion	**± R 150 million to R 250 million**
Expected yearly income that will be generated by or as a result of the proposed project	**Not Applicable**
Estimated number of new employment opportunities that will be created in the construction phase of the proposed project	**Approximately 130**
Expected value of the employment opportunities during the construction phase of the proposed project	**± R 10 million**
Percentage of the value of employment opportunities that will accrue to previously disadvantaged individuals during the construction phase of the proposed project	**± 60 %**
Estimated number of permanent new employment opportunities that will be created during the operational phase of the proposed project	**Eskom Operated**
Expected current value of the employment opportunities during the first 10 years during the operational phase of the proposed project	**Eskom Operated**
Percentage of the value of employment opportunities that will accrue to previously disadvantaged individuals during the operational phase of the proposed project	**Eskom Operated**

SECTION C: PUBLIC PARTICIPATION

This section provides an overview of the tasks undertaken during the BA Phase, with a particular emphasis on providing a clear record of the PPP followed. It is important to note that Shawn Johnston of Sustainable Futures ZA, an independent Public Participation Specialist has been appointed by Mainstream to undertake the PPP for the proposed project. As noted above, an integrated PPP has been undertaken for the BA Processes (i.e. Sutherland WEF – Electrical Grid Infrastructure, Sutherland 2 WEF – Electrical Grid Infrastructure, and Rietrug WEF – Electrical Grid Infrastructure (i.e. this project)). It was originally planned to run an integrated PPP for the three BA Projects and the three abovementioned Amendment 2 projects, however the schedules of these projects became misaligned during the processes. The integrated PPP for the proposed projects entails that all public participation documents (such as newspaper advertisements, site notices, notification letters etc.) will serve to notify I&APs, Stakeholders and Organs of State of the joint availability of all reports for the abovementioned projects and will provide I&APs with an opportunity to comment on the reports. This process is outlined in Figure 33. This approach is being undertaken due to the close proximity of the sites (i.e. the proposed projects will take place within the same geographical area) and that proposed projects will entail the same activity (i.e. distribution of electricity via distribution lines).

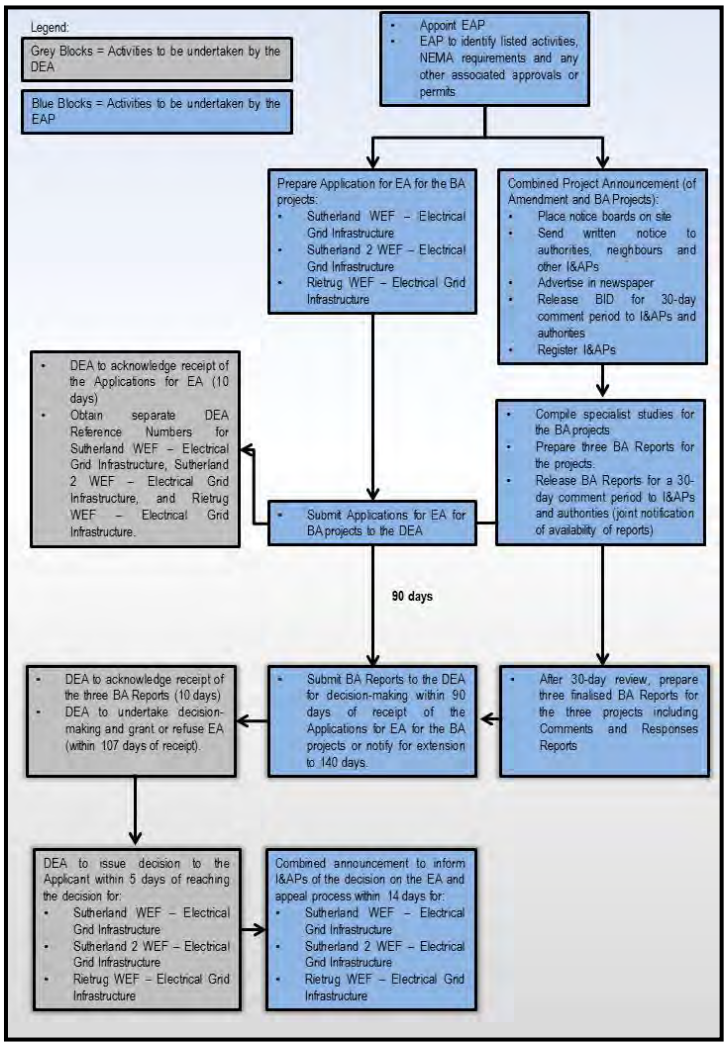


Figure 33: Joint PPP proposed for the Sutherland, Sutherland 2 and Rietrug WEF Electrical Grid Infrastructure BA Projects

The BA Processes commenced in December 2016, during which the proposed projects were announced in the public domain via the release of the Background Information Document (BID) for a 30-day comment period (extending from 9 December 2016 to 1 February 2017). Following the release of the BID, and the closure of the associated 30-day comment period, the Applications for EA and the BA Reports were compiled. All comments submitted during the 30-day review of the BID were incorporated into the BA Reports as applicable and where necessary. The BA Reports are currently being released to I&APs, Stakeholders and Organs of State (including the National DEA) for a 30-day comment period. The Applications for EA are submitted to the National DEA at the same time as the BA Reports.

All comments submitted during the 30-day review of the BA Reports (which are being circulated during the consultation process) will be incorporated into the finalised BA Reports as applicable and where necessary. The finalised BA Reports will be submitted to the DEA, in accordance with Regulation 19 (1) of the 2014 NEMA EIA Regulations (as amended), for decision-making in terms of Regulation 20 of the 2014 NEMA EIA Regulations (as amended).

1. ADVERTISEMENT AND NOTICE

Appendix E.1 of this BA Report includes proof of the placement of the newspaper advertisements and site notice boards.

Newspaper Advertisement:

In order to notify and inform the public of the proposed projects and invite I&APs to register on the project database, the BA Processes (combined with the Amendment 2 Processes) were advertised in two provincial newspapers and one local newspaper, as noted above. Specifically, the advertisements were placed in the Noordwester (local newspaper), the Cape Times and Die Burger (provincial) newspapers on 9 December 2016. The Noordwester is a weekly newspaper which is distributed every Wednesday and made available from Wednesday to Friday; however it is dated for a Friday. The newspaper advertisements also provided the details of the project website (i.e. https://www.csir.co.za/environmental-impact-assessment), where information available on the project could be downloaded from.

It is proposed that at the end of the decision-making phase, three advertisements will also be placed in the local and provincial newspapers to notify I&APs of the outcome of the decision-making phase (should an EA be granted for the proposed projects) and associated appeal process.

Site Notice Board:

Regulation 41 (2) (a) of the 2014 NEMA EIA Regulations (as amended) requires that a notice board providing information on the project and BA Process is fixed at a place that is conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of the site where the application will be undertaken or any alternative site. To this end, notice boards were placed at the locations shown in Table 13 on 7 and 8 December 2016. Overall, 11 notice boards were placed for the proposed projects. A copy of the notice boards and proof of placement thereof is included in Appendix E.1 of this BA Report.

Table 13: Site Notice Boards Placed for the Commencement of the BA and Amendment Processes (Sutherland, Sutherland 2 and Rietrug WEF Electrical Grid Infrastructure BA Projects)

Location	Co-ordinates	Language
Laingsburg Public Library and Municipality	33° 11' 50.81''S and 20° 51' 30.86"E	Afrikaans and English
2a. Sutherland 2 Site A	32° 36' 14.80''S and 20° 45' 09.22"E	Afrikaans and English
2b. Sutherland 2 Site B	32° 37' 12.22''S and 20° 44' 56.13"E	Afrikaans and English
2c. Sutherland 2 Site C	32° 37' 59.30''S and 20° 45' 32.88"E	Afrikaans and English
Sutherland OK Bazaar Store	32° 23' 31.35''S and 20° 39' 44.19"E	Afrikaans and English
Karoo Hoogland Local Municipality, Sutherland, Northern Cape	32° 23' 35.11''S and 20° 39' 41.70"E	Afrikaans and English
Sutherland Farmers Corporation	32° 23' 41.38''S and 20° 39' 52.45"E	Afrikaans and English
Sutherland Public Library	32° 23' 36.59''S and 20° 39' 34.45"E	Afrikaans and English
Sutherland Multi Save Market	32° 23' 44.33''S and 20° 39' 40.18"E	Afrikaans and English
Rietrug WEF Site (Farm Entrance)	32° 36' 09.74''S and 21° 00' 36.51"E	Afrikaans and English
Sutherland 2 WEF (Farm Entrance)	32° 36' 33.38''S and 20° 56'36.70"E	Afrikaans and English

2. DETERMINATION OF APPROPRIATE MEASURES

Refer to the section below which provides a detailed outline of the measures taken to include all potential I&APs during the BA Process (as required by Regulation 41(2)(e), 41(6) and 41(2)(b) of GN R326, in terms of the 2014 NEMA EIA Regulations (as amended)).

Proof of emails sent during the Project Initiation Phase (i.e. for the release of the BID, Letter 1 to I&APs, Stakeholders and Organs of State, as well as a Comment and Registration Form) and hand delivery receipts are included in Appendix E.2 of this BA Report. In terms of Regulation 41(2)(e) of GN R326, at this stage of the assessment process no persons have been identified as desiring but unable to participate in the process. Therefore, no alternative methods have been agreed to by the competent authority.

In line with Regulation 41(2)(b) of GN R326 and prior to the commencement of the BA Process (and advertising the EA Process in the local print media), an initial database of I&APs (including key stakeholders and Organs of State) was developed for the combined BA Processes. This was supplemented with input from the PPP Specialist (Sustainable Futures ZA), BA Project Managers (CSIR), and the Project Applicant (Mainstream). Appendix E.4 of this BA Report contains a detailed copy of the I&AP database which indicates interaction with I&APs, key stakeholders and all I&APs registered on the project database during the BA Process. The current I&AP database has been updated to include requests to register interest in the project, and comments received during the 30-day review of the BID. At the time of compiling the BA Report for release to I&APs, Organs of State and stakeholders in July 2017, the database included 143 registered I&APs.

While I&APs have been encouraged to register their interest in the project from the start of the process, following the public announcements, the identification and registration of I&APs is ongoing for the duration of the study. Stakeholders from a variety of sectors, geographical locations and/or interest groups are expected to show an interest in the proposed project, for example:

- Provincial and Local Government Departments;
- Local interest groups, for example, Councillors and Rate Payers associations;
- Surrounding landowners;
- Farmer Organisations;
- Environmental Groups and NGOs; and
- Grassroots communities and structures.

In terms of the electronic database, I&AP details are captured and automatically updated as and when information is distributed to or received from I&APs. This ongoing record of communication is an important component of the PPP. It must be noted that while not required by the regulations, those I&APs proactively identified at the outset of the BA Process will remain on the project

database throughout the process and will be kept informed of all opportunities to comment and will only be removed from the database by request (it should be noted that to date, no requests to de-register were received by the EAP or Public Participation Specialist).

As noted above, Alternative 1 of the third party substation and proposed distribution line will traverse three farm portions in the Northern Cape, and Alternative 2 will traverse five farm portions in the Northern Cape and six farm portions in the Western Cape. The landowners of the affected farm properties and adjacent farm properties were identified during the Project Initiation Phase based on the proposed project layout at the time (i.e. December 2016), and they were informed of the proposed project and included on the database of I&APs (as included in Appendix E.4). Therefore, written notice has been provided to the occupiers of the site (as shown in Appendix E of this BA Report) (in accordance with Regulation 41 (2) (b) (i) of the 2014 NEMA EIA Regulations (as amended)). However, as noted in Section A of this BA Report, the proposed project layout has changed since the release of the BID (as shown in Figure 2), and as such the relevant landowners and adjacent landowners have been identified and added to the I&AP database, to ensure that they receive a notification of the release of the BA Report.

3. APPROACH TO THE PPP

In terms of Regulation 41(6) of GN R326 the section below outlines the PPP for this assessment in order to provide potential I&APs, Stakeholders and Organs of State access to information on the project and the opportunity to comment at the various stages of the assessment process. It should be noted that no deviations from the PPP have been requested.

3.1. Project Initiation Phase - Identification and Notification to I&APs and Organs of State

The following summarises the PPP undertaken up to the release of the BA Report for I&AP Review:

- **Database Development and Maintenance**: In line with Regulation 41(2)(b) of GN R326, prior to the commencement of the BA Process and placing the newspaper advertisements (during the Project Initiation Phase as noted in Section C (1) above), an initial database of potential I&APs was developed for the BA Process. As noted above, while not required by the regulations, all I&APs (and authorities and Organs of State) proactively identified prior to advertising the BA Process will remain on the database for the duration of the assessment process. As comments are received or requests to register interest are received from I&APs during the project, the database is amended to include these I&APs as registered I&APs. At the time of release of this BA Report, **143 I&APs** were registered on the project database. A copy of the updated I&AP database is included in Appendix E.4 of this BA Report.
- **Letter 1 to I&APs**: As noted above, I&APs were notified via Letter 1 (dated 9 December 2016) of the Project Initiation Phase, which included a BID and a Comment and Registration Form. Letter 1 to I&APs (in English and Afrikaans), the BID and Comment and Registration Form were emailed to I&APs and organs of state on the database (where email addresses were available) on 9 December 2016, as well as hand delivered to the Laingsburg Local Municipality, Laingsburg Public Library, Sutherland Public Library, Karoo Hoogland Local Municipality, and Sutherland Farmers Association, on 8 December 2016. A copy of this correspondence and proof of delivery is included in Appendix E.2 of this BA Report.
- **Advertisements to Register Interest:** An advertisement was placed in The Cape Times (Provincial), Die Burger (Provincial) and Die Noordwester (Local) newspapers on 9 December 2016, advertising the BA (and Amendment 2) commencement and opportunity to comment. A copy of this advertisement is included in Appendix E.1 of this BA Report.
- **Site Notice Board**: As noted in Section C (1) above, 11 notice boards were placed for the proposed projects on 7 and 8 December 2016. A copy of the notice boards and proof of placement thereof are included in Appendix E.1 of this BA Report.
- **30 Day Comment Period**: As noted above, during the Project Initiation Phase, the potential I&APs, including authorities and Organs of State, were notified via Letter 1 of the 30 day comment and registration period within which to submit comments on the proposed project

and/or to register on the I&AP database, which extended from 9 December 2016 to 1 February 2017.

- **Comments Received:** Copies of all comments received during the Project Initiation Phase are included in Appendix E.5 of this BA Report and in the Comments and Response Report in Appendix E.3. The Comments and Responses Report indicates the nature of the comment, as well as when and who raised the comment. The comments received have been considered by the BA team and appropriate responses have been provided by the relevant member of the team, Applicant and/or specialist. The response provided indicates how the comment received has been considered in the BA Reports and in the project design or EMPRs, where and if applicable.
- **Access to Information**: All project information has been made available on an easily accessible website: https://www.csir.co.za/environmental-impact-assessment

3.2. BA Report Phase - Review of the BA Report (Current Stage)

As noted above, the BA Reports for each Electrical Grid Infrastructure project are currently being released to I&APs for review. The section below summarises the PPP for the review of the BA Reports.

- **Database Maintenance**: As noted above, at the time of release of this BA Report for comment, 143 I&APs were registered on the project database. The current database is included in Appendix E.4 of this BA Report.
- **Letter 2 to I&APs**: Written notification of the availability of the BA Reports will be sent to all I&APs and Organs of State registered on the project database via Letter 2 via email (where email addresses are available) and hand delivery (to the Laingsburg Local Municipality, Laingsburg Public Library, Sutherland Public Library, Karoo Hoogland Local Municipality, and Sutherland Farmers). The letter will include notification of the 30-day comment period for the BA Reports, and a Comment and Registration Form. Proof of hand delivery and a copy of the emails sent will be included in Appendix E.2 of the finalised BA Report (which will be submitted to the DEA for decision-making).
- **30-day Comment Period**: As noted above, registered I&APs, including authorities and Organs of State, will be notified via Letter 2, of the 30-day comment period for the BA Reports.
- **Availability of Information:** The BA Reports will be made available and distributed to ensure access to information on the project and to communicate the outcome of specialist studies. Copies of the reports will be placed at the Sutherland and Laingsburg local libraries for I&APs and Stakeholders to access for viewing. Key authorities will be provided with either a hard copy and/or CD of the BA Reports via courier. The BA Reports will also be uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment) and telephonic consultations will take place, as necessary.
- **Meetings Held:** A public meeting could possibly be held during the review of the BA Reports, if warranted and if there is substantial public interest. However, due to the limited public input and/or interest in the proposed project, this was not deemed necessary. Telephonic consultations and focus group meetings with key I&APs will take place as required and where necessary (i.e. to seek comments).
- **Comments Received**: A key component of the BA Process is documenting and responding to the comments received from I&APs and the authorities. Copies of all comments received during the review of the BA Reports will be included in Appendix E.5 of the finalised BA Report and in the Comments and Response Report (Appendix E.3 of the finalised BA Report), which will be submitted to the DEA for decision-making. The Comments and Responses Report will indicate the nature of the comment, as well as when and who raised the comment. The comments received will be considered by the BA team and appropriate responses will be provided by the relevant member of the team, Applicant and/or specialist.

3.3. Compilation of finalised BA Report for Submission to the DEA

- Following the 30-day commenting period of the BA Reports and incorporation of the comments received into the reports, the finalised BA Reports (i.e. hard copies and electronic copies) will

be submitted to the DEA in line with Regulation 19 (1) (a) of the 2014 NEMA EIA Regulations (as amended). In line with best practice, I&APs on the project database will be notified via email (where email addresses are available) of the submission of the finalised BA Reports to the DEA for decision-making.

- The BA Reports that are submitted for decision-making will include proof of the PPP that will be undertaken to inform Organs of State, Stakeholders and I&APs of the availability of the BA Reports for the 30 day review (as explained above). To ensure ongoing access to information, copies of the finalised BA Reports that will be submitted for decision-making and the Comments and Response Report (detailing comments received during the BA Phase and responses thereto) will be placed on the project website (i.e. https://www.csir.co.za/environmental-impact-assessment).
- The DEA will have 107 days (from receipt of the finalised BA Reports) to either grant or refuse EA (in line with Regulation 20 (1) of the 2014 NEMA EIA Regulations).

3.4. Environmental Decision-Making

- **Environmental Decision-Making and Appeal Period** - Subsequent to the decision-making phase, if an EA is granted by the DEA for the proposed projects, all registered I&APs, Organs of State and stakeholders on the project database will receive notification of the issuing of the EA and the appeal period. The 2014 NEMA EIA Regulations (as amended) (i.e. Regulation 4 (1)) states that after the Competent Authority has a reached a decision, it must inform the Applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) of the 2014 NEMA EIA Regulations (as amended) stipulates that I&APs need to be informed of the EA and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the EA and the appeal procedure and its respective timelines. The distribution of the EA (should such authorisation be granted by the DEA), as well as the notification of the appeal period, will include the placement of one advertisement in The Cape Times (Provincial), Die Burger (Provincial) and Die Noordwester (Local) newspapers. A letter (i.e. Letter 3) will also be sent via registered mail and email to all registered I&APs, Stakeholders and Organs of State (where postal, physical and email addresses are available) on the database. The letter will include information on the appeal period, as well as details regarding where to obtain a copy of the EA. A copy of the EA will be uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment). In addition, all I&APs on the project database will be notified of the outcome of the appeal period in writing.

4. ISSUES RAISED BY I&APS AND COMMENTS AND RESPONSE REPORT

Issues raised by I&APs prior to the release of the BA Report are noted in Table 14 below. The complete Comments and Response Report is attached as Appendix E.3 of this BA Report, which shows all comments received from I&APs, as well as responses to the comments from the project team.

Table 14: Summary of Main Issues Raised by I&APs and Response from the EAP

Summary of Main Issues Raised by I&APs	Summary of Response from EAP
BA Process and PPP: ▪ Western Cape DEADP Directorate: Development Management (Region 3) will only comment on applications falling within the boundaries of the Western Cape (i.e. for Alternative 2 to allow connection of the WEFs to the Eskom Nuwerust Substation). Hard copies of the relevant reports to be provided to DEADP once they are available for comment. ▪ Cape Nature provided 2016 requirements for providing comments on Agricultural, Environmental, Mining, Planning, and Water Use	These comments relate to the requests to register interest, update of contact details and contact persons, confirmation of project scope within the Western Cape, submission of completed comment and registration forms, requests for project layout, and requests for copies of reports. All these comments and the responses thereto have been provided in Appendix E.3 of this BA Report.

Summary of Main Issues Raised by I&APs	Summary of Response from EAP
related Applications. Cape Nature requires a hard copy and CD of all relevant documentation for comment when available. ▪ Request for additional project information was received from WWF Land Programme.	
Project Details: ▪ Impact on Archaeology and Palaeontology.	As noted in Section A (2) of this BA Report, a Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape) has been undertaken as part of the BA Processes. This specialist assessment was conducted by Dr. Jayson Orton of ASHA Consulting (PTY) Ltd, who is a registered member of the Association of Southern African Professional Archaeologists and Dr. John Almond of Natura Viva cc, who is an accredited member of the Palaeontological Society of South Africa (PSSA) and the Association of Professional Heritage Assessment Practitioners – Western Cape. The Heritage Impact Assessment is included in Appendix D.4 of this BA Report. The Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape) has identified and assessed the significance of archaeological and palaeontological sites that are located within the proposed project area. The specialist assessment also indicates the relevant permit requirements, if a permit is required from the relevant Provincial Heritage Resources Authority for the potential disturbance of any heritage features on site. It also includes mitigation measures, management actions and recommendations for inclusion in the EMPr (Appendix G of this BA Report). As noted above, both the SAHRA and Heritage Western Cape are required to provide comments on the proposed project for the Northern Cape and Western Cape, respectively. In line with this, a NID was submitted to the Heritage Western Cape for the proposed projects on 7 February 2017. The Heritage Western Cape provided a response to the NIDs on 28 February 2017 and provided the following case numbers: ▪ Sutherland WEF – Electrical Grid Infrastructure (Case: 17020605AS0207E); ▪ Sutherland 2 WEF – Electrical Grid Infrastructure (Case: 17020606AS0207E); and ▪ Rietrug WEF – Electrical Grid Infrastructure (Case: 17020607AS0207E). Heritage Western Cape requires that a Heritage Impact Assessment, in accordance with provisions of Section 38 (3) of the National Heritage Resources Act (Act 25 of 1999) be submitted for approval, with specific reference to impacts on archaeological and palaeontological heritage resources, with an integrated set of recommendations. This is being complied with and the Final Heritage Impact Assessment will be submitted to Heritage Western Cape for decision-making.

Summary of Main Issues Raised by I&APs	Summary of Response from EAP
	During the Project Initiation Phase, the BID, Letter 1 and Comment and Registration Form were uploaded to the SAHRIS for comment on 8 December 2016. Three different cases were created for the BA Projects, and the following Reference Numbers were provided: ▪ Sutherland WEF – Electrical Grid Infrastructure (Case: 10493); ▪ Sutherland 2 WEF – Electrical Grid Infrastructure (Case: 10495); and ▪ Rietrug WEF – Electrical Grid Infrastructure (Case: 10494). The BA Reports will also be uploaded to SAHRIS for comment.

5. AUTHORITY PARTICIPATION

The proof of email delivery and hand delivery, included in Appendix E.2 of this BA Report does not distinguish between potential I&APs, Authorities and Organs of State identified as key stakeholders. However, the current database of potential I&APs, including Authorities and Organs of State, is included in Appendix E.4. Authorities and Organs of State received written notification of the proposed activities via email together with all potential I&APs identified for this assessment.

The I&AP database included in Appendix E.4 of this BA Report has been divided into Organs of State, Stakeholders (NGOs and Conservation Organisations), Landowners, Adjacent Property Owners and Additional Registered I&APs (based on requests to register). As this project will support a renewable energy project, Eskom and the SKA Project Office are included on the database of Organs of State.

Below is a summary of the notification process undertaken as part of the PPP for Authorities:

- **Notification of the Project Initiation Phase:**

Authorities and Organs of State were notified via Letter 1 (dated 9 December 2016) of the 30 day period within which to submit comments on the proposed project, which extended from 9 December 2016 to 1 February 2017.

- **Notification of the BA Report Release Phase:**

All Authorities and Organs of State on the project database will be notified of the 30-day comment period on the BA Reports, via Letter 2. Key authorities will be provided with either a hard copy and/or CD of the BA Reports via courier. Proof of courier waybills will be included in Appendix E.2 of the finalised BA Report, which will be submitted to the DEA for decision-making.

Organs of State will also be notified via email (where email addresses are available) of the submission of the finalised BA Report to the DEA, as well as via post and email (where postal, physical and email addresses are available) of the outcome of the decision-making process.

SECTION D: IMPACT ASSESSMENT

1. POTENTIAL 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

This section includes a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning phase, in line with the requirements of the 2014 NEMA EIA Regulations (as amended).

In terms of Regulation 19(3) of GN R326, a complete Impact Assessment is included in Appendix F of this BA Report. The following must be noted:

- In this section, the impact status (i.e. neutral, negative or positive) is provided in brackets adjacent to the significance ratings.
- The impact significance ratings provided in this section (i.e. Section D (1)) are provided without the implementation of the recommended mitigation measures.
- Layout, technology and other alternatives for this proposed BA project are not applicable. Site alternatives for the proposed on-site substation (including O&M Building and laydown area) are not applicable as the proposed project location is dependent on the location of the proposed WEF. Location alternatives of the proposed distribution line are also dependent on and determined by the location of the proposed WEF, the proposed collector hub (i.e. Moyeng Suurplaat on-site substation) and the proposed Eskom Nuwerust Substation. Nevertheless, two location or routing alternatives for the third party substation and distribution line routings thereto have been assessed in this BA Report. The impact assessments provided in this section (i.e. Section D (1)) for Alternative 1 of the third party substation and the associated distribution line routing are the same as that of Alternative 2, unless clearly specified (i.e. potential visual impacts are differentiated between Alternative 1 and Alternative 2). The no-go alternative has also been described.

1.1. APPROACH TO THE BA: METHODOLOGY OF THE IMPACT ASSESSMENT

The identification of potential impacts includes impacts that may occur during the construction, operational and decommissioning phases of the proposed development. The assessment of impacts includes direct, indirect as well as cumulative impacts. In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed projects is well understood so that the impacts associated with the projects can be assessed. The process of identification and assessment of impacts includes:

- Determining the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determining future changes to the environment that will occur if the activity does not proceed;
- Develop an understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

The impact assessment methodology has been aligned with the requirements for BA Reports as stipulated in Appendix 1 (3) (1) (j) of the 2014 NEMA EIA Regulations (as amended), which states the following:

"A BA Report must contain the information that is necessary for the Competent Authority to consider and come to a decision on the application, and must include an assessment of each identified potentially significant impact and risk, including –

- (i) cumulative impacts;
- (ii) the nature, significance and consequences of the impact and risk;
- (iii) the extent and duration of the impact and risk;
- (iv) the probability of the impact and risk occurring;
- (v) the degree to which the impact and risk can be reversed;
- (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and
- (vii) the degree to which the impact and risk can be mitigated".

As per the DEAT Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the prediction and assessment of impacts and risks. Potential impacts and risks have been rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts. The cumulative impacts have been assessed by identifying other renewable energy project proposals and other applicable (and relevant) projects, such as construction and upgrade of electricity generation, and transmission or distribution infrastructure in the local area (i.e. within 50 km of the proposed Rietrug WEF Electrical Grid Infrastructure project) that have been approved (i.e. positive EA has been issued) or an EA Process is currently underway. The proposed and existing electrical and renewable energy developments that have been considered as part of the BA Phase are provided in Table 15 below, and illustrated in Figure 34. Cumulative effects associated with these similar types of projects include inter alia: traffic generation; avifaunal collisions and mortalities; habitat destruction and fragmentation; loss of agricultural land; removal of vegetation; increase in stormwater run-off and erosion; increase in water requirements; job creation; social upliftment; and upgrade of infrastructure and contribution of renewable energy into the National Grid.

Table 15: Projects considered as part of the cumulative impact assessment that occur within 50 km of the site

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
Proposed REF at the Sutherland Site, Western and Northern Cape	Mainstream	DEA Reference Number: 12/12/20/1782 DEA Reference Number: 12/12/20/1782/AM1	Mainstream intended to develop the Sutherland REF, consisting of a Solar Energy Facility and a WEF, with a collective generation capacity (i.e. for wind and solar) of 747 MW to 1137 MW, with 325 turbines on site.	Mainstream accordingly received EA on 22 February 2012 (DEA Reference Number: 12/12/20/1782) from the National DEA to construct and operate the proposed Sutherland REF. Following this, a non-substantive Amended EA, dated 6 October 2015 (DEA Reference Number: 12/12/20/1782/AM1), was issued to Mainstream. Refer to the following rows of this table for the status of this project, as this project has since been replaced.
Proposed 140 MW Sutherland WEF near Sutherland, Northern and Western Cape	Mainstream	DEA Reference Number: 12/12/20/1782/2 DEA Reference Number: 12/12/20/1782/2/AM1	Mainstream intends to develop a 140 MW WEF on several farm portions in the Northern and Western Cape Provinces.	As noted in Section A of this BA Report, on 10 November 2016, the National DEA granted three separate EAs for the Sutherland WEF, Sutherland 2 WEF, and Rietrug WEF (DEA Reference Numbers: 12/12/20/1782/2; 12/12/20/1782/3; and 12/12/20/1782/1). These EAs replace the original EA (dated 22 February 2012) and the amended EA (dated 6 October 2015). The CSIR was appointed by Mainstream to apply for the amendment to split the Sutherland REF into three separate WEFs. As part of the approved WEFs, the EAs (dated 10 November 2016) authorised the construction of wind turbines with a hub height of up to 120 m and rotor diameter of up to 120 m. A second amendment application was submitted to the National DEA in February 2017 to increase the hub height and rotor diameter of the turbines from 120 m to up to 150 m. In addition, the authorised layout will change to accommodate the larger turbines. The CSIR was appointed by Mainstream to apply for the amendment to change the turbine and hub specifications and layout.
Proposed 140 MW Sutherland 2 WEF near Sutherland, Northern Cape	Mainstream	DEA Reference Number: 12/12/20/1782/3 DEA Reference Number: 12/12/20/1782/3/AM1	Mainstream intends to develop a 140 MW WEF on several farm portions in the Northern Cape Province.	
Proposed 140 MW Rietrug WEF near Sutherland, Northern Cape	Mainstream	DEA Reference Number: 12/12/20/1782/1 DEA Reference Number: 12/12/20/1782/1/AM1	Mainstream intends to develop a 140 MW WEF on several farm portions in the Northern Cape Province.	
BA for the Proposed Construction of Electrical Grid Infrastructure to support the Sutherland WEF, Northern and Western Cape Provinces (Sutherland WEF – Electrical Grid Infrastructure)	Mainstream	Pending. It will be received once the Application for EA has been processed by the National DEA.	Mainstream intends to develop a 132 KV distribution line and associated Electrical Grid Infrastructure to support the proposed Sutherland WEF. The proposed distribution line will extend from the Sutherland WEF on-site substation to Alternative 1 of the third party substation	As noted in Section C of this BA Report, a joint PPP is being undertaken for the Sutherland, Sutherland 2, and Rietrug WEFs – Electrical Grid Infrastructure BA projects. The BID was released for a 30-day comment period extending from 9 December 2016 to 1 February 2017. The BA Reports have been complied and are currently being released for a 30-

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
			(i.e. collector hub) in the Northern Cape or Alternative 2 of the third party substation (i.e. Eskom Nuwerust Substation) in the Western Cape.	day comment period.
BA for the Proposed Construction of Electrical Grid Infrastructure to support the Sutherland 2 WEF, Northern and Western Cape Provinces (Sutherland 2 WEF – Electrical Grid Infrastructure)	Mainstream	Pending. It will be received once the Application for EA has been processed by the National DEA.	Mainstream intends to develop a 132 KV distribution line and associated Electrical Grid Infrastructure to support the proposed Sutherland 2 WEF. The proposed distribution line will extend from the Sutherland 2 WEF on-site substation to Alternative 1 of the third party substation (i.e. collector hub) in the Northern Cape or Alternative 2 of the third party substation (i.e. Eskom Nuwerust Substation) in the Western Cape.	
Proposed Suurplaat WEF and Associated Infrastructure on a site near Sutherland, Western Cape and Northern Cape Provinces	Moyeng Energy (PTY) Ltd	DEA Reference Number: 12/12/20/1583 DEA Reference Number: 12/12/20/1583/AM1 DEA Reference Number: 12/12/20/1583/AM2 DEA Reference Number: 12/12/20/1583/AM3	Moyeng Energy (PTY) Ltd intends to develop a WEF on several farm portions in the Northern and Western Cape Provinces.	Moyeng Energy (PTY) Ltd received EA for the Suurplaat WEF on 5 April 2011 (DEA Reference Number: 12/12/20/1583). The EIA included a separate assessment of the three phases of the WEF, transmission lines and substations (Savannah Environmental, 2016), however a single EIA Process was followed and a single EA was received. An Amended EA was issued by the National DEA on 26 March 2014 (DEA Reference Number: 12/12/20/1583/AM1) and 1 February 2016 (DEA Reference Number: 12/12/20/1583/AM2), for a change to applicant details and extension of the validity period. It is understood that Moyeng Energy (PTY) Ltd is currently undertaking an Application for EA Amendment to split the approved Moyeng Energy (PTY) Ltd Suurplaat WEF EIA project into four separate EAs (DEA Reference Number: 12/12/20/1583/AM3): ▪ Proposed Suurplaat WEF and Associated Infrastructure: Suurplaat Phase ▪ Proposed Suurplaat WEF and Associated Infrastructure: Gemini Phase ▪ Proposed Suurplaat WEF and Associated Infrastructure: Klipfontein Phase ▪ Proposed Suurplaat WEF and Associated Infrastructure: Grid Connection Phase
Proposed construction of the	G7 Renewable Energies	DEA Reference Number:	G7 Renewable Energies (PTY) Ltd intends	The project received an EA (DEA Reference Number:

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
750 MW Roggeveld Wind Farm within the Karoo Hoogland Local Municipality of the Northern Cape Province and within the Laingsburg Local Municipality of the Western Cape Province	(PTY) Ltd and Roggeveld Wind Power (PTY) Ltd	12/12/20/1988 DEA Reference Number: 12/12/20/1988/1	to develop a 750 MW WEF on several farm portions in the Northern and Western Cape Provinces.	12/12/20/1988) on 21 May 2013 for the 750 MW Wind Farm. However, the project is being split into three phases. Phase 1 included a separate EIA Process, which obtained EA (DEA Reference Number: 12/12/20/1988/1) on 12 August 2014 to establish a 140MW WEF and associated infrastructure within the Northern Cape and Western Cape. The Roggeveld Wind Farm was awarded Preferred Bidder status in May 2015 in terms of the REIPPPP.
Proposed PV Solar Energy Facility on a site south of Sutherland, within the Karoo Hoogland Local Municipality of the Namakwa District Municipality, Northern Cape Province	Inca Sutherland Solar (PTY) Ltd	DEA Reference Number: 12/12/20/2235	Inca Sutherland Solar (PTY) Ltd is proposing to develop a 10 MW Solar Energy Facility on the farm Jakhals Valley (99), approximately 11 km south of Sutherland, in the Karoo Hoogland Local Municipality, Northern Cape Province.	The project received an EA on 8 February 2012.
Proposed Hidden Valley WEF Northern Cape	Hidden Valley Wind - African Clean Energy Developments (PTY) Ltd (ACED Renewables Hidden Valley)	DEA Reference Number: 12/12/20/2370/1	ACED Renewables Hidden Valley is proposing to develop a 150 MW WEF in the Northern Cape Province.	The project received an EA on 13 May 2013.
Proposed Hidden Valley WEF Northern Cape	Hidden Valley Wind - African Clean Energy Developments (PTY) Ltd (ACED Renewables Hidden Valley)	DEA Reference Number: 12/12/20/2370/2	ACED Renewables Hidden Valley is proposing to develop a 150 MW WEF in the Northern Cape Province.	The project received an EA on 12 August 2014.
Proposed Hidden Valley WEF Northern Cape	Hidden Valley Wind - African Clean Energy Developments (PTY) Ltd (ACED Renewables Hidden Valley)	DEA Reference Number: 12/12/20/2370/3	ACED Renewables Hidden Valley is proposing to develop a 150 MW WEF in the Northern Cape Province.	The project received an EA on 12 August 2014.
Proposed Renewable Gunsfontein Energy Facility WEF, Northern Cape	Networx Renewables (PTY) Ltd	DEA Reference Number: 14/12/16/3/3/2/399	Networx Renewables (PTY) Ltd is proposing to develop a 280 MW WEF in the Northern Cape.	The Final Scoping Report was submitted to the DEA in November 2013.
Proposed Renewable Gunsfontein Energy Facility, Solar Energy Facility, Northern Cape	Networx Renewables (PTY) Ltd	DEA Reference Number: 14/12/16/3/3/2/395	Networx Renewables (PTY) Ltd is proposing to develop a 150 MW Solar Energy Facility in the Northern Cape.	The Final Scoping Report was submitted to the DEA in November 2013.
Proposed Renewable Gunsfontein Energy Facility, 132 kV Power Lines, Northern Cape	Networx Renewables (PTY) Ltd	DEA Reference Number: 14/12/16/3/3/1/910	Networx Renewables (PTY) Ltd is proposing to develop 132 kV power lines to support the proposed Renewable Gunsfontein Energy Facility in the Northern Cape.	The Final Scoping Report was submitted to the DEA in November 2013.

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
Proposed Renewable Gunsfontein Energy Facility, 400 kV Substation, Northern Cape	Networx Renewables (PTY) Ltd	DEA Reference Number: 14/12/16/3/3/2/554	Networx Renewables (PTY) Ltd is proposing to develop a 400 kV substation to support the proposed Renewable Gunsfontein Energy Facility in the Northern Cape.	The Final Scoping Report was submitted to the DEA in November 2013.
Proposed Gunstfontein Wind Farm near Sutherland, Northern Cape Province	Gunstfontein Wind Farm (PTY) Ltd	DEA Reference Number: 14/12/16/3/3/2/826	Gunstfontein Wind Farm (PTY) Ltd is proposing to construct the Gunstfontein WEF and bid it in the subsequent round of the REIPPPP.	The Draft EIA Report was made available for public review in February 2016.
Proposed Gunstfontein Switching Station, 132kV overhead power line and ancillary infrastructure for the proposed Gunstfontein Wind Farm near Sutherland, Northern Cape Province	Gunstfontein Wind Farm (PTY) Ltd	Unknown	Gunstfontein Wind Farm (PTY) Ltd is proposing to bid the proposed Gunstfontein WEF in the subsequent round of the REIPPPP. In order to connect the proposed Gunstfontein WEF to the national grid, supporting electrical infrastructure will be required, such as a switching station, 132 kV power line, and ancillary infrastructure.	The BA Report was made available for public review from 21 July 2016 to 22 August 2016.
Proposed Esizayo Wind Energy Facility near Laingsburg, Western Cape	BioTherm Energy (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/967	BioTherm Energy (PTY) Ltd is proposing to construct a 250 MW WEF approximately 30 km Northeast of Laingsburg in the Western Cape.	The Draft EIA Report was released to the public for comment in February 2017.
Proposed Maralla East Wind Energy Facility near Sutherland, Northern and Western Cape	BioTherm Energy (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/962	BioTherm Energy (PTY) Ltd is proposing to construct a 250 MW WEF approximately 34km South of Sutherland in the Northern and Western Cape	The Draft EIA Report was released to the public for comment in February 2017.
Proposed Maralla West Wind Energy Facility near Sutherland, Northern Cape	BioTherm Energy (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/963	BioTherm Energy (PTY) Ltd is proposing to construct a 250 MW WEF approximately 34km South of Sutherland in the Northern and Western Cape	The Draft EIA Report was released to the public for comment in February 2017.
Proposed Komsberg West Grid Connection (Power Line and Switching Station), Western and Northern Cape Provinces, and the associated Komsberg West WEF	Komsberg Wind Farms (PTY) Ltd	DEA Reference Number: 14/12/16/3/3/1/1562	Komsberg Wind Farms (Pty) Ltd is proposing the establishment of an overhead power line which will form the grid connection for the proposed Komsberg West WEF in the Western and Northern Cape Provinces.	The proposed project received EA in September 2016.
Proposed Komsberg East Grid Connection (Power Line and Switching Station), Western and Northern Cape Provinces, and the associated Komsberg East WEF	Komsberg Wind Farms (PTY) Ltd	DEA Reference Number: 14/12/16/3/3/1/1561	Komsberg Wind Farms (Pty) Ltd is proposing the establishment of an overhead power line which will form the grid connection for the proposed Komsberg East WEF in the Western and Northern Cape Provinces.	The proposed project received EA in September 2016.

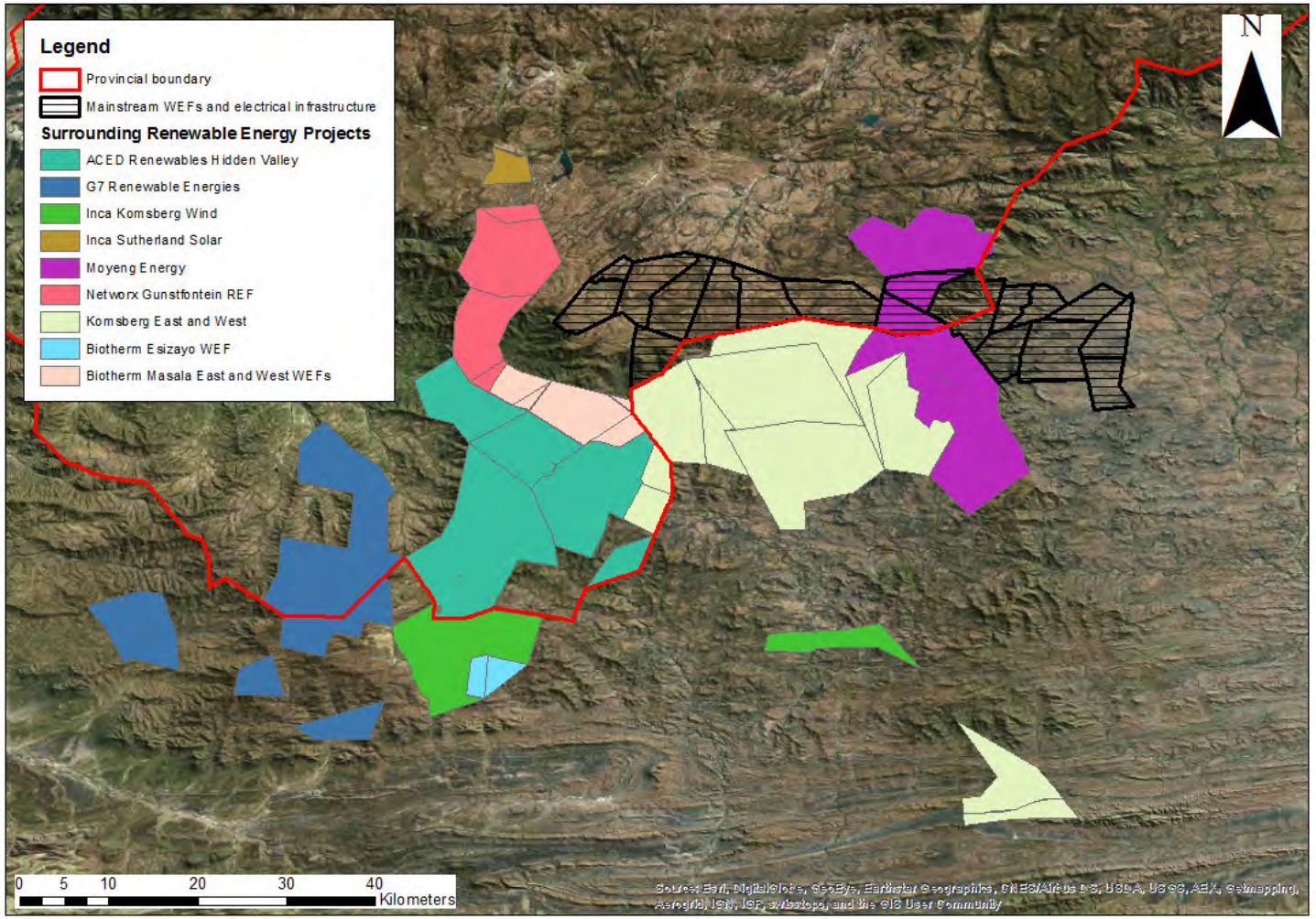


Figure 34: Map of proposed Renewable Energy and Electrical Infrastructure projects considered for the Cumulative Impact Assessment

In addition to the above, the impact assessment methodology includes the following aspects:

Nature of impact/risk - The type of effect that a proposed activity will have on the environment.

Status - Whether the impact/risk on the overall environment will be:
- Positive - environment overall will benefit from the impact/risk;
- Negative - environment overall will be adversely affected by the impact/risk; or
- Neutral - environment overall not be affected.

Spatial extent – The size of the area that will be affected by the impact/risk:
- Site specific;
- Local (<10 km from site);
- Regional (<100 km of site);
- National; or
- International (e.g. Greenhouse Gas emissions or migrant birds).

Duration – The timeframe during which the impact/risk will be experienced:
- Very short term (instantaneous);
- Short term (less than 1 year);
- Medium term (1 to 10 years);
- Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or
- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).

Consequence – The anticipated consequence of the risk/impact:
- Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
- Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
- Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
- Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
- Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).

Reversibility of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):
- High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);
- Moderate reversibility of impacts;
- Low reversibility of impacts; or
- Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).

Irreplaceability of Receiving Environment/Resource Loss caused by impacts/risks – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):
- High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment);
- Moderate irreplaceability of resources;
- Low irreplaceability of resources; or
- Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).

Using the criteria above, the impacts are further assessed in terms of the following:

Probability – The probability of the impact/risk occurring:
- Extremely unlikely (little to no chance of occurring);
- Very unlikely (<30% chance of occurring);
- Unlikely (30-50% chance of occurring)
- Likely (51 – 90% chance of occurring); or
- Very Likely (>90% chance of occurring regardless of prevention measures).

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure 35). This approach incorporates internationally recognised methods from the Intergovernmental Panel on Climate Change (IPCC) (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the municipal capacity, a sensitive wetland), qualitatively (very low, low, moderate, high, and very high) against a predefined set of criteria (i.e. probability and consequence) as indicated in Figure 35:

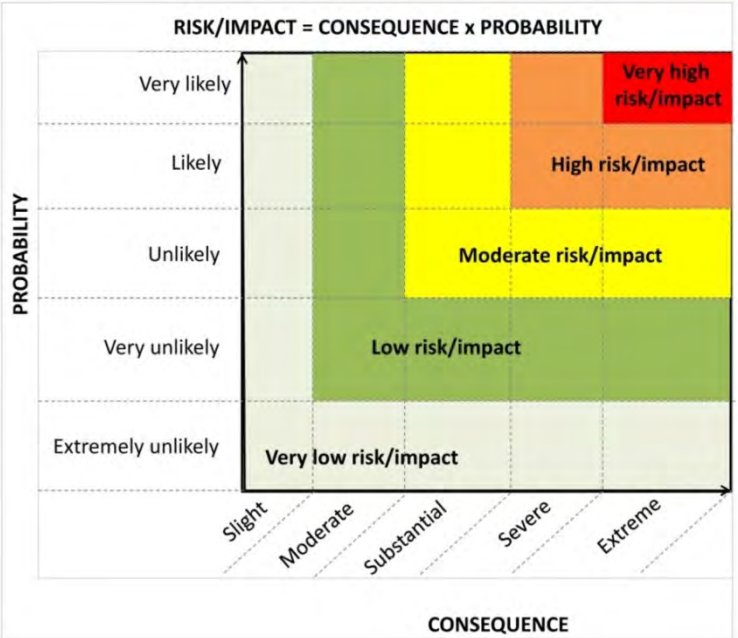


Figure 35: Guide to assessing risk/impact significance as a result of consequence and probability.

Significance – Will the impact cause a notable alteration of the environment?
- Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
- Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
- Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);
- High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and

- Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

With the implementation of mitigation measures, the residual impacts/risks will be ranked as follows in terms of significance (based on Figure 35):

- Very low = 5;
- Low = 4;
- Moderate = 3;
- High = 2; and
- Very high = 1.

Confidence – The degree of confidence in predictions based on available information and specialist knowledge:
- Low;
- Medium; or
- High.

Impacts have been collated into the EMPr (Appendix G of the BA Report) and these include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements (as applicable). This includes a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this is stated.
- Positive impacts and augmentation measures have been identified to potentially enhance positive impacts where possible.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts are evaluated for the construction and operational phases of the development. The assessment of impacts for the decommissioning phase is brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- Impacts have been evaluated with and without mitigation in order to determine the effectiveness of mitigation measures on reducing the significance of a particular impact;
- The impact evaluation has, where possible, taken into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area (as described above and in Table 15); and
- The impact assessment attempts to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are used as a measure of the level of impact.

Planning and Design Phase:

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
Alternative 1 (Preferred Alternative) – Refer to Section A (8) of this BA Report and the explanation above regarding applicable alternatives. ***Note that the following two alternatives have been assessed as part of the BA Process by the specialists and EAP:*** - ***Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape; and*** - ***Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape.*** ***Therefore, in this section, the impacts described are applicable to both Alternatives 1 and 2 (i.e. all the impacts noted in the Alternative 1 section apply to Alternative 2). The impacts are the same for both Alternative 1 and 2, except for the Visual Impacts, as these have been differentiated between Alternatives 1 and 2, as noted above. As a result, the impacts, significance and mitigation measures for both Alternative 1 and 2 have been displayed once under this section, with the exception of the potential Visual Impacts, to avoid repetition and for ease of reference and review.***			
Planning and design of the proposed project activities.	***Direct impacts:*** • Impact on existing infrastructure (roads, nearby farm structures and fences, stormwater pipelines, sewers, and electrical infrastructure and cables etc.).	• Moderate (Negative)	• Review building and site plans of the surrounding site in order to ensure the location of existing underground structures (such as electricity cables, stormwater pipelines etc.) are determined to make provision for safe excavation. • Potential access routes to the project site must be selected during the planning phase in order to prevent traffic impacts. • Ensure that discussions are held with the relevant surrounding landowners during the design phase in order to determine requirements for potential use of private roads in order to transport construction material, personnel and equipment. • Relevant stakeholders (such as the owners and occupiers of the nearby and adjacent farms) must be contacted in order to inform them of the proposed project. This will also ensure that current operations associated with the farms are not hindered in any way. • Consultation should be undertaken with the relevant municipal departments during the detailed engineering phase to discuss the impact of the proposed project on existing infrastructure. Mainstream should ensure that all relevant approvals

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			have been obtained from the municipality (with regards to Building Plans etc.) prior to construction. • The design of the proposed electrical infrastructure should incorporate Stormwater Management and also ensure the free flow of runoff and prevent ponding of water once construction is complete.
	Indirect impacts:		
	No indirect impacts have been identified for the planning and design phase.		
	Cumulative impacts:		
	No cumulative impacts have been identified for the planning and design phase.		
NO-GO OPTION			
Planning and design of the proposed project activities.	***Direct Impacts:***		
	If this proposed project does not proceed: • None of the impacts mentioned above will occur. • Only the current agricultural (grazing) land use will remain. • The landowners of the affected farm portions will not be able to derive benefits from the implementation of an additional land-use. • No additional power will be generated or supplied through means of renewable energy resources by this project at this location. Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified. • There will be no contributions and assistance to the government in achieving its proposed renewable energy target of 17 800 MW by 2030. • Local communities will continue their dependence on agriculture production and government subsidies.	Not applicable.	Not applicable.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	• There will be lost opportunity for skills transfer and education/training of local communities. • The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised, which may lead to negative local socio-economic implications. • The local economic benefits associated with the REIPPPP will not be realised.		
	Indirect Impacts:		
	No indirect impacts have been identified for the planning and design phase for the No-go Option.		
	Cumulative Impacts:		
	No cumulative impacts have been identified for the planning and design phase for the No-go Option.		

Construction Phase:

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
Alternative 1 (Preferred Alternative) – Refer to Section A (8) of this BA Report and the explanation above regarding applicable alternatives. ***Note that the following two alternatives have been assessed as part of the BA Process by the specialists and EAP:*** - ***Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape; and*** - ***Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape.*** ***Therefore, in this section, the impacts described are applicable to both Alternatives 1 and 2 (i.e. all the impacts noted in the Alternative 1 section apply to Alternative 2). The impacts are the same for both Alternative 1 and 2, except for the Visual Impacts, as these have been differentiated between Alternatives 1 and 2, as noted above. As a result, the impacts, significance and mitigation measures for both Alternative 1 and 2 have been displayed once under this section, with the exception of the potential Visual Impacts, to avoid repetition and for ease of reference and review.***			
▪ Removal of indigenous vegetation for the proposed infrastructure (including on-site substation, laydown area, O&M Building, service road, pylons, stringing of the power line, as well as earthworks); ▪ Site clearance; ▪ Site clearing and the removal of vegetation associated with the freshwater habitats; ▪ Site clearing and the disturbance of soils leading to alien and invasive floral species proliferation; ▪ Levelling; ▪ Excavations and earthworks; ▪ Site establishment; ▪ Establishment of a	***Direct Impacts:*** ***TERRESTRIAL ECOLOGY IMPACT ASSESSMENT*** • Change in ecological processes and habitat form and alteration of biophysical factors at a localised level as a result of the removal of indigenous vegetation, site clearance and levelling for the establishment of the proposed laydown area, on-site substation, O&M Building, service road, pylons, and stringing of the power line, as well as earthworks.	• Moderate (Negative)	• Conduct a site survey and habitat identification and relocation prior to construction. • Ensure that demarcation of the construction area is undertaken prior to the commencement of construction and that it is maintained throughout (i.e. containment of construction and laydown areas). Fencing of the site is an option for containment. In this regard, conduct a survey of the work space around the proposed on-site substation site and laydown area (i.e. in order to ensure delimiting through demarcation of the construction area). • Ensure that access roads are adequately routed and identified prior to the construction phase, and ensure that they are clearly demarcated for use throughout the construction phase. • Access roads should be surveyed prior to the construction of the proposed power line towers and follow routes that avoid unnecessary large scale clearance of vegetation and avoid "sensitive habitats". • Undertake a site review and fauna and plant search and rescue prior to the commencement of the construction phase, and possible removal/relocation

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
laydown area for equipment and construction materials; ▪ Stockpiling of topsoil and cleared vegetation; ▪ Transportation of material and equipment to site; ▪ Construction of the distribution line (including tower construction, power line stringing), and additional infrastructure; ▪ Increased noise, dust and changes in prevailing biophysical factors within the study area as a result of increased human presence; ▪ Increased light pollution from the proposed site camp and related areas of the site; ▪ Importing of materials not associated with the surrounding environment; ▪ Solid and liquid waste generation; ▪ Compaction of soils due to construction activities; ▪ Movement of construction vehicles as well as service road construction within the			of flora and fauna of value within the affected site (i.e. such specimens may be relocated/removed or avoided (with the relevant permits and approvals in place)). • Carry out a survey of all the proposed power line tower points at the final survey stage prior to the construction phase, taking measures to avoid more sensitive terrain, while meeting stringing distance between towers, together with a plant and fauna rescue programme. • Ensure that lithic environments are incorporated or avoided during the construction phase. • Compile and implement a Vegetation Rehabilitation Plan for the construction phase. • Stringing of towers may be performed using aerial methods (e.g. helicopter) if and where possible, to avoid undue disturbance to habitat.
	• Localised extinction or ousting of species with concomitant change in ecosystem function and loss, disturbance or alteration of botanical communities at a localised level, particularly geophytes and uncommon to rare species as a result of site clearance, as well as destruction of localised vegetation communities.	• Moderate (Negative)	• Ensure that lithic environments are incorporated or avoided during the construction phase. • Undertake plant search and rescue operations within the affected site, where such specimens may be relocated/removed or avoided (with the relevant permits and approvals in place).
	• Alteration of lithic structures and clearance of rock and minor features (resulting in change in ecological processes and habitat form) due to the construction of the proposed infrastructure; and site levelling (including areas that are eco-geomorphologically important) for the proposed construction of towers and the on-site substation. The service road will also traverse level to steeper ground and require some level of	• High (Negative)	• Avoidance of lithic environments during the construction phase.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
freshwater resource zones; ▪ Topsoil stockpiling adjacent to the freshwater resources and runoff from stockpiles leading to sedimentation of the system; ▪ Dumping of waste and construction material within freshwater resources; ▪ Loss of phosphate, nitrate and toxicant removal abilities due to vegetation clearing; ▪ Streamflow diversion and draining water from the freshwater resources resulting in the alteration of hydrological zones; and ▪ Potential risk of contaminated runoff from the access roads associated with the proposed development, leading to pollution of surface water.	clearance of vegetation and disturbance along the powerline route.		
	• Loss of refugia particularly in respect of fauna associated with lithic habitats (e.g. *Homopus spp*). Rock ledges and other geological structures are intrinsic habitat for species such as padlopers (tortoises), and removal of these features (as a result of site clearance and levelling) will result in the loss of this habitat (i.e. localised ousting of species and change in ecosystem function).	• Moderate (Negative)	• None
	• Local extinction of species leading to ecosystem change due to direct faunal mortalities as a result of construction activities such as traffic movement and general disturbance on site.	• Moderate (Negative)	• Ensure proper management of traffic movement and construction labour conduct is implemented.
	• Change in habitat form and structure as a result of alteration of surface hydrology due to hardpanning of the upper soil horizon (i.e. soil compaction) due to traffic movement within and around the construction area, as well as use of materials to establish a sound working platform (including site levelling and site earthworks).	• Low (Negative)	• Implement ripping of disturbed areas and create a managed environment.
	• Change in habitat form and structure as a result of general activities and disturbance on site, and import of earth materials during the construction phase, giving rise to prevalence of exotic vegetation. Indigenous vegetation may also serve to alter habitat form and structure.	• Low (Negative)	• Undertake exotic weed control, vegetation control and broader vegetation management of source materials and the construction site through monitoring during the construction phase.
	• Change in habitat structure due to general erosion primarily as a result of	• Low (Negative)	• Ensure site management and timeous redress of evident wind and water erosion.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	the movement of construction traffic, earth and plant operations, which causes compaction and surface disturbance. Erosion may occur particularly on steeper slopes where the trampling and compaction of vegetation occurs.		
	• Impact of solid waste generation on fauna with possible mortalities as a result of potential ingestion or ensnarement. Solid waste (e.g. small bolts, wires etc.) has the potential to harm or kill animals through ingestion or ensnarement.	• Low (Negative)	• Waste management on site by adopting a cradle to grave approach.
	• Changes in ecological processes and vegetation and habitat alteration through the introduction of nutrients and other materials which may impact directly or indirectly on flora and faunal components of region.	• Moderate (Negative)	• Compile and implement a Vegetation Rehabilitation Plan for the construction phase. • Containment and demarcation of the construction area, labour workforce and related activities. Construction activities should be confined to the laydown area and construction footprints. • Implementation of control measures relating to the conduct of construction staff and contractors on site and in relation to the prevailing natural environment. Construction staff should be managed and maintained within construction areas, and educated on waste management and conduct on site. • Control of all imported materials including concrete and hazardous materials to ensure that materials are managed on site and within the construction footprint. • Control of all waste materials to ensure that all materials are removed from site, including sewage, for disposal at an appropriate point (i.e. a licenced facility). • Ensure a well-managed and timeous construction schedule to avoid prolonged period of construction and disturbance. • Use of appropriate lumen within all lighting and

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			appropriate establishment of lighting will prevent undue Electrical Light Pollution (ELP).
	• Ousting and behavioural change in fauna through effects such as altering corridors associated with movement, herbivory and predation. Certain species will benefit from the various changes in land use, while others will be ousted from areas.	• Moderate (Negative)	• Compile and implement a Vegetation Rehabilitation Plan to improve habitat diversity during the construction phase. • Containment and demarcation of the construction area, labour workforce and related activities. Construction activities should be confined to the laydown area and construction footprints. • Implementation of control measures relating to the conduct of construction staff and contractors on site and in relation to the prevailing natural environment. Construction staff should be managed and maintained within construction areas, and educated on waste management and conduct on site. • Control of all imported materials including concrete and hazardous materials to ensure that materials are managed on site and within the construction footprint. • Control of all waste materials to ensure that all materials are removed from site, including sewage, for disposal at an appropriate point (i.e. a licenced facility). • Ensure a well-managed and timeous construction schedule to avoid prolonged period of construction and disturbance. • Use of appropriate lumen within all lighting and appropriate establishment of lighting will prevent undue ELP.
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	• Loss of freshwater habitat and ecological structure; changes to the freshwater resource ecological and sociocultural service provision; impacts on the freshwater resources hydrological function and sediment balance; and potential impacts on water quality.	• Low (Negative)	• Special mention is made of the need to ensure that careful planning of the placement of the monopoles takes place in order to minimise the risk of placing infrastructure unnecessarily within riparian zones. Wherever possible, it is highly recommended that the linear development (i.e. powerlines) spans the relevant watercourse, and every effort should be made to prevent/avoid placement of monopoles

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			within the riparian zone/habitat or applicable zones of regulation in terms of NEMA and/or GN509. If this is not avoidable, the monopoles should be placed as far from the active channel of the watercourse as possible. • If at all practicable, all monopoles should be developed above the applicable zone of regulation in terms of Regulation GN509 of the NWA. • Careful planning of the location of the substations. The applicable zone of regulation around the freshwater resources in terms of NEMA is 32m, and this must be adhered to, in order to assist in minimising impacts on the freshwater resources in close proximity to the proposed substations. Section 8 of the Aquatic Ecology (Freshwater) Ecology Impact Assessment in Appendix D of this BA Report, and Section A and Appendix D of this BA Report include maps showing the locality of the freshwater resources, and the applicable zone of regulation. • Where it is impossible to avoid placing infrastructure within riparian habitat, flow connectivity must be retained by preventing fragmentation of the riparian habitat. Fragmentation of the riparian habitat can be avoided by (for example) ensuring that the disturbance footprint remains as small as possible, that no solid strips are excavated within the riparian habitat, that structures (such as culverts or monopoles) placed within the active channel do not cause increased turbulence, which will result in erosion. It must also be ensured that no canalization or incision of the riparian resource takes place as a result of the construction activities. • Ensure that vegetation clearing and indiscriminate vehicle driving does not occur within demarcated sensitive areas, including the identified freshwater resources, their associated riparian zones and the applicable 32m NEMA zone of regulation. • Contractor laydown areas must not be permitted within the 32m NEMA zone of regulation around the

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			identified freshwater resources. • Minimize construction footprints and edge effects of construction activities. • Clearing of vegetation at all impact sites must be kept to an absolute minimum, and growth of indigenous vegetation must be promoted to protect soils. • Implement alien vegetation control program. • Construction activities should occur in the low flow season/ dry season to avoid sedimentation and minimize disturbance to hydraulic function. • Use construction techniques to support the hydrology and sediment control functions of the freshwater resource. A suitably qualified engineer should be consulted for guidance in this regard. • Limit excavations to ensure that drainage patterns return to normal after construction. • No disposal of waste within/in the vicinity of the freshwater resources. Correct waste management principles must be implemented on site and adequate waste disposal facilities must be provided. • Rehabilitate disturbed areas following completion of construction activities through reprofiling and revegetation. • Desilt the freshwater resource areas affected by construction activities, in the vicinity of construction activities. Desilting should preferably be undertaken by hand, and not using heavy machinery to avoid further impacts on the freshwater resources. • Strict erosion control and soil management measures must be implemented during the construction and operational phases, particularly in areas where vegetation has been removed. • Stockpiled soil must be levelled as required during construction and post-construction to avoid sedimentation from runoff, and revegetated with indigenous vegetation. • Compacted soil should be ripped, reprofiled and

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			reseeded with indigenous vegetation following completion of construction activities.
	VISUAL IMPACT ASSESSMENT		
	• Potential visual intrusion of activities associated with the construction of electrical infrastructure along Alternative 1 on existing views of sensitive visual receptors in the surrounding landscape.	• Moderate (Negative)	• Implement mitigation measures associated with construction activities to ensure that they are managed and performed in such a way as to minimise its impact on the receiving environment, as well as minimising visual impact during the construction phase. These best practice guidelines for construction can include: ▪ The contractor is required to maintain good housekeeping on site to avoid litter and minimise waste; ▪ The Project Developer is required to demarcate construction boundaries and minimise areas of surface disturbance; ▪ Vegetation and ground disturbance should be minimised, and existing clearings should be taken advantage of where possible; ▪ Construction of new access roads should be minimised and existing roads should be used where possible; ▪ Topsoil from the site should be stripped, stockpiled, and stabilised before excavating earth for the construction of the proposed distribution line; ▪ Vegetation material from vegetation removal will be mulched and spread over fresh soil disturbances to aid in the rehabilitation process; ▪ Plans should be in place to control and minimise erosion risks; ▪ Plans should be in place to minimise fire hazards and dust generation; and ▪ Plans should be in place to rehabilitate cleared areas as soon as possible. • Where possible construction camps and laydown areas should be located (where sensitive visual receptors are least likely to be affected):

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			▪ In low visibility areas (e.g. avoid ridgelines and open plains); ▪ Previously disturbed areas (e.g. clearings created by farmers for other purposes which are no longer being used); and/or ▪ Areas near derelict farmsteads (taking into consideration the findings of the Heritage Impact Assessment as well as other assessments that may be relevant), particularly where existing trees can be used to screen these areas from views. • Night time construction should be avoided where possible (however some construction work on electrical components may need to occur after dark). • Night lighting of the construction sites should be minimised within requirements of safety and efficiency.
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	• Destruction of archaeological remains as a result of the construction of the proposed powerlines, on-site substation and service road. Direct impacts to archaeological resources may also occur when construction vehicles move through the area and when foundation excavations are made.	• Low (Negative)	• Avoid and protect all sites if possible. • The farm road passing through the kraal complex (at waypoint 546) may not be widened towards the east and preferably should not be widened at all. • Those sections of the final alignment that have not been surveyed should be subjected to a pre-construction walk-down survey (by a suitably qualified archaeologist) to locate any sites that need to be avoided or mitigated. • Record significant sites within the project footprint that cannot be avoided. The one site noted as occurring in the proposed on-site substation development envelope does not merit mitigation but should be avoided if possible. No other sites requiring mitigation have been found within the project footprint to date.
	• Alteration of the cultural landscape as a result of the construction of the proposed powerlines, on-site substation and service road. The cultural	• Low (Negative)	• Avoid creating the service road up steep slopes (i.e. where the road would be visible from longer distances). This is mainly applicable to the scarp within the Alternative 2 distribution line and service

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	landscape will be impacted through the presence of incompatible structures (i.e. the proposed power line and pylons) and the construction vehicles in the rural landscape.		road alignment. • Follow the suggested service road detour around the east side of the scarp for the Alternative 2 routing.
	• Disturbance, damage or destruction of scientifically important fossils at or beneath the ground surface as a result of surface clearance (for access roads, substations and laydown areas etc.) and excavations (for the power line footings and O&M building).	• Very Low (Negative)	• Safeguarding of identified sites of high palaeontological sensitivity by a 30-m wide buffer zone (i.e. extensive surface scatter of petrified wood plus occasional bone fragments either side of a farm track, as indicated in Figure 48 of the Palaeontological Impact Assessment, which is included as an appendix to the Heritage Impact Assessment (Appendix D.4 of this BA Report)). • A pre-construction walk-down must be undertaken by a palaeontological specialist for any sectors of the 132 kV power line route finally chosen that were not covered during the BA Phase (as indicated by the yellow dashed rectangle in Figure 1 of the Palaeontological Impact Assessment, which is included as an appendix to the Heritage Impact Assessment (Appendix D.4 of this BA Report)). The resulting report will need to be submitted to and approved by the relevant heritage management authority. • Monitoring of all surface clearance and substantial (deeper than 1 m) excavations by the Environmental Control Officer (ECO) for fossil material. • Safeguarding of chance fossil finds (preferably *in situ*) during the construction phase by the ECO. • Reporting of chance fossil finds to Heritage Western Cape (for the Western Cape) or SAHRA (for the Northern Cape). • Recording and sampling of significant chance fossil finds by a qualified palaeontologist, together with pertinent contextual data (stratigraphy, sedimentology, taphonomy) (Phase 2 mitigation). • The palaeontologist concerned with potential mitigation work (Phase 2) would need a valid fossil

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			collection permit from the relevant heritage management authority, i.e. Heritage Western Cape (for the Western Cape) or SAHRA (for the Northern Cape). • Curation of fossil material within an approved repository (museum/university fossil collection) and submission of a Phase 2 palaeontological heritage report to (for the Western Cape) or SAHRA (for the Northern Cape) by a qualified palaeontologist. • All palaeontological fieldwork and reporting should meet the minimum standards outlined by Heritage Western Cape (2016) and SAHRA (2013).
	AVIFAUNA IMPACT ASSESSMENT		
	• Displacement of Red Data avifauna due to permanent habitat transformation associated with the construction activities.	• Low (Negative)	• A site-specific Construction EMPr must be implemented, which gives an appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction and degradation of habitat. All contractors are to adhere to the Construction EMPr and should apply good environmental practice during construction. The Construction EMPr should specifically include the following: ▪ The minimum footprint areas for infrastructure should be used wherever possible, including road widths and lengths; ▪ Ensure that no off-road driving is allowed; ▪ Ensure maximum use of existing roads; ▪ Measures to control dust; ▪ Ensure that access to the rest of the property is restricted; and ▪ Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks) must be undertaken and to this end a habitat restoration plan is to be developed by a rehabilitation specialist and implemented accordingly.
	• Displacement of Red Data avifauna due to disturbance associated with the	• Moderate (Negative)	• A site-specific Construction EMPr must be implemented, which gives an appropriate and

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	construction activities.		detailed description of how construction activities must be conducted. All contractors are to adhere to the Construction EMPr and should apply good environmental practice during construction. The Construction EMPr must specifically include the following: ▪ Ensure that no off-road driving is allowed; ▪ Ensure maximum use of existing roads; ▪ Measures to control noise; ▪ Ensure that access to the rest of the property is restricted; ▪ Ensure that the footprint is restricted to the absolute minimum; ▪ The appointed ECO must be trained by an avifaunal specialist to identify the potential priority species as well as the signs that indicate possible breeding by these species. The ECO must then, during audits/site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed; and ▪ Prior to construction, an avifaunal specialist should conduct a site walk through, covering the final service road and power line routes, to identify any nests/breeding/roosting activity of priority species, as well as any additional sensitive habitats. The results of which may inform the final construction

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.
	Indirect Impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	• Local extinction of species leading to ecosystem change due to direct faunal mortalities as a result of construction activities such as traffic movement and general disturbance on site.	• Moderate (Negative)	• Ensure proper management of traffic movement and construction labour conduct is implemented.
	• Changes in ecological processes and vegetation and habitat alteration through the introduction of nutrients and other materials which may impact directly or indirectly on flora and faunal components of region.	• Moderate (Negative)	• Compile and implement a Vegetation Rehabilitation Plan for the construction phase. • Containment and demarcation of the construction area, labour workforce and related activities. Construction activities should be confined to the laydown area and construction footprints. • Implementation of control measures relating to the conduct of construction staff and contractors on site and in relation to the prevailing natural environment. Construction staff should be managed and maintained within construction areas, and educated on waste management and conduct on site. • Control of all imported materials including concrete and hazardous materials to ensure that materials are managed on site and within the construction footprint. • Control of all waste materials to ensure that all materials are removed from site, including sewage, for disposal at an appropriate point (i.e. a licenced facility). • Ensure a well-managed and timeous construction schedule to avoid prolonged period of construction and disturbance. • Use of appropriate lumen within all lighting and appropriate establishment of lighting will prevent undue ELP.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	• Ousting and behavioural change in fauna through effects such as altering corridors associated with movement, herbivory and predation. Certain species will benefit from the various changes in land use, while others will be ousted from areas.	• Moderate (Negative)	• Compile and implement a Vegetation Rehabilitation Plan to improve habitat diversity during the construction phase. • Containment and demarcation of the construction area, labour workforce and related activities. Construction activities should be confined to the laydown area and construction footprints. • Implementation of control measures relating to the conduct of construction staff and contractors on site and in relation to the prevailing natural environment. Construction staff should be managed and maintained within construction areas, and educated on waste management and conduct on site. • Control of all imported materials including concrete and hazardous materials to ensure that materials are managed on site and within the construction footprint. • Control of all waste materials to ensure that all materials are removed from site, including sewage, for disposal at an appropriate point (i.e. a licenced facility). • Ensure a well-managed and timeous construction schedule to avoid prolonged period of construction and disturbance. • Use of appropriate lumen within all lighting and appropriate establishment of lighting will prevent undue ELP.
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	• Not applicable. As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the overall low direct impact significance of the proposed electrical infrastructure during the construction, operational and decommissioning phases when mitigation measures are applied, potential indirect impacts which the proposed electrical infrastructure might have on the receiving freshwater resources were therefore considered to be negligible, and were therefore not assessed in the specialist report since they are considered to be inconsequential.		
	VISUAL IMPACT ASSESSMENT		
	• Not applicable. Indirect impacts were not identified in the Visual Impact Assessment (Appendix D.3 of this BA Report).		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	• Not applicable. As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), because of the very low probability of indirect impacts occurring, the significance of all such impacts will be very low, and certainly lower than the significance of the		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	potential direct impacts listed above. Therefore, it was not deemed necessary by the specialist to specifically assess potential indirect impacts. Furthermore, indirect impacts were not identified in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	• Not applicable. Indirect impacts were not identified in the Avifauna Impact Assessment (Appendix D.5 of this BA Report).		
	Cumulative Impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	• Increased ELP levels as a result of light pollution that may be associated with all built structures of the proposed project and the projects considered within the 50 km radius, including the wind turbines of the various proposed WEFs listed in Section D.1 above. The cumulative level of increased lighting in the area will serve to alter the behaviour of a number of nocturnal (and possibly crepuscular and diurnal) species and alter ecological processes in and around these points (i.e. localised change in species composition and ethology with concomitant change in ecosystem function).	• Moderate (Negative)	• The direction of lighting should not be focused outside of the subject area, while the level of lumens should be such that the necessary lighting to achieve its objective is achieved (security, operations etc.).
	• Increased dissection of habitat on account of increasing levels of infrastructure resulting in changes in plant community structure and species composition. Such dissection will have already arisen as a consequence of the establishment of the proposed turbines and road network across the site (as a result of the proposed Sutherland, Sutherland 2 and Rietrug WEFs), effectively dividing the properties into numerous dissected habitats.	• Moderate (Negative)	• Implementation of control measures relating to conduct of staff and contractors on site and in relation to the prevailing natural environment.
	• Increased presence of exotic and disturbance driven plant species. With increasing levels of anthropogenic	• Moderate (Negative)	• Implement vegetation management and conservation initiatives, such as control of exotic vegetation, and avoid unnecessary disturbance to the ground which

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	activity on site and within the surrounding area, the propensity for plant invasion or the dominance of species that are tolerant of higher levels of disturbance will see such species dominating and perhaps ousting other less tolerant species.		promotes exotic weed invasion and vegetation change.
	• Altered surface hydrology and impact on plant community structure. Increasing levels of areas dominated by built structures will see localised changes in surface hydrology across the subject site. The associated road network will add to this impact. These changes affect habitat structure and form within the terrestrial environment.	• Low (Negative)	• Implement ripping of disturbed areas and create a managed environment.
	• Increased and expanded anthropogenic influences across the region. The nature of the surrounding proposed WEFs, electrical infrastructure and Solar Energy Facilities (as noted in Section D.1 above) suggests that human activity will arise at points that are presently only intermittently visited by a farmer or his staff. With the proposed projects listed in Section D.1 above, as well as the proposed Rietrug WEF Electrical Grid Infrastructure (i.e. this project), greater levels of human activity can be anticipated across the area, with the likely influence of ousting particular species of fauna.	• Moderate (Negative)	• Control and management procedures relating to construction activities in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).
	• Increased noise pollution levels with concomitant impact on faunal behaviour. Allied to increasing human presence across the site, increase noise levels, together with the other electrical infrastructure proposed by	• Low (Negative)	• Control and management procedures relating to construction activities in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	the projects listed in Section D.1 above, may influence behaviour in respect of smaller mammals and other fauna that utilise sound in their various behavioural patterns (prey detection, social interaction).		
	• Vegetation and habitat alteration, and change in ecological processes and habitat with reversion to secondary habitat structure at transformed sites.	• Low (Negative) • *Note that the status of this potential impact is rated as negative with some potential positive aspects. Positive impacts may include increased variability in habitat (i.e. secondary habitat and present primary habitat form; increased grassland communities etc.).*	• Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity.
	• Recruitment and behavioural change in fauna (i.e. change in ecological processes and habitat).	• Low (Negative)	• Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity and maintenance of improved habitat within areas subject to change as a consequence of the proposed development.
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	• Loss of freshwater habitat and ecological structure; changes to the freshwater resource ecological and sociocultural service provision; impacts on the freshwater resources hydrological function and sediment balance; and potential impacts on water quality.	• Low (Negative)	• If required, road crossings should be minimized, and where these are unavoidable, crossings must be made at right angles to the freshwater resource. Bridge designs should prevent flow interruption, should not cause turbulent flow, and preferably span rivers, so as to avoid placement of support structures within active channels. • Placement of substations must not be permitted within the 32m zone of regulation in terms of NEMA. • Where it is impossible to avoid placing infrastructure within riparian habitat, flow connectivity must be retained by preventing fragmentation of the riparian habitat. Fragmentation of the riparian habitat can be avoided by (for example) ensuring that the

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			disturbance footprint remains as small as possible, that no solid strips are excavated within the riparian habitat, that structures (such as culverts or monopoles) placed within the active channel do not cause increased turbulence, which will result in erosion. It must be ensured that no canalization or incision of the riparian resource takes place as a result of the construction activities. • Ensure that vegetation clearing and indiscriminate vehicle driving does not occur within demarcated sensitive areas, including the identified freshwater resources, their associated riparian zones and the applicable 32m NEMA zone of regulation. • Contractor laydown areas must not be permitted within the 32m NEMA zone of regulation around the identified freshwater resources. • Minimize construction footprints and edge effects of construction activities. • Promote indigenous vegetation growth to protect soils. • Implement alien vegetation control program. • Construction activities should occur in the low flow season/ dry season to avoid sedimentation and minimize disturbance to hydraulic function. • Limit excavations to ensure that drainage patterns return to normal after construction. • No disposal of waste within/in the vicinity of the freshwater resources. Correct waste management principles must be implemented on site and adequate waste disposal facilities must be provided. • Rehabilitate disturbed areas following completion of construction activities through reprofiling and revegetation. • Desilt the freshwater resource areas affected by construction activities, in the vicinity of construction activities. Desilting should preferably be undertaken by hand, and not using heavy machinery in order to avoid further impacts on the freshwater resources.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			• Strict erosion control and soil management measures must be implemented during the construction and operational phases, particularly in areas where vegetation has been removed. • Stockpiled soil must be levelled as required during construction and post-construction to avoid sedimentation from runoff, and revegetated with indigenous vegetation. • Compacted soil should be ripped, reprofiled and reseeded with indigenous vegetation following construction. • Use construction techniques to support the hydrology and sediment control functions of the freshwater resource. A suitably qualified engineer should be consulted for guidance in this regard, and these techniques should be incorporated into the EMPr and stormwater management plan.
	VISUAL IMPACT ASSESSMENT		
	Not applicable. As noted in the Visual Impact Assessment (Appendix D.3 of this BA Report), cumulative impacts are predicated and assessed only for the operational phase of the proposed development since the construction and decommissioning phases are temporary and will not change the landscape character.		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	• Destruction of archaeological remains as a result of the construction of the proposed powerlines, on-site substation and service road. Direct impacts to archaeological resources may also occur when construction vehicles move through the area and when foundation excavations are made. *Note: Cumulative impacts to archaeological resources are the same as the construction phase impacts except that they may occur over a larger area.*	• Low (Negative)	• Avoid and protect all sites if possible. • Those sections of the final alignment that have not been surveyed should be subjected to a pre-construction walk-down survey (by a suitably qualified archaeologist) to locate any sites that need to be avoided or mitigated. • Record significant sites within the project footprint that cannot be avoided (none have been found to date). The one site noted as occurring in the proposed on-site substation development envelope does not merit mitigation but should be avoided if possible. No other sites requiring mitigation have been found within the project footprint to date.
	• Alteration of the cultural landscape as a result of the construction of the	• Low (Negative)	• Avoid creating the service road up steep slopes (i.e. where the road would be visible from longer

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	proposed powerlines, on-site substation and service road. The cultural landscape will be impacted through the presence of incompatible structures (i.e. the proposed power line and pylons) and the construction vehicles in the rural landscape.		distances). This is mainly applicable to the scarp within the Alternative 2 distribution line and service road alignment. • Follow the suggested service road detour around the east side of the scarp for the Alternative 2 routing.
	• Disturbance, damage or destruction of scientifically important fossils at or beneath the ground surface as a result of surface clearance (for access roads, substations and laydown areas etc.) and excavations (for the power line footings and O&M building). *Note: Cumulative impacts to palaeontological resources are the same as the construction phase impacts except that they may occur over a larger area.*	• Moderate (Negative)	• Safeguarding of identified sites of high palaeontological sensitivity by a 30-m wide buffer zone (i.e. extensive surface scatter of petrified wood plus occasional bone fragments either side of a farm track, as indicated in Figure 48 of the Palaeontological Impact Assessment, which is included as an appendix to the Heritage Impact Assessment (Appendix D.4 of this BA Report)). • A pre-construction walk-down must be undertaken by a palaeontological specialist for any sectors of the 132 kV power line route finally chosen that were not covered during the BA Phase (as indicated by the yellow dashed rectangle in Figure 1 of the Palaeontological Impact Assessment, which is included as an appendix to the Heritage Impact Assessment (Appendix D.4 of this BA Report)). The resulting report will need to be submitted to and approved by the relevant heritage management authority. • Monitoring of all surface clearance and substantial (deeper than 1 m) excavations by the ECO for fossil material. • Safeguarding of chance fossil finds (preferably *in situ*) during the construction phase by the ECO. • Reporting of chance fossil finds to Heritage Western Cape (for the Western Cape) or SAHRA (for the Northern Cape). • Recording and sampling of significant chance fossil finds by a qualified palaeontologist, together with pertinent contextual data (stratigraphy, sedimentology, taphonomy) (Phase 2 mitigation).

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			• The palaeontologist concerned with potential mitigation work (Phase 2) would need a valid fossil collection permit from the relevant heritage management authority, i.e. Heritage Western Cape (for the Western Cape) or SAHRA (for the Northern Cape). • Curation of fossil material within an approved repository (museum/university fossil collection) and submission of a Phase 2 palaeontological heritage report to (for the Western Cape) or SAHRA (for the Northern Cape) by a qualified palaeontologist. • All palaeontological fieldwork and reporting should meet the minimum standards outlined by Heritage Western Cape (2016) and SAHRA (2013).
	AVIFAUNA IMPACT ASSESSMENT		
	• Temporary displacement of Red Data avifauna due to disturbance associated with the construction of the proposed on-site substation (including the O&M Building and laydown area), service road and powerline; permanent displacement of Red Data avifauna due to habitat transformation associated with the construction of the proposed power line, service road and on-site substation (including the O&M Building and laydown area), and mortality of Red Data avifauna due to collisions with the powerline, and electrocutions in the substation yard. The incremental impact of the proposed on-site substation (including the O&M Building and laydown area), service road and powerline on Red Data avifauna added to the impacts of other past, present or reasonably foreseeable future activities.	• Moderate (Negative)	• A site-specific Construction EMPr must be implemented, which gives an appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction and degradation of habitat. All contractors are to adhere to the Construction EMPr and should apply good environmental practice during construction. The Construction EMPr should specifically include the following: ▪ The minimum footprint areas for infrastructure should be used wherever possible, including road widths and lengths; ▪ Ensure that no off-road driving is allowed; ▪ Ensure maximum use of existing roads; ▪ Measures to control dust; ▪ Measures to control noise; ▪ Ensure that access to the rest of the property is restricted; ▪ Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks) must be undertaken and to this end a habitat restoration plan is to be developed

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			by a rehabilitation specialist and implemented accordingly; ▪ The appointed ECO must be trained by an avifaunal specialist to identify the potential priority species as well as the signs that indicate possible breeding by these species. The ECO must then, during audits/site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed; ▪ Prior to construction, an avifaunal specialist should conduct a site walk through, covering the final service road and power line routes, to identify any nests/breeding/roosting activity of priority species, as well as any additional sensitive habitats. The results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.
Alternative 2 – Refer to Section A (8) of this BA Report and the explanation above regarding applicable alternatives. ***Note that the following two alternatives have been assessed as part of the BA Process by the specialists and EAP:*** - ***Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape; and*** - ***Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape.***			

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
Refer to the explanation provided above; all the impacts noted in the Alternative 1 section apply to Alternative 2, except for the Visual Impacts, as these have been differentiated between Alternatives 1 and 2, as noted above.			
▪ Removal of indigenous vegetation for the proposed infrastructure (including on-site substation, laydown area, O&M Building, service road, pylons, stringing of the power line, as well as earthworks); ▪ Site clearance; ▪ Site clearing and the removal of vegetation associated with the freshwater habitats; ▪ Site clearing and the disturbance of soils leading to alien and invasive floral species proliferation; ▪ Levelling; ▪ Excavations and earthworks; ▪ Site establishment; ▪ Establishment of a laydown area for equipment and construction materials; ▪ Stockpiling of topsoil and cleared vegetation; ▪ Transportation of material and equipment to site; ▪ Construction of the distribution line (including tower construction, power	***Direct impacts:***		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	The Direct Impacts identified in the Terrestrial Ecology Impact Assessment for Alternative 2 of the Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape are the same as that identified for Alternative 1. **As noted in the Terrestrial Ecology Assessment (Appendix D.1 of this BA Report), the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar and therefore proffer the same level of impact (i.e. the impact significance does not differ)**. However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1. **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the construction phase.**		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the similarity of the perceived impacts, as well as the largely similar sensitivities of the freshwater resources associated with the study area, the impact assessment was undertaken once for both Alternative 1 and Alternative 2 of the proposed distribution line and connection to the third party substations, the service roads associated with the proposed development, and the proposed on-site substation and link to the third party substation. **The perceived impacts, significance thereof, impact ratings and mitigation measures are the same for both alternatives**. **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the construction phase.**		
	VISUAL IMPACT ASSESSMENT		
	• Potential visual intrusion of activities associated with the construction of electrical infrastructure along Alternative 2 on existing views of sensitive visual receptors in the surrounding landscape.	• Moderate (Negative)	• Implement mitigation measures associated with construction activities to ensure that they are managed and performed in such a way as to minimise its impact on the receiving environment, as well as minimising visual impact during the construction phase. These best practice guidelines for construction can include: ▪ The contractor is required to maintain good housekeeping on site to avoid litter and minimise waste; ▪ The Project Developer is required to demarcate construction boundaries and minimise areas of surface disturbance; ▪ Vegetation and ground disturbance should be minimised, and existing clearings should be

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
line stringing), and additional infrastructure; ▪ Increased noise, dust and changes in prevailing biophysical factors within the study area as a result of increased human presence; ▪ Increased light pollution from the proposed site camp and related areas of the site; ▪ Importing of materials not associated with the surrounding environment; ▪ Solid and liquid waste generation; ▪ Compaction of soils due to construction activities; ▪ Movement of construction vehicles as well as service road construction within the freshwater resource zones; ▪ Topsoil stockpiling adjacent to the freshwater resources and runoff from stockpiles leading to sedimentation of the system; ▪ Dumping of waste and construction material			taken advantage of where possible; ▪ Construction of new access roads should be minimised and existing roads should be used where possible; ▪ Topsoil from the site should be stripped, stockpiled, and stabilised before excavating earth for the construction of the proposed distribution line; ▪ Vegetation material from vegetation removal will be mulched and spread over fresh soil disturbances to aid in the rehabilitation process; ▪ Plans should be in place to control and minimise erosion risks; ▪ Plans should be in place to minimise fire hazards and dust generation; and ▪ Plans should be in place to rehabilitate cleared areas as soon as possible. • Where possible construction camps and laydown areas should be located (where sensitive visual receptors are least likely to be affected): ▪ In low visibility areas (e.g. avoid ridgelines and open plains); ▪ Previously disturbed areas (e.g. clearings created by farmers for other purposes which are no longer being used); and/or ▪ Areas near derelict farmsteads (taking into consideration the findings of the Heritage Impact Assessment as well as other assessments that may be relevant), particularly where existing trees can be used to screen these areas from views. • Particular care should be taken to avoid erosion scarring and damage along the ridge down the escarpment; • Night time construction should be avoided where possible (however some construction work on electrical components may need to occur after dark).

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
within freshwater resources; ▪ Loss of phosphate, nitrate and toxicant removal abilities due to vegetation clearing; ▪ Streamflow diversion and draining water from the freshwater resources resulting in the alteration of hydrological zones; and ▪ Potential risk of contaminated runoff from the access roads associated with the proposed development, leading to pollution of surface water.			• Night lighting of the construction sites should be minimised within requirements of safety and efficiency.
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), the majority of impacts will be felt during the construction phase when land is cleared and excavations are made for the purposes of erecting the power line pylons. **The impact assessments apply equally to both Alternative 1 and Alternative 2. The nature and significance of impacts – based on known sites – is likely to be the same except that a few more sites may be affected by Alternative 2 because it is longer**. As noted in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report), given the rather uniform geology and sparse, largely unpredictable distribution of recorded or anticipated palaeontological resources within the Rietrug WEF electrical grid infrastructure study area, this impact assessment applies equally to all the proposed on-site and third party substation sites as well as the alternative 132 kV powerline routes under consideration for the Rietrug WEF electrical grid infrastructure project (i.e. both Alternative 1 and Alternative 2). **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the construction phase.**		
	AVIFAUNA IMPACT ASSESSMENT		
	Based on the findings of the Avifauna Impact Assessment (Appendix D.5 of this BA Report), the impacts identified and rated for Alternative 1 also applies to Alternative 2. **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the construction phase.**		
	Indirect impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	The Indirect Impacts identified in the Terrestrial Ecology Impact Assessment for Alternative 2 of the Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape are the same as that identified for Alternative 1. **As noted in the Terrestrial Ecology Assessment (Appendix D.1 of this BA Report), the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar and therefore proffer the same level of impact (i.e. the impact significance does not differ)**. However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1. **Therefore, please refer to the indirect impacts indicated above for Alternative 1 for the construction phase.**		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	Not applicable. As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the overall low direct impact significance of the proposed electrical infrastructure during the construction, operational and decommissioning phases when mitigation measures are applied, potential indirect impacts which the proposed electrical infrastructure might have on the receiving freshwater resources were therefore considered to be negligible, and were therefore not assessed in the specialist report since they are		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	considered to be inconsequential.		
	VISUAL IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Visual Impact Assessment (Appendix D.3 of this BA Report).		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), because of the very low probability of indirect impacts occurring, the significance of all such impacts will be very low, and certainly lower than the significance of the potential direct impacts listed above. Therefore, it was not deemed necessary by the specialist to specifically assess potential indirect impacts. Furthermore, indirect impacts were not identified in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Avifauna Impact Assessment (Appendix D.5 of this BA Report).		
	Cumulative impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	The Cumulative Impacts identified in the Terrestrial Ecology Impact Assessment for Alternative 2 of the Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape are the same as that identified for Alternative 1. **As noted in the Terrestrial Ecology Assessment (Appendix D.1 of this BA Report), the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar and therefore proffer the same level of impact (i.e. the impact significance does not differ)**. However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1. **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the construction phase.**		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the similarity of the perceived impacts, as well as the largely similar sensitivities of the freshwater resources associated with the study area, the impact assessment was undertaken once for both Alternative 1 and Alternative 2 of the proposed distribution line and connection to the third party substations, the service roads associated with the proposed development, and the proposed on-site substation and link to the third party substation. **The perceived impacts, significance thereof, impact ratings and mitigation measures are the same for both alternatives**. **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the construction phase.**		
	VISUAL IMPACT ASSESSMENT		
	Not applicable. As noted in the Visual Impact Assessment (Appendix D.3 of this BA Report), cumulative impacts are predicated and assessed only for the operational phase of the proposed development since the construction and decommissioning phases are temporary and will not change the landscape character.		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), the majority of impacts will be felt during the construction phase when land is cleared and excavations are made for the purposes of erecting the power line pylons. **The impact assessments apply**		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	equally to both Alternative 1 and Alternative 2. The nature and significance of impacts – based on known sites – is likely to be the same except that a few more sites may be affected by Alternative 2 because it is longer. As noted in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report), given the rather uniform geology and sparse, largely unpredictable distribution of recorded or anticipated palaeontological resources within the Rietrug WEF electrical grid infrastructure study area, this impact assessment applies equally to all the proposed on-site and third party substation sites as well as the alternative 132 kV powerline routes under consideration for the Rietrug WEF electrical grid infrastructure project (i.e. both Alternative 1 and Alternative 2). **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the construction phase.**		
	AVIFAUNA IMPACT ASSESSMENT		
	Based on the findings of the Avifauna Impact Assessment (Appendix D.5 of this BA Report), the impacts identified and rated for Alternative 1 also applies to Alternative 2. **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the construction phase.**		
NO-GO OPTION			
▪ Maintenance of status quo.	***Direct Impacts:***		
	If this proposed project does not proceed: • None of the impacts mentioned above will occur. • Only the current agricultural (grazing) land use will remain. • The landowners of the affected farm portions will not be able to derive benefits from the implementation of an additional land-use. • No additional power will be generated or supplied through means of renewable energy resources by this project at this location. Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified. • There will be no contributions and assistance to the government in achieving its proposed renewable energy target of 17 800 MW by 2030.	Not applicable.	Not applicable.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	• Local communities will continue their dependence on agriculture production and government subsidies. • There will be lost opportunity for skills transfer and education/training of local communities. • The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised, which may lead to negative local socio-economic implications. • The local economic benefits associated with the REIPPPP will not be realised.		
	Indirect Impacts:		
	No indirect impacts have been identified for the construction phase for the No-go Option.		
	Cumulative Impacts:		
	No cumulative impacts have been identified for the construction phase for the No-go Option.		

Operational Phase:

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
Alternative 1 (Preferred Alternative) – Refer to Section A (8) of this BA Report and the explanation above regarding applicable alternatives. ***Note that the following two alternatives have been assessed as part of the BA Process by the specialists and EAP:*** - ***Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape; and*** - ***Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape.*** ***Therefore, in this section, the impacts described are applicable to both Alternatives 1 and 2 (i.e. all the impacts noted in the Alternative 1 section apply to Alternative 2). The impacts are the same for both Alternative 1 and 2, except for the Visual Impacts, as these have been differentiated between Alternatives 1 and 2, as noted above. As a result, the impacts, significance and mitigation measures for both Alternative 1 and 2 have been displayed once under this section, with the exception of the potential Visual Impacts, to avoid repetition and for ease of reference and review.***			
▪ Removal of vegetation; ▪ Operation and maintenance of the proposed distribution line, service road, O&M Building, on-site substation and additional infrastructure; ▪ Disturbance of soils and on-going erosion as part of maintenance activities; ▪ Ineffective rehabilitation may lead to habitat transformation and alien vegetation encroachment; ▪ Insufficient aftercare and maintenance of disturbed areas, leading to ongoing erosion, gully formation and increased sedimentation due to	***Direct Impacts:*** ***TERRESTRIAL ECOLOGY IMPACT ASSESSMENT*** • Change in ecological processes and habitat due to disturbance as a result of general activities associated with the operation and maintenance of the proposed on-site substation and O&M Building, which will include replacing of parts and infrastructure, as well as use of materials such as hydrocarbons. Materials such as hydrocarbons and other solid materials that may be utilised on a daily basis are likely to generate potential waste and the spillage of hazardous materials. In addition, ELP and noise will affect faunal behaviour around the proposed on-site substation. Light will alter both invertebrate and vertebrate behaviour and activity around the proposed on-site substation, while, should an electric fence be established around the proposed on-site substation, it is possible that there may be an increase in animal mortalities (electrocution). Occasional vehicular traffic may impact	• Moderate (Negative)	• Implement sound and appropriate management of the proposed project (i.e. electrical infrastructure) site including storm water management, vegetation management and related aspects around the site. • Ensure that containment of maintenance activities is achieved to within the on-site substation and O&M Building site to avoid unnecessary disturbance outside of the footprint. • Implementation of control measures relating to the conduct of maintenance staff and contractors on site and in relation to the prevailing natural environment. Operational staff should be educated on correct procedures to be used in waste disposal, conduct on site and operations of vehicles and machinery. • Implement control of all imported material (where applicable) to ensure that all materials are managed on site and within the footprint of the proposed on-site substation and O&M Building. • Control of all waste materials to ensure that all materials are removed from site, including sewage, for disposal at an appropriate facility (i.e. a licenced facility). • Appropriate lighting of the O&M Building and on-site

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
poor management; ▪ Increased water runoff into wetland areas due to unvegetated areas overlooked after construction; ▪ Vegetation trampling during maintenance activities; and ▪ Indiscriminate driving within the freshwater resource areas during routine maintenance activities, resulting in soil compaction.	on fauna through collision (in particular tortoise). Note that the impact of ELP and terrestrial mortalities linked to the proposed on-site substation, operations and maintenance is discussed and assessed separately below.		substation should be provided in order to avoid unnecessary illumination of the surrounding environment. • Ensure the appropriate establishment of electric fencing around the proposed on-site substation (neutral line lowest). Inter alia, a neutral line should be established at ground level, while methods to prevent perching of birds on upper stands should be explored. • Monitoring of the fence line on a daily basis will alleviate impacts on smaller fauna, such as tortoise, that may become entrapped by the electric fence
	• Change in ecological processes and habitat, disturbance of emergent and established vegetation, changes in edaphic and other drivers, ousting of fauna in and around the site and particularly adjacent to powerlines, mortalities of species such as tortoise, and changes in biophysical drivers along the proposed powerline route (soil, vegetation cover, surface hydrology etc.), as a result of general activities during the power line and service road maintenance processes. General maintenance of the power line route will include regular inspection of the power line by foot and vehicle (by use of the proposed service road), repairs to structures and lines and possibly aerial cleaning of conductors on an irregular basis.	• Moderate (Negative)	• Implement sound and appropriate management of points around the proposed towers including storm water management and vegetation control. • Ensure that containment of maintenance activities is achieved to the proposed powerline servitude and points around towers to avoid unnecessary disturbance outside of the footprint. • Implementation of control measures relating to the conduct of maintenance staff and contractors on site and in relation to the prevailing natural environment. Operational staff should be educated on waste management while on site, adherence to speed limits and general conduct on site. • Implement control of all imported material to ensure that materials are managed during operations along the proposed powerline route. • Control of all waste materials to ensure that all materials are removed from along the proposed powerline route and disposed of correctly at a licenced facility.
	• Disturbance of vegetation and alteration of vegetation community structure and habitat form as a result of maintenance operations around the proposed on-site substation and O&M building, as well as increased human	• Low (Negative)	• Implement vegetation management and conservation initiatives which includes exotic weed control; vegetation management around fence lines and within the site; and monitoring and maintenance of larger plant associations in proximity to infrastructure.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	and vehicle traffic levels.		
	• Disturbance of vegetation and alteration of vegetation community structure and habitat form as a result of maintenance operations of the power line and service road, as well as increased human and vehicle traffic levels.	• Low (Negative)	• Implement vegetation management and conservation initiatives which includes exotic weed control; vegetation management along the power line and service road route; and monitoring and maintenance of larger plant associations in proximity to infrastructure.
	• Increased spread and introduction of exotic vegetation as a result of the movement of vehicles within the study area, particularly along the power line and service road. Exotic plant propagules will tend to be carried by the vehicles using the service road during maintenance and operations, which may change or alter the local ecology.	• Moderate (Negative)	• Implement vegetation management and conservation operations such as control of exotic vegetation along roads and the powerline, and avoid unnecessary disturbance to the ground which promotes exotic weed invasion and vegetation change.
	• Increase in terrestrial mortalities through the movement of vehicles along line route (particularly tortoises). Electric fencing also offers a potential threat to some species. This has the potential to inflict lethal consequences on smaller and less mobile species such as tortoises (i.e. localised extinction or ousting of species with concomitant change in ecosystem function).	• Moderate (Negative)	• Conservation management planning to include protocols on movement of vehicles, labour conduct and operations in respect of resident wildlife. • The lower string of the electric fence is to be neutral. • Conduct daily monitoring of fence line to address fauna that may be trapped by electric fence.
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	• Loss of freshwater habitat and ecological structure; changes to the freshwater resource ecological and sociocultural service provision; impacts on the freshwater resources hydrological function and sediment balance; and potential impacts on water quality.	• Low (Negative)	• Rehabilitate areas where active erosion is identified to re-instate natural topography and hydrological conditions. • Monitor for erosion and incision within affected freshwater resources. • Implement alien vegetation control program and ensure establishment of indigenous species within areas where alien vegetation was identified. • Vehicles should not be driven indiscriminately within

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			the freshwater resource areas during maintenance activities to prevent soil compaction, disturbances to fauna and destruction of riparian vegetation.
	VISUAL IMPACT ASSESSMENT		
	• Potential landscape impact of the proposed electrical infrastructure along Alternative 1 on a rural agricultural landscape with a strong sense of remoteness and potential for scenic views.	• Very Low (Negative)	• None recommended
	• Potential visual intrusion of the proposed electrical infrastructure along Alternative 1 on the views of sensitive visual receptors.	• Low (Negative)	• Lattice type towers should be used as they will be better camouflaged against the mottled vegetation and rock background than monopole towers. Although monopole structures can be seen as aesthetically more pleasing than lattice type structures, either is likely to cause negative visual impacts on views. The mitigation measure proposed here is therefore intended to reduce the visibility of the structures rather than to improve its aesthetics. This is not an essential mitigation measure but its implementation will potentially lower the significance of the impact for Alternative 1 to very low.
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	• Destruction of archaeological remains as a result of the existence and maintenance of the proposed powerlines, on-site substation and service road. Direct impacts to archaeological resources are highly unlikely to occur during this phase because vehicles will use the already established service road and public road.	• Very Low (Negative)	• Ensure that all vehicles remain on the service road at all times.
	• Alteration of the cultural landscape as a result of the existence and maintenance of the proposed powerlines, on-site substation and service road. The cultural landscape will be impacted through the presence	• Low (Negative)	• Not feasible.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	of incompatible structures (i.e. the proposed power line and pylons) in the rural landscape.		
	• Destruction of palaeontological material as a result of the existence and maintenance of the proposed powerlines, on-site substation and service road. Direct impacts to palaeontological resources are highly unlikely to occur during this phase because vehicles will use the already established service road and public road (it is important to note that for this reason the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.1 of this BA Report) did not specifically address the operational phase. The Palaeontological Impact Assessment explains that significant further adverse impacts on local palaeontological heritage resources are very unlikely and not anticipated during the operational, decommissioning and rehabilitation phases of the proposed project, therefore it has not been separately assessed and no further mitigation or management measures in this respect are proposed.	• Very Low (Negative)	• Ensure that all vehicles remain on the service road at all times.
	AVIFAUNA IMPACT ASSESSMENT		
	• Electrocution of Red Data avifauna on the 132kV line and in the on-site substation.	• Very Low (Negative)	• The avifaunal specialist must certify that the pole structures to be used on the proposed 132kV powerline are bird-friendly. • The hardware within the proposed on-site substation yard is too complex to warrant any mitigation for electrocution at this stage. It is recommended that if on-going impacts are recorded once operational, site

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			specific mitigation be applied reactively. This is an acceptable approach because Red Data avifauna is unlikely to frequent the substation and be electrocuted.
	• Mortality of Red Data avifauna due to collisions with the earth-wire of the proposed powerline.	• High (Negative)	• An avifaunal specialist must conduct a site walk through of final pylon positions prior to construction to determine if, and where, Bird Flight Diverters (BFDs) are required. • Install BFDs as per the instructions of the specialist following the site walk through, which may include the need for modified BFDs fitted with solar powered LED lights on certain spans. • The operational monitoring programme must include regular monitoring and inspections (i.e. quarterly) of the grid connection power line for collision-related mortalities by an avifaunal specialist.
	Indirect Impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	• Change in faunal behaviour due to increased lighting around the proposed on-site substation and O&M Building (ELP), which will be lit at night. In particular, invertebrate species may be attracted to lights which have concomitant influences on the behavioural patterns of other species in the area. Alternatively, hunting and other behaviours may alter as a consequence of additional lighting within an area previously devoid of such factor.	• Low (Negative)	• Apply suitable lumens and ensure direction of lighting is within the boundary of the proposed on-site substation. The direction of lighting should not be focused outside of the subject area, while the level of lumens should be such that the necessary lighting to achieve its objective is achieved (security, operations etc.).
	• Change in faunal community structure as a consequence of increased perching points for raptors due to the powerline, which will afford some birds of prey that hunt from perched positions improved opportunities for the detection and capture of prey. Such	• Low (Negative)	• None

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	increases in predation pressures on potential prey species (e.g. *Mastomys coucha*) in and around the proposed powerline may have consequences for localised ecological processes and for example, small mammal populations.		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	Not applicable. As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the overall low direct impact significance of the proposed electrical infrastructure during the construction, operational and decommissioning phases when mitigation measures are applied, potential indirect impacts which the proposed electrical infrastructure might have on the receiving freshwater resources were therefore considered to be negligible, and were therefore not assessed in the specialist report since they are considered to be inconsequential.		
	VISUAL IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Visual Impact Assessment (Appendix D.3 of this BA Report).		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), because of the very low probability of indirect impacts occurring, the significance of all such impacts will be very low, and certainly lower than the significance of the potential direct impacts listed above. Therefore, it was not deemed necessary by the specialist to specifically assess potential indirect impacts. Furthermore, indirect impacts were not identified in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Avifauna Impact Assessment (Appendix D.5 of this BA Report).		
	Cumulative Impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	• Increased ELP levels as a result of light pollution that may be associated with all built structures of the proposed project and the projects considered within the 50 km radius, including the wind turbines of the various proposed WEFs listed in Section D.1 above. The cumulative level of increased lighting in the area will serve to alter the behaviour of a number of nocturnal (and possibly crepuscular and diurnal) species and alter ecological processes in and around these points (i.e. localised change in species composition and ethology with concomitant change	• Moderate (Negative)	• Apply suitable lumens and ensure the direction of lighting is within the boundary of the proposed on-site substation. The direction of lighting should not be focused outside of the subject area, while the level of lumens should be such that the necessary lighting to achieve its objective is achieved (security, operations etc.).

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	in ecosystem function).		
	• Increased dissection of habitat on account of increasing levels of infrastructure resulting in changes in plant community structure and species composition. The proposed powerline and associated service road, as well as the on-site substation will give rise to the further dissection of habitat within the study area. Such dissection will have already arisen as a consequence of the establishment of the proposed turbines and road network across the site (as a result of the proposed Sutherland, Sutherland 2 and Rietrug WEFs), effectively dividing the properties into numerous dissected habitats.	• Moderate (Negative)	• Implementation of control measures relating to conduct of staff on site and in relation to the prevailing natural environment.
	• Increased presence of exotic and disturbance driven plant species. With increasing levels of anthropogenic activity on site and within the surrounding area, the propensity for plant invasion or the dominance of species that are tolerant of higher levels of disturbance will see such species dominating and perhaps ousting other less tolerant species.	• Moderate (Negative)	• Implement vegetation management and conservation initiatives, such as control of exotic vegetation along roads and the powerline, and avoid unnecessary disturbance to the ground which promotes exotic weed invasion and vegetation change.
	• Altered surface hydrology and impact on plant community structure. Increasing levels of areas dominated by built structures will see localised changes in surface hydrology across the subject site. The associated road network will add to this impact. These changes affect habitat structure and form within the terrestrial environment.	• Low (Negative)	• Implement ripping of disturbed areas and create a managed environment.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	• Increased and expanded anthropogenic influences across the region. The nature of the surrounding proposed WEFs, electrical infrastructure and Solar Energy Facilities (as noted in Section D.1 above) suggests that human activity will arise at points that are presently only intermittently visited by a farmer or his staff. With the proposed projects listed in Section D.1 above, as well as the proposed Rietrug WEF Electrical Grid Infrastructure (i.e. this project), greater levels of human activity can be anticipated across the area, with the likely influence of ousting particular species of fauna.	• Moderate (Negative)	• Control and management procedures relating to operations in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).
	• Increased noise pollution levels with concomitant impact on faunal behaviour. Allied to increasing human presence across the site, increase noise levels, in particular the low level sound emanating from buzz bars and the proposed on-site substation, together with the other electrical infrastructure proposed by the projects listed in Section D.1 above, may influence behaviour in respect of smaller mammals and other fauna that utilise sound in their various behavioural patterns (prey detection, social interaction).	• Low (Negative)	• Control and management procedures relating to operations in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).
	• Vegetation and habitat alteration, and change in ecological processes and habitat with reversion to secondary habitat structure at transformed sites.	• Low (Negative) • *Note that the status of this potential impact is rated as negative with some potential positive aspects. Positive impacts may include increased variability in habitat (i.e.*	• Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
		secondary habitat and present primary habitat form; increased grassland communities etc.).	
	• Recruitment and behavioural change in fauna (i.e. change in ecological processes and habitat).	• Low (Negative)	• Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity and maintenance of improved habitat within areas subject to change as a consequence of the proposed development.
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	• Loss of freshwater habitat and ecological structure; changes to the freshwater resource ecological and sociocultural service provision; impacts on the freshwater resources hydrological function and sediment balance; and potential impacts on water quality.	• Low (Negative)	• Rehabilitate areas where active erosion is identified to re-instate natural topography and hydrological conditions. • Monitor for erosion and incision within affected freshwater resources. • Implement alien vegetation control program and ensure establishment of indigenous species within areas where alien vegetation was identified. • Vehicles should not be driven indiscriminately within the freshwater resource areas during maintenance activities to prevent soil compaction, disturbances to fauna and destruction of riparian vegetation.
	VISUAL IMPACT ASSESSMENT		
	• Cumulative impact of renewable energy generation projects and large scale electrical infrastructure on the existing rural-agricultural landscape.	• Very Low (Negative)	• None recommended
	• Cumulative visual impact of renewable energy generation projects and large scale electrical infrastructure on existing views of sensitive visual receptors in the surrounding landscape.	• Low (Negative)	• Lattice type towers should be used as they will be better camouflaged against the mottled vegetation and rock background than monopole towers. Although monopole structures can be seen as aesthetically more pleasing than lattice type structures, either is likely to cause negative visual impacts on views. The mitigation measure proposed here is therefore intended to reduce the visibility of the structures rather than to improve its aesthetics. This is not an essential mitigation measure but its implementation will potentially lower the significance of the impact

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			to very low.
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. Cumulative impacts for the operational phase were not identified in the Heritage Impact Assessment (Appendix D.4 of this BA Report) and Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	• Temporary displacement of Red Data avifauna due to disturbance associated with the proposed on-site substation (including the O&M Building and laydown area), service road and powerline; permanent displacement of Red Data avifauna due to habitat transformation associated with the proposed power line, service road and on-site substation (including the O&M Building and laydown area), and mortality of Red Data avifauna due to collisions with the powerline, and electrocutions in the substation yard. The incremental impact of the proposed on-site substation (including the O&M Building and laydown area), service road and powerline on Red Data avifauna added to the impacts of other past, present or reasonably foreseeable future activities.	• Moderate (Negative)	• Ensure that no off-road driving is allowed. • Ensure maximum use of existing roads. • Measures to control dust. • Measures to control noise. • Ensure that access to the rest of the property is restricted. • Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks) must be undertaken and to this end a habitat restoration plan is to be developed by a rehabilitation specialist and implemented accordingly. • An avifaunal specialist must conduct a site walk through of final pylon positions prior to construction to determine if, and where, BFDs are required. • Install BFDs as per the instructions of the specialist following the site walk through, which may include the need for modified BFDs fitted with solar powered LED lights on certain spans. • The operational monitoring programme must include regular monitoring and inspections (i.e. quarterly) of the grid connection power line for collision-related mortalities by an avifaunal specialist.
Alternative 2 – Refer to Section A (8) of this BA Report and the explanation above regarding applicable alternatives. ***Note that the following two alternatives have been assessed as part of the BA Process by the specialists and EAP:*** - ***Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape; and*** - ***Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape.*** ***Refer to the explanation provided above; all the impacts noted in the Alternative 1 section apply to Alternative 2, except for the Visual Impacts, as these have been differentiated between Alternatives 1 and 2, as noted above.***			

<table>
<tr><th>ACTIVITY</th><th>IMPACT SUMMARY</th><th>SIGNIFICANCE</th><th>PROPOSED MITIGATION</th></tr>
<tr><td rowspan="8">▪ Removal of vegetation;
▪ Operation and maintenance of the proposed distribution line, service road, O&M Building, on-site substation and additional infrastructure;
▪ Disturbance of soils and on-going erosion as part of maintenance activities;
▪ Ineffective rehabilitation may lead to habitat transformation and alien vegetation encroachment;
▪ Insufficient aftercare and maintenance of disturbed areas, leading to ongoing erosion, gully formation and increased sedimentation due to poor management;
▪ Increased water runoff into wetland areas due to unvegetated areas overlooked after construction;
▪ Vegetation trampling during maintenance activities; and
▪ Indiscriminate driving within the freshwater resource areas during routine maintenance</td><td colspan="3">Direct impacts:</td></tr>
<tr><td colspan="3">TERRESTRIAL ECOLOGY IMPACT ASSESSMENT</td></tr>
<tr><td colspan="3">The Direct Impacts identified in the Terrestrial Ecology Impact Assessment for Alternative 2 of the Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape are the same as that identified for Alternative 1. As noted in the Terrestrial Ecology Assessment (Appendix D.1 of this BA Report), the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar and therefore proffer the same level of impact (i.e. the impact significance does not differ). However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1.

<u>Therefore, please refer to the direct impacts indicated above for Alternative 1 for the operational phase.</u></td></tr>
<tr><td colspan="3">AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT</td></tr>
<tr><td colspan="3">As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the similarity of the perceived impacts, as well as the largely similar sensitivities of the freshwater resources associated with the study area, the impact assessment was undertaken once for both Alternative 1 and Alternative 2 of the proposed distribution line and connection to the third party substations, the service roads associated with the proposed development, and the proposed on-site substation and link to the third party substation. The perceived impacts, significance thereof, impact ratings and mitigation measures are the same for both alternatives.

<u>Therefore, please refer to the direct impacts indicated above for Alternative 1 of the operational phase.</u></td></tr>
<tr><td colspan="3">VISUAL IMPACT ASSESSMENT</td></tr>
<tr><td>• Potential landscape impact of the proposed electrical infrastructure along Alternative 2 on a rural agricultural landscape with a strong sense of remoteness and potential for scenic views.</td><td>• Low (Negative)</td><td>• None recommended</td></tr>
<tr><td>• Potential visual intrusion of the proposed electrical infrastructure along Alternative 2 on the views of sensitive visual receptors.</td><td>• Low (Negative)</td><td>• Lattice type towers should be used as they will be better camouflaged against the mottled vegetation and rock background than monopole towers. Although monopole structures can be seen as aesthetically more pleasing than lattice type structures, either is likely to cause negative visual impacts on views. The mitigation measure proposed here is therefore intended to reduce the visibility of the structures rather than to improve its aesthetics. This is not an essential mitigation measure and it is unlikely to lower the significance of the impact for Alternative 2</td></tr>
</table>

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
activities, resulting in soil compaction.			but will reduce the visibility of the development.
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), **the impact assessments apply equally to both Alternative 1 and Alternative 2. The nature and significance of impacts – based on known sites – is likely to be the same except that a few more sites may be affected by Alternative 2 because it is longer**. As noted in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report), given the rather uniform geology and sparse, largely unpredictable distribution of recorded or anticipated palaeontological resources within the Rietrug WEF electrical grid infrastructure study area, this impact assessment applies equally to all the proposed on-site and third party substation sites as well as the alternative 132 kV powerline routes under consideration for the Rietrug WEF electrical grid infrastructure project (i.e. both Alternative 1 and Alternative 2). **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the operational phase.**		
	AVIFAUNA IMPACT ASSESSMENT		
	Based on the findings of the Avifauna Impact Assessment (Appendix D.5 of this BA Report), the impacts identified and rated for Alternative 1 also applies to Alternative 2. **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the operational phase.**		
	Indirect impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	The Indirect Impacts identified in the Terrestrial Ecology Impact Assessment for Alternative 2 of the Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape are the same as that identified for Alternative 1. **As noted in the Terrestrial Ecology Assessment (Appendix D.1 of this BA Report), the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar and therefore proffer the same level of impact (i.e. the impact significance does not differ)**. However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1. **Therefore, please refer to the indirect impacts indicated above for Alternative 1 for the operational phase.**		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	Not applicable. As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the overall low direct impact significance of the proposed electrical infrastructure during the construction, operational and decommissioning phases when mitigation measures are applied, potential indirect impacts which the proposed electrical infrastructure might have on the receiving freshwater resources were therefore considered to be negligible, and were therefore not assessed in the specialist report since they are considered to be inconsequential.		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	VISUAL IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Visual Impact Assessment (Appendix D.3 of this BA Report).		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), because of the very low probability of indirect impacts occurring, the significance of all such impacts will be very low, and certainly lower than the significance of the potential direct impacts listed above. Therefore, it was not deemed necessary by the specialist to specifically assess potential indirect impacts. Furthermore, indirect impacts were not identified in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Avifauna Impact Assessment (Appendix D.5 of this BA Report).		
	Cumulative impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	The Cumulative Impacts identified in the Terrestrial Ecology Impact Assessment for Alternative 2 of the Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape are the same as that identified for Alternative 1. **As noted in the Terrestrial Ecology Assessment (Appendix D.1 of this BA Report), the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar and therefore proffer the same level of impact (i.e. the impact significance does not differ)**. However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1. **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the operational phase.**		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the similarity of the perceived impacts, as well as the largely similar sensitivities of the freshwater resources associated with the study area, the impact assessment was undertaken once for both Alternative 1 and Alternative 2 of the proposed distribution line and connection to the third party substations, the service roads associated with the proposed development, and the proposed on-site substation and link to the third party substation. **The perceived impacts, significance thereof, impact ratings and mitigation measures are the same for both alternatives**. **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the operational phase.**		
	VISUAL IMPACT ASSESSMENT		
	• Cumulative impact of renewable energy generation projects and large scale electrical infrastructure on the existing rural-agricultural landscape.	• Very Low (Negative)	• None recommended
	• Cumulative visual impact of renewable energy generation projects and large	• Low (Negative)	• Lattice type towers should be used as they will be better camouflaged against the mottled vegetation

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	scale electrical infrastructure on existing views of sensitive visual receptors in the surrounding landscape.		and rock background than monopole towers. Although monopole structures can be seen as aesthetically more pleasing than lattice type structures, either is likely to cause negative visual impacts on views. The mitigation measure proposed here is therefore intended to reduce the visibility of the structures rather than to improve its aesthetics. This is not an essential mitigation measure but its implementation will potentially lower the significance of the impact to very low.
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. Cumulative impacts for the operational phase were not identified in the Heritage Impact Assessment (Appendix D.4 of this BA Report) and Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	Based on the findings of the Avifauna Impact Assessment (Appendix D.5 of this BA Report), the impacts identified and rated for Alternative 1 also applies to Alternative 2. **<u>Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the operational phase.</u>**		
NO-GO OPTION			
▪ Maintenance of the status quo.	***Direct Impacts:***		
	If this proposed project does not proceed: • None of the impacts mentioned above will occur. • Only the current agricultural (grazing) land use will remain. • The landowners of the affected farm portions will not be able to derive benefits from the implementation of an additional land-use. • No additional power will be generated or supplied through means of renewable energy resources by this project at this location. Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified.	Not applicable.	Not applicable.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	• There will be no contributions and assistance to the government in achieving its proposed renewable energy target of 17 800 MW by 2030. • Local communities will continue their dependence on agriculture production and government subsidies. • There will be lost opportunity for skills transfer and education/training of local communities. • The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised, which may lead to negative local socio-economic implications. • The local economic benefits associated with the REIPPPP will not be realised.		
	Indirect Impacts:		
	No indirect impacts have been identified for the operational phase for the No-go Option.		
	Cumulative Impacts:		
	No cumulative impacts have been identified for the operational phase for the No-go Option.		

Decommissioning Phase:

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
Alternative 1 (Preferred Alternative) – Refer to Section A (8) of this BA Report and the explanation above regarding applicable alternatives. ***Note that the following two alternatives have been assessed as part of the BA Process by the specialists and EAP:*** - ***Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape; and*** - ***Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape.*** ***Therefore, in this section, the impacts described are applicable to both Alternatives 1 and 2 (i.e. all the impacts noted in the Alternative 1 section apply to Alternative 2). The impacts are the same for both Alternative 1 and 2, except for the Visual Impacts, as these have been differentiated between Alternatives 1 and 2, as noted above. As a result, the impacts, significance and mitigation measures for both Alternative 1 and 2 have been displayed once under this section, with the exception of the potential Visual Impacts, to avoid repetition and for ease of reference and review.***			
▪ Establishment of a laydown area for equipment; ▪ Stockpiling of topsoil and cleared vegetation; ▪ Transportation of material and equipment to site; ▪ Removal of structures associated with the distribution line and electrical grid infrastructure; ▪ Compaction of and/or disturbances to soils due to demolition activities; ▪ Movement of heavy vehicles within the freshwater resource zones during demolition activities; ▪ Potential disposal of hazardous or non-hazardous waste and/or rubble within	***Direct Impacts:*** ***TERRESTRIAL ECOLOGY IMPACT ASSESSMENT*** • Vegetation and habitat alteration and reversion to secondary habitat structure at transformed sites. Removal of the proposed power line and related infrastructure will alter the localised topography at points, which may prevent successional processes establishing at these points on account of intrinsic changes in edaphics, lithic or other factors. Following the decommissioning of structures, the emergence of habitat that prevailed prior to construction may not arise and differing vegetation structures may establish, which may have consequences for the more expansive habitat (e.g. bush encroachment may be a consequential outcome of disturbance). Furthermore, the decommissioning of the construction laydown area around the proposed on-site substation will result in a cleared and altered biophysical environment (including edaphics and vegetation),	• Low (Negative)	• Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity. • Establish rehabilitation protocols and management interventions for site that would include post construction remediation and rehabilitation. • Rip and manage compacted surface soils at areas. Areas that have been subject to compaction should be ripped mechanically, or by hand in order to promote vegetative colonisation of the affected areas. • Undertake topographic sculpting of site. If and where required, areas should be sculpted to mimic the prevailing habitat. • Undertake management of secondary emergent vegetation communities to ensure that emergent vegetation is aligned to prevailing habitat.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
freshwater resources leading to proliferation of alien vegetation species, altered flow patterns and impacted water quality; ▪ Further removal of vegetation, particularly in the vicinity of the proposed on-site substations, impacting on the biodiversity maintenance of the freshwater environments; the overall sediment balance and the ability to control erosion; ▪ Site clearing and further removal of vegetation resulting in increased runoff which leads to erosion and alteration of the geomorphology of the freshwater resources; ▪ Inability to support biodiversity as a result of vegetation alteration, changes to water quality, increased sedimentation and alteration of natural hydrological regimes; ▪ Excavations and earthworks, leading to altered runoff patterns and altered preferential	which will give rise to differing surface and subsurface ecological drivers. Such a state is likely to give rise to altered surface hydrology, erosion, differing percolation and edaphic nature comparative to the prevailing environment; and exotic weed invasion or changes to emergent vegetation communities.		
	• Recruitment and behavioural change in fauna resulting in change in ecological processes and habitat.	• Low (Negative)	• Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity. Improved habitat complexity will buffer transformation and reduce impacts on faunal behaviour and populations.
	• Impact of solid waste generation on fauna as a result of potential ingestion or ensnarement. Solid waste (e.g. small bolts, wires etc.), and solid and derelict structures left on site following the demolition and removal of structures has the potential to harm or kill animals (local fauna) through ingestion or ensnarement.	• Low (Negative)	• Ensure that a thorough survey of the site following clearance and decommissioning is undertaken. All material is to be removed from site at the end of the decommissioning phase.
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	• Loss of freshwater habitat and ecological structure; changes to the freshwater resource ecological and sociocultural service provision; impacts on the freshwater resources hydrological function and sediment balance; and potential impacts on water quality.	• Low (Negative)	• Ensure that vegetation clearing and indiscriminate vehicle driving does not occur within demarcated sensitive areas, including the identified freshwater resources, their associated riparian zones and the applicable 32m NEMA zone of regulation. • Contractor laydown areas must not be permitted within the 32m NEMA zone of regulation around the identified freshwater resources. • Minimize decommissioning footprints and edge effects of demolition activities. • Promote indigenous vegetation growth to protect soils. • Implement alien vegetation control program. • Decommissioning activities should occur in the low flow season/dry season to avoid sedimentation and

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
flow paths, resulting in stream bank incision, sheet erosion, and gully formation; ▪ Earthworks in the vicinity of watercourses, leading to increased runoff and erosion and increased sediment inputs, potentially smothering riparian flora and altering surface water quality; ▪ Potential risk of contaminated runoff from machinery, leading to pollution of surface water; and ▪ Indiscriminate driving within the freshwater resource areas during routine maintenance activities, resulting in soil compaction.			minimize disturbance to hydraulic function. • Use appropriate techniques to support the hydrology and sediment control functions of the freshwater resource. A suitably qualified engineer should be consulted in this regard, and these techniques should be incorporated into the EMPr and stormwater management plan. • Limit excavations to ensure that drainage patterns return to normal after decommissioning. • No disposal of waste within/in the vicinity of the freshwater resources. Correct waste management principles must be implemented on site and adequate waste disposal facilities must be provided. • Rehabilitate disturbed areas through reprofiling and revegetation concurrently with decommissioning activities. • Desilt the freshwater resource areas affected by decommissioning activities. Desilting should preferably be undertaken by hand, and not using heavy machinery in order to avoid further impacts on the freshwater resources. • Stockpiled soil must be levelled during decommissioning to avoid sedimentation from runoff, and revegetated with indigenous vegetation. • Compacted soil should be ripped, reprofiled and reseeded with indigenous vegetation.
	VISUAL IMPACT ASSESSMENT		
	• Potential visual intrusion of decommissioning activities associated with electrical infrastructure along Alternative 1 on views of sensitive visual receptors.	• Moderate (Negative)	• Where possible decommissioning camps and laydown areas should be located (where sensitive visual receptors are least likely to be affected): ▪ In low visibility areas (e.g. avoid ridgelines and open plains); ▪ Previously disturbed areas (e.g. clearings created by farmers for other purposes which are no longer being used); and/or ▪ Areas near derelict farmsteads (taking into consideration the findings of the Heritage Impact Assessment as well as other

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			assessments that may be relevant), particularly where existing trees can be used to screen these areas from views. • Disturbed and transformed areas should be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes. • Stockpiled topsoil should be reapplied to disturbed areas and these areas should be re-vegetated using a mix of indigenous species in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape. • Edges of re-vegetated areas should be feathered to reduce form and line contrasts with surrounding undisturbed landscape. • Working at night should be avoided, where possible. • Night lighting of reclamation sites should be minimised within requirements of safety and efficiency.
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	• Destruction of archaeological remains as a result of the removal of the proposed powerlines, on-site substation and rehabilitation of the service road. Direct impacts to archaeological resources are highly unlikely to occur during this phase because vehicles will use the already established service road and public road.	• Very Low (Negative)	• Ensure that all vehicles remain on the service road at all times.
	• Alteration of the cultural landscape as a result of the removal of the proposed powerlines, on-site substation and rehabilitation of the service road. The cultural landscape will be impacted through the presence of vehicles in the rural landscape when the proposed power lines are removed.	• Very Low (Negative)	• Ensure that rehabilitation is effective and that no landscape scarring remains visible from long distances.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	• Destruction of palaeontological material as a result of the removal of the proposed powerlines, on-site substation and rehabilitation of the service road. Direct impacts to palaeontological resources are highly unlikely to occur during this phase because vehicles will use the already established service road and public road (it is important to note that for this reason the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.1 of this BA Report) did not specifically address the decommissioning phase. The Palaeontological Impact Assessment explains that significant further adverse impacts on local palaeontological heritage resources are very unlikely and not anticipated during the operational, decommissioning and rehabilitation phases of the proposed project, therefore it has not been separately assessed and no further mitigation or management measures in this respect are proposed.	• Very Low (Negative)	• Ensure that all vehicles remain on the service road at all times.
	AVIFAUNA IMPACT ASSESSMENT		
	• Displacement of Red Data avifauna due to disturbance associated with the decommissioning activities.	• Moderate (Negative)	• A site-specific Decommissioning EMPr must be implemented, which gives an appropriate and detailed description of how decommissioning activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the Decommissioning EMPr and should apply good environmental practice during decommissioning. • Following decommissioning, rehabilitation of all areas disturbed must be undertaken and to this end a habitat restoration plan is to be developed by a

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
			rehabilitation specialist and implemented accordingly.
	Indirect Impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	Not Applicable. Indirect impacts were not identified for the decommissioning phase in the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report).		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	Not applicable. As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the overall low direct impact significance of the proposed electrical infrastructure during the construction, operational and decommissioning phases when mitigation measures are applied, potential indirect impacts which the proposed electrical infrastructure might have on the receiving freshwater resources were therefore considered to be negligible, and were therefore not assessed in the specialist report since they are considered to be inconsequential.		
	VISUAL IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Visual Impact Assessment (Appendix D.3 of this BA Report).		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), because of the very low probability of indirect impacts occurring, the significance of all such impacts will be very low, and certainly lower than the significance of the potential direct impacts listed above. Therefore, it was not deemed necessary by the specialist to specifically assess potential indirect impacts. Furthermore, indirect impacts were not identified in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Avifauna Impact Assessment (Appendix D.5 of this BA Report).		
	Cumulative Impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	• Increased ELP levels as a result of light pollution that may be associated with all built structures of the proposed project and the projects considered within the 50 km radius, including the wind turbines of the various proposed WEFs listed in Section D.1 above. The cumulative level of increased lighting in the area will serve to alter the behaviour of a number of nocturnal (and possibly crepuscular and diurnal) species and alter ecological processes in and around these points (i.e. localised change in species composition and ethology with concomitant change	• Moderate (Negative)	• The direction of lighting should not be focused outside of the subject area, while the level of lumens should be such that the necessary lighting to achieve its objective is achieved (security, operations etc.).

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	in ecosystem function).		
	• Increased dissection of habitat on account of increasing levels of infrastructure resulting in changes in plant community structure and species composition. Such dissection will have already arisen as a consequence of the establishment of the proposed turbines and road network across the site (as a result of the proposed Sutherland, Sutherland 2 and Rietrug WEFs), effectively dividing the properties into numerous dissected habitats.	• Moderate (Negative)	• Implementation of control measures relating to conduct of staff and contractors on site and in relation to the prevailing natural environment.
	• Increased presence of exotic and disturbance driven plant species. With increasing levels of anthropogenic activity on site and within the surrounding area, the propensity for plant invasion or the dominance of species that are tolerant of higher levels of disturbance will see such species dominating and perhaps ousting other less tolerant species.	• Moderate (Negative)	• Implement vegetation management and conservation initiatives, such as control of exotic vegetation, and avoid unnecessary disturbance to the ground which promotes exotic weed invasion and vegetation change.
	• Altered surface hydrology and impact on plant community structure. Increasing levels of areas dominated by built structures will see localised changes in surface hydrology across the subject site. These changes affect habitat structure and form within the terrestrial environment.	• Low (Negative)	• Implement ripping of disturbed areas and create a managed environment.
	• Increased and expanded anthropogenic influences across the region. The nature of the surrounding proposed WEFs, electrical infrastructure and Solar Energy Facilities (as noted in Section D.1 above) suggests that human activity will arise at points that are presently only intermittently visited by	• Moderate (Negative)	• Control and management procedures relating to decommissioning procedures in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	a farmer or his staff. With the proposed projects listed in Section D.1 above, as well as the proposed Rietrug WEF Electrical Grid Infrastructure (i.e. this project), greater levels of human activity can be anticipated across the area, with the likely influence of ousting particular species of fauna.		
	• Increased noise pollution levels with concomitant impact on faunal behaviour. Allied to increasing human presence across the site, increase noise levels, together with the other electrical infrastructure proposed by the projects listed in Section D.1 above, may influence behaviour in respect of smaller mammals and other fauna that utilise sound in their various behavioural patterns (prey detection, social interaction).	• Low (Negative)	• Control and management procedures relating to decommissioning procedures in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).
	• Vegetation and habitat alteration, and change in ecological processes and habitat with reversion to secondary habitat structure at transformed sites.	• Low (Negative) • *Note that the status of this potential impact is rated as negative with some potential positive aspects. Positive impacts may include increased variability in habitat (i.e. secondary habitat and present primary habitat form; increased grassland communities etc.).*	• Compile and implement a Vegetation Rehabilitation Plan for the decommissioning phase in order to improve habitat diversity.
	• Recruitment and behavioural change in fauna (i.e. change in ecological processes and habitat).	• Low (Negative)	• Compile and implement a Vegetation Rehabilitation Plan for the decommissioning phase in order to improve habitat diversity and maintenance of improved habitat within areas subject to change as a consequence of the proposed development.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	• Loss of freshwater habitat and ecological structure; changes to the freshwater resource ecological and sociocultural service provision; impacts on the freshwater resources hydrological function and sediment balance; and potential impacts on water quality.	• Low (Negative)	• Ensure that vegetation clearing and indiscriminate vehicle driving does not occur within demarcated sensitive areas, including the identified freshwater resources, their associated riparian zones and the applicable 32m NEMA zone of regulation. • Contractor laydown areas must not be permitted within the 32m NEMA zone of regulation around the identified freshwater resources. • Minimize demolition footprints and edge effects of decommissioning activities. • Promote indigenous vegetation growth to protect soils. • Implement alien vegetation control program. • Decommissioning activities should occur in the low flow season/ dry season to avoid sedimentation and minimize disturbance to hydraulic function. • Limit excavations to ensure that drainage patterns return to normal after decommissioning. • No disposal of waste within/in the vicinity of the freshwater resources. Correct waste management principles must be implemented on site and adequate waste disposal facilities must be provided. • Rehabilitate disturbed areas through reprofiling and revegetation. • Desilt the freshwater resource areas affected by demolition activities. Desilting should preferably be undertaken by hand, and not using heavy machinery in order to avoid further impacts on the freshwater resources. • Stockpiled soil must be levelled to avoid sedimentation from runoff, and revegetated with indigenous vegetation. • Compacted soil should be ripped, reprofiled and reseeded with indigenous vegetation.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	VISUAL IMPACT ASSESSMENT		
	Not applicable. As noted in the Visual Impact Assessment (Appendix D.3 of this BA Report), cumulative impacts are predicated and assessed only for the operational phase of the proposed development since the construction and decommissioning phases are temporary and will not change the landscape character.		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. Cumulative impacts for the decommissioning phase were not identified in the Heritage Impact Assessment (Appendix D.4 of this BA Report) and Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	• Temporary displacement of Red Data avifauna due to disturbance associated with the decommissioning of the proposed on-site substation (including the O&M Building and laydown area), service road and powerline; permanent displacement of Red Data avifauna due to habitat transformation associated with the decommissioning of the proposed power line, service road and on-site substation (including the O&M Building and laydown area), and mortality of Red Data avifauna due to collisions and electrocutions. The incremental impact of the proposed on-site substation (including the O&M Building and laydown area), service road and powerline on Red Data avifauna added to the impacts of other past, present or reasonably foreseeable future activities.	• Moderate (Negative)	• A site-specific Decommissioning EMPr must be implemented, which gives an appropriate and detailed description of how decommissioning activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the Decommissioning EMPr and should apply good environmental practice during decommissioning. The Decommissioning EMPr should specifically include the following: ▪ The minimum footprint areas for infrastructure should be used wherever possible; ▪ Ensure that no off-road driving is allowed; ▪ Ensure maximum use of existing roads; ▪ Measures to control dust; ▪ Measures to control noise; and ▪ Ensure that access to the rest of the property is restricted. • Following decommissioning, rehabilitation of all areas disturbed must be undertaken and to this end a habitat restoration plan is to be developed by a rehabilitation specialist and implemented accordingly.
Alternative 2 – Refer to Section A (8) of this BA Report and the explanation above regarding applicable alternatives. ***Note that the following two alternatives have been assessed as part of the BA Process by the specialists and EAP:*** - ***Alternative 1: Distribution Line Routing and Connection to the Proposed Collector Hub in the Northern Cape; and*** - ***Alternative 2: Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape.***			

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
Refer to the explanation provided above; all the impacts noted in the Alternative 1 section apply to Alternative 2, except for the Visual Impacts, as these have been differentiated between Alternatives 1 and 2, as noted above.			
▪ Establishment of a laydown area for equipment; ▪ Stockpiling of topsoil and cleared vegetation; ▪ Transportation of material and equipment to site; ▪ Removal of structures associated with the distribution line and electrical grid infrastructure; ▪ Compaction of and/or disturbances to soils due to demolition activities; ▪ Movement of heavy vehicles within the freshwater resource zones during demolition activities; ▪ Potential disposal of hazardous or non-hazardous waste and/or rubble within freshwater resources leading to proliferation of alien vegetation species, altered flow patterns and impacted water quality; ▪ Further removal of vegetation, particularly in the vicinity of the proposed on-site substations, impacting	***Direct impacts:***		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	The Direct Impacts identified in the Terrestrial Ecology Impact Assessment for Alternative 2 of the Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape are the same as that identified for Alternative 1. **As noted in the Terrestrial Ecology Assessment (Appendix D.1 of this BA Report), the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar and therefore proffer the same level of impact (i.e. the impact significance does not differ)**. However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1. **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the decommissioning phase.**		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the similarity of the perceived impacts, as well as the largely similar sensitivities of the freshwater resources associated with the study area, the impact assessment was undertaken once for both Alternative 1 and Alternative 2 of the proposed distribution line and connection to the third party substations, the service roads associated with the proposed development, and the proposed on-site substation and link to the third party substation. **The perceived impacts, significance thereof, impact ratings and mitigation measures are the same for both alternatives**. **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the decommissioning phase.**		
	VISUAL IMPACT ASSESSMENT		
	• Potential visual intrusion of decommissioning activities associated with electrical infrastructure along Alternative 2 on views of sensitive visual receptors.	• Moderate (Negative)	• Where possible decommissioning camps and laydown areas should be located (where sensitive visual receptors are least likely to be affected): ▪ In low visibility areas (e.g. avoid ridgelines and open plains); ▪ Previously disturbed areas (e.g. clearings created by farmers for other purposes which are no longer being used); and/or ▪ Areas near derelict farmsteads (taking into consideration the findings of the Heritage Impact Assessment as well as other assessments that may be relevant), particularly where existing trees can be used to screen these areas from views. • Disturbed and transformed areas should be contoured

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
on the biodiversity maintenance of the freshwater environments; the overall sediment balance and the ability to control erosion; ▪ Site clearing and further removal of vegetation resulting in increased runoff which leads to erosion and alteration of the geomorphology of the freshwater resources; ▪ Inability to support biodiversity as a result of vegetation alteration, changes to water quality, increased sedimentation and alteration of natural hydrological regimes; ▪ Excavations and earthworks, leading to altered runoff patterns and altered preferential flow paths, resulting in stream bank incision, sheet erosion, and gully formation; ▪ Earthworks in the vicinity of watercourses, leading to increased runoff and erosion and increased sediment inputs,			to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes. • Stockpiled topsoil should be reapplied to disturbed areas and these areas should be re-vegetated using a mix of indigenous species in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape. • Edges of re-vegetated areas should be feathered to reduce form and line contrasts with surrounding undisturbed landscape. • Working at night should be avoided, where possible. • Night lighting of reclamation sites should be minimised within requirements of safety and efficiency.
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), **the impact assessments apply equally to both Alternative 1 and Alternative 2. The nature and significance of impacts – based on known sites – is likely to be the same except that a few more sites may be affected by Alternative 2 because it is longer**. As noted in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report), given the rather uniform geology and sparse, largely unpredictable distribution of recorded or anticipated palaeontological resources within the Rietrug WEF electrical grid infrastructure study area, this impact assessment applies equally to all the proposed on-site and third party substation sites as well as the alternative 132 kV powerline routes under consideration for the Rietrug WEF electrical grid infrastructure project (i.e. both Alternative 1 and Alternative 2). **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the decommissioning phase.**		
	AVIFAUNA IMPACT ASSESSMENT		
	Based on the findings of the Avifauna Impact Assessment (Appendix D.5 of this BA Report), the impacts identified and rated for Alternative 1 also applies to Alternative 2. **Therefore, please refer to the direct impacts indicated above for Alternative 1 for the decommissioning phase.**		
	Indirect impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	Not Applicable. Indirect impacts were not identified for the decommissioning phase in the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report).		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
potentially smothering riparian flora and altering surface water quality; ▪ Potential risk of contaminated runoff from machinery, leading to pollution of surface water; and ▪ Indiscriminate driving within the freshwater resource areas during routine maintenance activities, resulting in soil compaction.	Not applicable. As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the overall low direct impact significance of the proposed electrical infrastructure during the construction, operational and decommissioning phases when mitigation measures are applied, potential indirect impacts which the proposed electrical infrastructure might have on the receiving freshwater resources were therefore considered to be negligible, and were therefore not assessed in the specialist report since they are considered to be inconsequential.		
	VISUAL IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Visual Impact Assessment (Appendix D.3 of this BA Report).		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. As noted in the Heritage Impact Assessment (Appendix D.4 of this BA Report), because of the very low probability of indirect impacts occurring, the significance of all such impacts will be very low, and certainly lower than the significance of the potential direct impacts listed above. Therefore, it was not deemed necessary by the specialist to specifically assess potential indirect impacts. Furthermore, indirect impacts were not identified in the Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	Not applicable. Indirect impacts were not identified in the Avifauna Impact Assessment (Appendix D.5 of this BA Report).		
	Cumulative impacts:		
	TERRESTRIAL ECOLOGY IMPACT ASSESSMENT		
	The Cumulative Impacts identified in the Terrestrial Ecology Impact Assessment for Alternative 2 of the Distribution Line Routing and Connection to the Proposed Eskom Nuwerust Substation in the Western Cape are the same as that identified for Alternative 1. **As noted in the Terrestrial Ecology Assessment (Appendix D.1 of this BA Report), the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar and therefore proffer the same level of impact (i.e. the impact significance does not differ)**. However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1. **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the decommissioning phase.**		
	AQUATIC ECOLOGY (FRESHWATER) IMPACT ASSESSMENT		
	As noted in the Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report), due to the similarity of the perceived impacts, as well as the largely similar sensitivities of the freshwater resources associated with the study area, the impact assessment was undertaken once for both Alternative 1 and Alternative 2 of the proposed distribution line and connection to the third party substations, the service roads associated with the proposed development, and the proposed on-site substation and link to the third party substation. **The perceived impacts, significance thereof, impact ratings and mitigation measures are the same for both alternatives**. **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the decommissioning phase.**		
	VISUAL IMPACT ASSESSMENT		
	Not applicable. As noted in the Visual Impact Assessment (Appendix D.3 of this BA Report), cumulative impacts are predicated and assessed only for the operational phase of the proposed development since the construction and decommissioning phases are temporary and will not		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE	PROPOSED MITIGATION
	change the landscape character.		
	HERITAGE IMPACT ASSESSMENT (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)		
	Not applicable. Cumulative impacts for the decommissioning phase were not identified in the Heritage Impact Assessment (Appendix D.4 of this BA Report) and Palaeontological Impact Assessment (which is included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report).		
	AVIFAUNA IMPACT ASSESSMENT		
	Based on the findings of the Avifauna Impact Assessment (Appendix D.5 of this BA Report), the impacts identified and rated for Alternative 1 also applies to Alternative 2. **Therefore, please refer to the cumulative impacts indicated above for Alternative 1 for the decommissioning phase.**		
NO-GO OPTION			
▪ Maintenance of the status quo.	***Direct Impacts:***		
	If this project does not go ahead there will be no need to decommission the project. Therefore direct impacts during the decommissioning phase for the No-go Option are not applicable.	Not applicable.	Not applicable.
	Indirect Impacts:		
	If this project does not go ahead there will be no need to decommission the project. Therefore indirect impacts during the decommissioning phase for the No-go Option are not applicable.	Not applicable.	Not applicable.
	Cumulative Impacts:		
	If this project does not go ahead there will be no need to decommission the project. Therefore cumulative impacts during the decommissioning phase for the No-go Option are not applicable.	Not applicable.	Not applicable.

2. ENVIRONMENTAL IMPACT STATEMENT

2.1. Overall Impact Assessment including Alternatives 1 and 2 of the Proposed Distribution Line Routing and Connection to the proposed Third Party Substation

As mentioned above, layout, technology and other alternatives for this proposed BA project are not applicable. Site alternatives for the proposed on-site substation (including O&M Building and laydown area) are not applicable as the proposed project location is dependent on the location of the proposed WEF. Location alternatives of the proposed distribution line are also dependent on and determined by the location of the proposed WEF, the proposed collector hub (i.e. Moyeng Suurplaat on-site substation) and the proposed Eskom Nuwerust Substation, as well as environmental sensitivities identified by the specialists, landowner willingness and feasibility in terms of cost effectiveness. As previously explained the locations of the third party substations are fixed, which influences the connection and routing of the distribution line thereto. Nevertheless, two location alternatives for the third party substation and distribution line routings thereto have been assessed in this BA Report.

This section provides a summary of the BA and conclusions drawn from the impacts identified as a result of the proposed project. It is important to note that only the findings of the main specialist studies are summarised in this section. All additional impacts identified by the EAP (outside of those covered by the specialist studies) have been rated with a moderate to low significance with the implementation of mitigation measures (i.e. no impacts have been identified with a high impact significance with the implementation of mitigation measures).

- **Terrestrial Ecology Impact Assessment:**

A Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report) was conducted as part of the BA Process in order to identify and assess potential impacts associated with the construction, operation and decommissioning phases of the proposed project on the terrestrial ecology within the surrounding regions.

The following main impacts were identified in the Terrestrial Ecology Impact Assessment:

Construction Phase:

- Removal of indigenous vegetation and site clearance will be required, particularly within and around the area required for the proposed on-site substation, laydown area, O&M Building, service road, and at the towers along the powerline. This will entail the clearance of primarily indigenous vegetation.
- Loss, disturbance or alteration of botanical communities at a localised level, particularly geophytes and uncommon to rare species as a result of site clearance, as well as destruction of localised vegetation communities.
- Alteration of lithic structures and clearance of minor features will need to be undertaken for the establishment of the proposed on-site substation, laydown area, O&M Building, service road, and pylon towers. The towers, substation and its associated built structures will require the levelling of areas which may include eco-geomorphologically important points. The service road will also traverse level to steeper ground and require some level of clearance of vegetation and disturbance along the powerline route.
- Loss of refugia, particularly in respect of fauna associated with lithic habitats (e.g. *Homopus spp*). Rock ledges and other geological structures are intrinsic habitat for species such as padlopers (tortoises). The removal of these features will see the loss of such habitat.
- Direct faunal mortalities: the construction activities may directly and indirectly result in fauna such as and in particular tortoise, or other animals being killed or injured through traffic movement or general disturbance to site and beyond the site.
- Hardpanning of the upper soil horizon, thereby altering surface hydrology. The movement of traffic across site and around the construction areas, as well as intentional use of materials to establish a sound working platform, will result in the compaction of soils and concomitant changes in surface water discharge.

- Import of earth materials and the general disturbance of the site, may give rise to the invasion and a prevalence of exotic vegetation. Exotic weeds and other vegetation may establish and flourish within a disturbed environment such as a construction site. The import of soils and other materials may facilitate such invasion through the inadvertent import of seed and other propagules. The subject area may be subject to some invasion by exotic or in some cases, indigenous plants during and after the construction phase.
- General erosion through, primarily the movement of construction traffic. As traffic in particular, moves across the site, disturbance to surfaces and compaction may facilitate erosion of soils, particularly on steeper slopes where the trampling and compaction of vegetation ensues. Such impacts may be localised but evident both during and post construction.
- Solid waste and its impact on fauna through ingestion or ensnarement. Construction of both the proposed on-site substation and towers will result in solid waste generation.
- General change in faunal behaviour. Construction activities will alter faunal behaviour in and around the site through effects such as altering corridors associated with movement, herbivory and predation. Certain species will benefit from the various changes in land use, while others will be ousted from areas.
- Vegetation and habitat alteration through the introduction of nutrients and other materials: The construction phase will result in increased human presence within presently unencumbered areas, leading to increased noise, dust and changes in prevailing biophysical factors within the study area; increased light pollution from the proposed site camp and related areas of the site; import of materials not associated with the surrounding environment, resulting in increased risks of a localised nature, if not managed; changes in edaphic form and structure; and solid and liquid waste associated with construction activities including sewage and solid waste. These factors, through impacts on both flora and fauna will serve to alter local ecological processes through the introduction of nutrients and other materials which may impact directly or indirectly on flora and faunal components of region.

Operational Phase:

- Disturbance as a result of general activities associated with the operation and maintenance of the proposed on-site substation and O&M Building, which will include replacing of parts and infrastructure, as well as use of materials such as hydrocarbons, which may find their way into the broader environment through spillage and loss during the power line and service road maintenance processes.
- Disturbance as a result of general activities during the power line and service road maintenance processes.
- Alteration of vegetation community structure through maintenance operations around the on-site substation, O&M building, service road and powerline. As human traffic, vehicles and general maintenance procedures commence, vegetation will be affected by such disturbance and over time, habitat form and structure may change, particularly around towers and the on-site substation and its associated infrastructure.
- Introduction of exotic vegetation through movement of vehicles within the study area. As vehicles move along, in particular the powerline, locally exotic plant propagules carried by the vehicles may be introduced into areas within the study site. The potential for such introductions to change or alter the local ecology is evident.
- Increase in terrestrial mortalities through the movement of vehicles along line route (particular tortoises). Electric fencing also offers a potential threat to some species. As with the construction phase, components such as electric fences, moving vehicles and other activities have the potential to inflict lethal consequences on smaller and less mobile species such as tortoises.
- Change in faunal behaviour on account of increased lighting around the proposed on-site substation (ELP). The proposed on-site substation will be lit at night. As a consequence, some, in particular invertebrate species, may be attracted to such lights which have concomitant influences on other species' behavioural patterns in the area. Alternatively, hunting and other behaviours may alter as a consequence of additional lighting within an area previously devoid of such factor.
- Change in faunal community structure as a consequence of increased perching points for raptors. Powerlines will afford some birds of prey that hunt from perched positions improved

opportunities for the detection and capture of prey. Such increases in predation pressures on potential prey species (e.g. *Mastomys coucha*) in and around the proposed powerline may have consequences for localised ecological processes and for example, small mammal populations.

Decommissioning Phase:
- Vegetation and habitat alteration as result of the removal of the proposed infrastructure will alter the localised topography at points, which may prevent successional processes establishing at these points on account of intrinsic changes in edaphics, lithic or other factors.
- Recruitment and behavioural change in fauna.
- Solid waste and the impact on fauna through ingestion or ensnarement. As indicated, with solid waste materials being left on site following the demolition or removal of structures, the potential to inflict lethal injury to local fauna remains.

Cumulative Impacts:
- Increased dissection of habitat on account of increasing levels of infrastructure.
- Increased presence of exotic and disturbance driven plant species due to increasing levels of anthropogenic activity on site and within the surrounding area.
- Altered surface hydrology and impact on plant community structure as a result of increasing levels of areas dominated by built structures.
- Increased and expanded anthropogenic influences across the region.
- Increased ELP levels as a result of light pollution associated with all built structures of the proposed project and the projects listed in Section D.1 above, including the wind turbines of the various proposed WEFs listed above. The cumulative level of increased lighting in the area will serve to alter the behaviour of a number of nocturnal (and possibly crepuscular and diurnal) species and alter ecological processes in and around these points.
- Increased noise pollution levels with concomitant impact on faunal behaviour.
- Vegetation and habitat alteration and change in ecological processes and habitat, with reversion to secondary habitat structure at transformed sites.
- Recruitment and behavioural change in fauna (change in ecological processes and habitat).

The specialist study has determined that most significantly, the 1600 m contour and topographically variable lithic features across the site are determined to be of eco-geomorphological value and importance, while the potential impact of construction and operations are likely to see subtle changes in the vegetative and faunal composition of sites adjacent to the development footprint.

Table 16 below illustrates a summary of the overall impact significance, with the implementation of mitigation measures, identified in the Terrestrial Ecology Impact Assessment.

Table 16: Summary of the Overall Impact Significance (Post Mitigation) for the Terrestrial Ecological Impact Assessment (Alternative 1 and Alternative 2)

Phase and Type of Impact	Overall Significance After Mitigation
Construction Phase: Direct and Indirect Impacts	Low
Operational Phase: Direct and Indirect Impacts	Low
Decommissioning Phase: Direct Impacts	Very Low
Cumulative Impacts: Construction Phase	Very Low
Cumulative Impacts: Operational Phase	Low
Cumulative Impacts: Decommissioning Phase	Very Low

Overall, the above impacts are predicted to be of a low to very low significance with the implementation of mitigation measures. It is clear from Table 16 that no impacts were assessed as being of high significance after the implementation of mitigation measures, and that the construction and operational phases offer generally low significance impacts to the project site provided the recommended mitigation options are exercised. It is however, to be noted that such impacts are considered to be of low significance, primarily on account of the generally confined spatial extent of such impacts (i.e. proposed on-site substation, O&M Building, laydown area, service road, powerline and tower footprints), as well as the generally low level of habitat diversity

associated with the proposed on-site substation site and powerline route. Notably, the highest risk or impact is associated with the construction phase, where lithic habitat forms such as ledges and rocky outcrops may have to be removed to facilitate construction, however in such cases, the implementation of mitigation measures will reduce such impacts to low significance where implemented.

It is evident when considering the cumulative impacts across the site, that the proposed on-site substation (including the O&M Building and laydown area), and the majority of the proposed powerline and service road route alternatives lie primarily amidst the approved REFs and associated electrical infrastructure. If impacts are determined according to this approved and expectant land use, then the cumulative level of impact associated with the proposed on-site substation and powerline must be considered to vary between low to very low significance.

- **Aquatic Ecology (Freshwater) Impact Assessment:**

An Aquatic Ecology (Freshwater) Impact Assessment (Appendix D.2 of this BA Report) was conducted as part of the BA Process in order to identify and assess potential impacts associated with the construction, operational and decommissioning phases of the proposed project on the freshwater resources and aquatic ecology within the surrounding regions.

The following main impacts were identified in the Aquatic Ecology (Freshwater) Impact Assessment:

Construction, Operational and Decommissioning Phases (including Direct and Cumulative Impacts):
- Loss of habitat and ecological structure;
- Changes to ecological and sociocultural service provision;
- Hydrological function and sediment balance; and
- Impacts on water quality.

In terms of cumulative impacts, most of the relevant projects considered were identified adjacent to the study area; however, not located within the same catchment as the freshwater resources identified within the study area. Those projects falling within the catchments of the freshwater resources identified within the study area include the Sutherland, Sutherland 2, Rietrug and Suurplaat WEFs, as well as the proposed Sutherland and Sutherland 2 Electrical Grid Infrastructure BA projects. However, due to the topography of the area, it is considered very likely that several potential impacts associated with these projects on the freshwater resources will be minimized, as the predominantly mountainous terrain will aid in containing impacts.

Table 17 below illustrates a summary of the overall impact significance, with the implementation of mitigation measures, identified in the Aquatic Ecology (Freshwater) Impact Assessment.

Table 17: Summary of the Overall Impact Significance (Post Mitigation) for the Aquatic Ecology (Freshwater) Impact Assessment (Alternative 1 and Alternative 2)

Phase and Type of Impact	Overall Significance After Mitigation
Construction Phase: Direct Impacts	Very Low
Operational Phase: Direct Impacts	Very Low
Decommissioning Phase: Direct Impacts	Very Low
Cumulative Impacts: Construction Phase	Very Low
Cumulative Impacts: Operational Phase	Very Low
Cumulative Impacts: Decommissioning Phase	Very Low

The results of the impact assessment indicate that overall, during the construction, operational and decommissioning phases, the significance of potential impacts on any of the freshwater resources is likely to be low (before the implementation of mitigation measures). Careful planning of the location of the proposed on-site substation, connection to the third party substation, proposed distribution line and service road beneath the distribution line, in order to avoid freshwater

resources as far as possible, will aid in minimising the impact significance. In addition, strict adherence to cogent, well-developed mitigation measures (as included in Section D.1 and Appendix D.2 of this BA Report) will further minimise risks, reducing the impact significance to very low levels. Based on the findings of the specialist study, it is the opinion of the ecologists that the project is regarded as having low levels of impact on the surrounding freshwater resources identified, even if less than desirable mitigation of impacts occurs. It is nevertheless strongly recommended that strict implementation of mitigation measures throughout all phases of the proposed project takes place in order to ensure that perceived impacts can be reduced to, and remain at, very low significance levels. Therefore, from a freshwater resource conservation perspective, the proposed project is not considered to be "fatally flawed".

- **Visual Impact Assessment:**

A Visual Impact Assessment (Appendix D.3 of this BA Report) was conducted as part of the BA Process in order to identify and assess potential impacts associated with the construction, operation and decommissioning phases of the proposed project on the surrounding sensitive viewers and receptors.

The following main impacts were identified in the Visual Impact Assessment:

Construction Phase:
- Potential visual intrusion of construction activities on existing views of sensitive visual receptors in the surrounding landscape.

Operational Phase:
- Potential landscape impact of the proposed electrical infrastructure on a rural agricultural landscape with a strong sense of remoteness and potential for scenic views; and
- Potential visual intrusion of the proposed electrical infrastructure on the views of sensitive visual receptors.

Decommissioning Phase:
- Potential visual intrusion of decommissioning activities on existing views of sensitive visual receptors.

Cumulative Impacts:
- Cumulative impact of renewable energy generation projects and electrical infrastructure on the existing rural-agricultural landscape; and
- Cumulative visual impact of renewable energy generation projects and electrical infrastructure on existing views of sensitive visual receptors in the surrounding landscape.

Table 18 below illustrates a summary of the overall impact significance, with the implementation of mitigation measures, identified in the Visual Impact Assessment.

Table 18: Summary of the Overall Impact Significance (Post Mitigation) for the Visual Impact Assessment (Alternative 1 and Alternative 2)

Phase and Type of Impact	Overall Significance After Mitigation
Construction Phase: Direct Impacts	Low (Alternative 1) and Low (Alternative 2)
Operational Phase: Direct Impacts	Very Low (Alternative 1) and Low (Alternative 2)
Decommissioning Phase: Direct Impacts	Low (Alternative 1) and Low (Alternative 2)
Cumulative Impacts: Operational Phase	Very Low (Alternative 1) and Very Low (Alternative 2)

As noted above, no indirect impacts were identified in the Visual Impact Assessment. As shown in Table 18 above, the proposed construction and decommissioning activities will potentially cause a low significance visual impact for either alternative if mitigation measures are successfully implemented. The overall significance of the potential visual impact of the operation of the proposed electrical infrastructure will be very low for Alternative 1 and low for Alternative 2 if

mitigation measures are successfully implemented. Furthermore, the overall significance of the cumulative visual impact on sensitive visual receptors is expected to be very low (with successful mitigation measures implemented) for all phases of the projects since the proposed electrical infrastructure will fit into the landscape and will be familiar elements in views. It is clear from Table 18 that no impacts were assessed as being of high significance after the implementation of mitigation.

- **Heritage Impact Assessment (Palaeontology, Archaeology and Palaeontology):**

A Heritage Impact Assessment (Appendix D.4 of this BA Report) was conducted as part of the BA Process in order to identify and assess potential impacts associated with the construction, operation and decommissioning phases of the proposed project on the palaeontology, archaeology and the cultural landscape.

The following main impacts were identified in the Heritage Impact Assessment:

Palaeontology:

Construction Phase:
- Potential loss of palaeontological heritage resources through disturbance, damage or destruction of fossils and fossil sites (including associated geological contextual data) through surface clearance and excavation activities during the construction phase.

Cumulative Impacts:
- The Palaeontology Impact Assessment (included as an appendix to the Heritage Impact Assessment in Appendix D.4 of this BA Report) explains that due to the current absence of field-based palaeontological heritage assessments for the relevant Sutherland, Sutherland 2 and Rietrug WEFs (which were requested in the pre-construction phase by SAHRA, Interim Comment of 5 July 2016; Case ID 9622), as well as the separate Moyeng Energy Suurplaat WEF, it is not yet feasible to meaningfully assess cumulative palaeontological impacts for the associated electrical grid infrastructure. Among available palaeontological impact studies for other developments proposed for the region, the most relevant are those on the Roggeveld Plateau for Jakhals Valley solar project (Almond, 2011) and the Gunsfontein WEF (Almond, 2015g), both located to the south of Sutherland and west of the present study area. The Gamma-Omega 765 kV powerline study by Almond (2012a) considers fossil heritage in the Koup region to the west of Merweville. There are numerous further WEF projects proposed for the Klein-Roggeveld region, below the great escarpment and south of the present study area, but for the most part these concern rocks and fossil assemblages that are older than those encountered in the present study area; exceptions include the Maralla East and Maralla West WEFs (Almond 2015h, 2015i) as well as the Komsberg West and Komsberg East WEFs (Almond 2015j, 2015k).

  In all the strictly relevant field-based palaeontological studies previously undertaken by Dr. John Almond in the Klein-Roggeveld and Roggeveld Plateau regions the palaeontological sensitivity of the project area and the palaeontological heritage impact significance for the developments concerned has been rated as low. In all cases it was concluded that, despite the undoubted occurrence of scientifically-important fossil remains (notably fossil vertebrates, vertebrate trackways and burrows, petrified wood), the overall impact significance of the proposed developments was low because the probability of significant impacts on scientifically important, unique or rare fossils was slight. While fossils do indeed occur within some of the formations present, they tend to be sparse – especially as far as fossil vertebrates are concerned - while the great majority represent common forms that occur widely within the outcrop areas of the rock units concerned. It is concluded that – pending the outcome of outstanding palaeontological field-based studies for the Moyeng Energy Suurplaat WEF and original Mainstream Sutherland WEF (now split into the Sutherland, Sutherland 2 and Rietrug WEFs) - the cumulative impact significance of the proposed new electrical grid infrastructure developments in the context of other regional projects is likely to be low (negative). This is the case provided that the proposed monitoring and mitigation recommendations made for all these

various projects are followed through. Unavoidable residual negative impacts may be partially offset by the improved understanding of Karoo palaeontology resulting from appropriate professional mitigation. This is regarded as a positive impact for Karoo palaeontological heritage. However, without mitigation the magnitude of cumulative (negative, direct) impacts of such a large number of WEFs and associated powerlines affecting the same (albeit sparsely) fossiliferous rock successions would be significantly higher and probable. The cumulative impact significance without mitigation is accordingly assessed provisionally as medium.

As indicated in the Impact Assessment tables above, the Palaeontology Impact Assessment explains that the planning, operational and decommissioning phases of the proposed electrical grid infrastructure are very unlikely to involve further significant adverse impacts on local palaeontological heritage. Therefore, no further mitigation measures or impact assessment has been provided in this regard. In addition, no indirect impacts were identified in the Palaeontology Impact Assessment.

Archaeology and Cultural Landscape (including Palaeontology):

Construction Phase (Direct and Cumulative Impacts):
- Destruction of archaeological resources as a result of the construction of the proposed powerlines, on-site substation and service road;
- Destruction of palaeontological material as a result of the construction of the proposed powerlines, on-site substation and service road; and
- Alteration of the cultural and natural landscape as a result of the construction of the proposed powerlines, on-site substation and service road.

Operational Phase (Direct Impacts):
- Destruction of archaeological resources as a result of the existence and maintenance of the proposed powerlines, on-site substation and service road;
- Destruction of palaeontological material as a result of the existence and maintenance of the proposed powerlines, on-site substation and service road; and
- Alteration of the cultural and natural landscape as a result of the existence and maintenance of the proposed powerlines, on-site substation and service road.

Decommissioning Phase (Direct Impacts):
- Destruction of archaeological resources as a result of the removal of the proposed powerlines and on-site substation and rehabilitation of the service road;
- Destruction of palaeontological material as a result of the removal of the proposed powerlines and on-site substation and rehabilitation of the service road; and
- Alteration of the cultural and natural landscape as a result of the removal of the proposed powerlines and on-site substation and rehabilitation of the service road.

In terms of potential indirect impacts, the Heritage Impact Assessment notes that these could occur as follows:
- During construction there could be unintended impacts either through, for example, vehicles deviating from the permitted route or from construction personnel ignorantly damaging heritage sites in proximity of the power line; or
- Contextual impacts could occur because of the existence of incompatible structures (power lines and pylons) in the rural landscape which spoil the immediate context of a heritage site.

The first type of impact is generally unlikely to happen because there are very few heritage sites within close enough proximity to the alignments. Rock art sites are usually the most vulnerable to human damage, often in the form of graffiti, but in this instance the chances of anyone finding the site are virtually zero, despite its proximity to the study area. Rock art is also sensitive to contextual impacts but in this case the painted panels face away from the power line and the site would be completely unaffected. The two sensitive historical ruins lie some 310 m (waypoint 614) and 150 m (waypoint 498) from the proposed alignments and will need to be marked as no-go areas. However, the Heritage Impact Assessment concludes that because of the very low probability of

indirect impacts occurring, the significance of all such impacts will be very low, and certainly lower than the significance of the potential direct impacts listed above.

The Heritage Impact Assessment explains that only impacts to archaeology, palaeontology and the cultural landscape are specifically assessed because impacts to graves and buildings are not expected to occur (i.e. sites found were located too far away from the proposed alignments to be of any concern). Furthermore, the specialist study explains that the majority of impacts will be felt during the construction phase when land is cleared and excavations are made for the purposes of erecting the power line pylons. In addition, direct impacts to archaeological and palaeontological resources are highly unlikely to occur during the operational and decommissioning phases because vehicles will use the already established service road and public road (hence it was not specifically addressed in the Palaeontological Impact Assessment, as noted above).

Table 19 below illustrates a summary of the overall impact significance, with the implementation of mitigation measures, identified in the Heritage Impact Assessment.

Table 19: Summary of the Overall Impact Significance (Post Mitigation) for the Heritage Impact Assessment (Alternative 1 and Alternative 2)

Phase and Type of Impact	Overall Significance After Mitigation
Palaeontology	
Construction Phase: Direct Impacts	Very Low
Construction Phase: Cumulative Impacts	Low (Refer to detailed explanation provided above)
Archaeology and Cultural Landscape	
Construction Phase: Direct Impacts	Low to Very Low
Construction Phase: Cumulative Impacts	Very Low
Operational Phase: Direct Impacts	Low to Very Low
Decommissioning Phase: Direct Impacts	Very Low

As noted in the Palaeontological Impact Assessment, no significant fossil remains were recorded at the proposed on-site substation and third-party substation sites; and the overall palaeontological sensitivity of the electrical grid infrastructure study area is rated as low. Overall, the above potential impacts on palaeontology are predicted to be of a low to very low significance with the implementation of mitigation measures. The same pattern is followed for potential impacts on archaeology and cultural landscape (i.e. because there are few heritage sites located within close proximity of the alignments, the potential impacts to all types of heritage resources are of generally low significance before mitigation and very low significance after mitigation). The Heritage Impact Assessment notes that the broader study area around the proposed power line routes and associated electrical infrastructure does contain some significant heritage resources. These include archaeological sites (mostly historical), palaeontological occurrences, graveyards and historical structures. Alternative 1 does not have any heritage sites on its alignment. Because the eastern part of Alternative 2 was routed by the heritage specialist especially to avoid significant heritage sites, it should also not impact on anything significant. However, a part of this route that is potentially sensitive could not be surveyed in the field. Just one heritage resource was found to lie directly within the proposed development envelope and that was a small stone ruin (at waypoint 576) within the proposed Sutherland on-site substation area (i.e. subject to a separate assessment). It is also noted that the Stone Age kraal complex (at waypoint 546) is bisected by an access road that might be used during the proposed development. The greater landscape, especially along the escarpment, is visually significant but because it lies within a proposed REDZ the area is very likely to be devoted to renewable energy developments (some facilities are already scheduled for construction in 2017) and the proposed power line and associated electrical infrastructure would thus not be out of place. Overall, it is clear from Table 19 that no impacts were assessed as being of high significance with or without the implementation of mitigation.

- **Avifauna Impact Assessment:**

An Avifauna Impact Assessment (Appendix D.5 of this BA Report) was conducted as part of the BA Process in order to identify and assess potential impacts associated with the construction, operation and decommissioning phases of the proposed project on avifauna.

The following main impacts were identified in the Avifauna Impact Assessment:

Construction Phase:
- Displacement of Red Data avifauna due to disturbance associated with the construction activities.
- Displacement of Red Data avifauna due to habitat transformation associated with the construction activities.

Operational Phase:
- Mortality of Red Data avifauna due to collisions with the earth wire of the proposed 132kV line.
- Electrocution of Red Data avifauna on the proposed 132kV line and in the on-site substation yard.

Decommissioning Phase:
- Displacement of Red Data avifauna due to disturbance associated with the decommissioning activities.

Cumulative Impacts:
- Displacement of Red Data avifauna due to disturbance associated with the construction of the proposed powerline, service road and on-site substation (including laydown area and O&M Building) in conjunction with existing and future similar projects.
- Displacement of Red Data avifauna due to habitat transformation associated with the construction of the proposed powerline, service road and on-site substation (including laydown area and O&M Building) in conjunction with existing and future similar projects.

As noted above, no indirect impacts were identified in the specialist study. Table 20 below illustrates a summary of the overall impact significance, with the implementation of mitigation measures, identified in the Avifauna Impact Assessment.

Table 20: Summary of the Overall Impact Significance (Post Mitigation) for the Avifauna Impact Assessment (Alternative 1 and Alternative 2)

Phase and Type of Impact	Overall Significance After Mitigation
Construction Phase: Direct Impacts	Low
Operational Phase: Direct Impacts	Very Low to Moderate
Decommissioning Phase: Direct Impacts	Low
Cumulative Impacts: Construction Phase	Moderate
Cumulative Impacts: Operational Phase	Moderate
Cumulative Impacts: Decommissioning Phase	Moderate

Overall, in terms of an average, the pre-mitigation significance of all potential impacts identified in the Avifauna Impact Assessment is assessed as moderate to low, leaning more towards moderate; and the post-mitigation significance is assessed as low to moderate, leaning more towards low. It is clear from Table 20 that no impacts were assessed as being of high significance with or without the implementation of mitigation.

2.2. Summary of Preference Between Alternative 1 and Alternative 2 of the Proposed Third Party Substation and Distribution Line Routing

- **Terrestrial Ecology Impact Assessment:**

Based on the low to very low significance of the predicted impacts identified in the Terrestrial Ecology Impact Assessment (Appendix D.1 of this BA Report), as well as with adherence to the recommendations contained within the specialist report and the EMPr included in Appendix G of this BA Report, as well as the judicious placement of the proposed on-site substation and electrical powerline towers, the proposed development cannot be precluded from the site. The Terrestrial Ecology Impact Assessment also concludes that the establishment of the proposed powerline that connects to Alternative 1 of the third party substation (i.e. the proposed collector hub) is proposed as the recommended routing and grid connection from the proposed Rietrug WEF on-site substation. Alternative 1 of the proposed third party substation and distribution line routing is preferred over Alternative 2 (i.e. routing to the proposed Eskom Nuwerust substation) due to the reduced footprint associated with the proposed distribution line and due to the fact that the proposed distribution line to Alternative 1 does not traverse below the 1600 m contour, which has been generally identified as an area of improved comparative ecological value. However, as noted above, based on this area of improved ecological value, several options of the Alternative 2 distribution line route from the proposed on-site substation to the Eskom Nuwerust Substation were considered in order to find the most suitable routing from an ecological, visual and heritage perspective. In line with this, the Alternative 2 distribution line route currently assessed in this BA Report and indicated in the mapping is considered and deemed to be the most suitable line route option to be utilised, should connection with the proposed Eskom Nuwerust substation be required, and it was considered as most suitable (from the various options considered) as it aligns with existing roads and traverses areas deemed to be of lower eco-morphological significance comparative to those encountered along the line route of the remaining various options that were considered for Alternative 2. These findings thus do not negate the use of the proposed Eskom Nuwerust substation as a point of connection with the grid. If this option is exercised the abovementioned powerline route should be utilised.

Overall, both Alternative 1 and Alternative 2 of the distribution line routing and connection to the third party substation are suitable and no "fatal flaws" that would prevent the utilisation of these routes have been identified. Although Alternative 1 is preferred over Alternative 2 based on its shorter length and lesser extent, the selected routing for Alternative 2 (despite extending below the 1600 m contour), cannot be considered as a "no-go option", from an impact assessment perspective.

- **Aquatic Ecology (Freshwater) Impact Assessment:**

As noted in the Aquatic Ecology (Freshwater) Impact Assessment, and as stated above, the perceived impacts, significance thereof, impact ratings and mitigation measures are the same for both Alternatives 1 and 2 due to the similarity of the perceived impacts, as well as the largely similar sensitivities of the freshwater resources associated with the study area. Therefore, there is no specific preference for a certain alternative, and furthermore from a freshwater resource conservation perspective, the proposed project is not considered to be "fatally flawed" although it is considered essential that suitable mitigation measures are implemented throughout all phases of the project in order to ensure that perceived impacts remain of low significance.

- **Visual Impact Assessment:**

The Visual Impact Assessment explains that the preferred route is Alternative 1 from a visual impact perspective since it is shorter and it will affect fewer sensitive visual receptors, however no fatal flaws were associated with Alternative 2.

- **Heritage Impact Assessment (Archaeology and Cultural Landscape):**

The Heritage Impact Assessment concluded that neither Alternative 1 nor Alternative 2 of the proposed third party substation and distribution line routing has any fatal flaws but Alternative 1 is preferred because its alignment is shorter and therefore it passes close to fewer heritage sites.

- **Heritage Impact Assessment (Palaeontology):**

The Palaeontological Impact Assessment states that there are no fatal flaws in the proposed project as far as fossil heritage is concerned; and that there are no preferences on palaeontological grounds for any particular powerline connection to a third-party substation or particular powerline route option (i.e. the shortest route will obviously have the lowest impact, though this may be offset by a longer onward connection to the Eskom national grid).

- **Avifauna Impact Assessment:**

The Avifauna Impact Assessment notes that Alternative 1 of the proposed distribution line (and service road) and third party substation is approximately 65.5 % shorter than Alternative 2, with both alternatives running through the same habitat. This formed the main contributing factor in determining the preferred alternative, as described below.

In terms of displacement of Red Data Avifauna due to habitat transformation associated with construction activities, although both alternatives of the proposed distribution line routing (and service road) and third party substation are acceptable from an avifaunal impact perspective; as far as the proposed service road is concerned, Alternative 1 is the preferred option due to its shorter length (and corresponding significantly reduced impact from a habitat transformation perspective); however Alternative 2 would not constitute a fatal flaw.

Similar to the above, in terms of displacement of Red Data Avifauna due to disturbance associated with construction and decommissioning activities, although both alternatives of the proposed distribution line routing (and service road) and third party substation are acceptable from an avifaunal impact perspective; as far as the proposed service road and the distribution line are concerned, Alternative 1 is the preferred option due to its shorter length (and corresponding significantly reduced impact from a disturbance perspective); however Alternative 2 would not constitute a fatal flaw.

In terms of potential electrocution of avifauna due to the proposed distribution line, there is no material difference in the risk associated with the two alternative route options, as they will both be utilising the same steel monopole design.

In terms of potential collisions due to the proposed distribution line, Alternative 2 would create a larger collision risk due to its considerable longer length; and for this reason Alternative 1 is the preferred alternative from an avifaunal impact perspective, although both alternatives are acceptable provided the proposed anti-collision mitigation is implemented. Furthermore, Alternative 2 of the proposed distribution line routing would not constitute a fatal flaw if properly mitigated.

Therefore, overall from an avifaunal perspective, both Alternatives 1 and 2 of the proposed distribution line (and service road) and third party substation are acceptable and do not have any fatal flaws, however Alternative 1 is the preferred option due its shorter length.

Table 21 indicated below provides a summary of the findings of the specialist studies in terms of Alternatives 1 and Alternatives 2 based on the reasoning provided above.

Table 21: Overall findings for Alternative 1 and Alternative 2

Specialist Study	Alternative 1	Alternative 2
Terrestrial Ecology Impact Assessment	Preferred (and acceptable with no fatal flaws)	Acceptable with no fatal flaws
Aquatic Ecology (Freshwater) Impact Assessment	Acceptable, no fatal flaws, and no specific preference from an Aquatic Ecology perspective.	Acceptable, no fatal flaws, and no specific preference from an Aquatic Ecology perspective.
Visual Impact Assessment	Preferred (and acceptable with no fatal flaws)	Acceptable with no fatal flaws
Heritage Impact Assessment (Archaeology and Cultural Landscape)	Preferred (and acceptable with no fatal flaws)	Acceptable with no fatal flaws
Heritage Impact Assessment (Palaeontology)	Acceptable, no fatal flaws, and no specific preference based on palaeontological grounds.	Acceptable, no fatal flaws, and no specific preference based on palaeontological grounds.
Avifauna Impact Assessment	Preferred (and acceptable with no fatal flaws)	Acceptable with no fatal flaws

Therefore, it is clear based on the findings of the specialist studies that overall Alternative 1 of the distribution line routing and third party substation is preferred due to its shorter length, however Alternative 2 is still acceptable and there are no fatal flaws associated with it. **Furthermore, as indicated above, the impact assessments and impact significance ratings are the same for both alternatives for all specialist studies, except for the Visual Impact Assessment, which only differ very slightly in terms of potential operational phase impacts, as described below**:

Operational Phase:

- The significance of the potential landscape impact of the proposed power line is rated as **very low** (with and without the implementation of mitigation measures) for **Alternative 1** and **low** (with and without the implementation of mitigation measures) for **Alternative 2**; since the impact is localised and has a slight consequence for Alternative 1 and moderate consequence for Alternative 2.
- The significance of the potential visual intrusion of the proposed electrical infrastructure on the views of sensitive visual receptors is **low** before the implementation of mitigation measures for both **Alternatives 1 and 2**. Mitigation measures will potentially lower the significance for **Alternative 1** to **very low**. Due to the length (and therefore higher number of potentially affected visual receptors) and the fact that it passes over the escarpment, the significance of impact for **Alternative 2** will remain **low** after mitigation.

Therefore, considering the above, it is noted that even though Alternative 1 is preferred over Alternative 2 from a visual impact perspective, the significance ratings for the impacts identified for Alternative 2 are low without mitigation. **Therefore, Alternative 2 is also shown to be acceptable**. However, since only one alternative can be approved in the EA, it is recommended by the EAP that Alternative 1 of the distribution line routing and third party substation be approved in the EA (should such an authorisation be granted for the project), and should Mainstream need to connect to the proposed Eskom Nuwerust Substation via Alternative 2 in the future, it would also be considered as acceptable, pending the relevant environmental legislation enforced at the time, the feedback from the Competent Authority and the completion of an EA Amendment Application.

2.3. No-Go Alternative

As noted in Section A of this BA Report, the no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed supporting Electrical Grid Infrastructure. This alternative would result in no environmental impacts (as identified in Section D of this BA Report) on the site or surrounding local area. The following implications will occur if the "no-go" alternative is implemented (i.e. if the proposed Rietrug WEF – Electrical Grid Infrastructure project is not constructed):

- There will be negative implications for the proposed Rietrug WEF, which has already been authorised as part of a separate EIA Process, as there will be no dedicated, fundamental electrical infrastructure to allow the proposed WEF to connect to the national grid via the proposed collector hub or Eskom Nuwerust Substation. This could possibly result in non-realisation of the benefits, such as economic spin offs and electricity generation, associated with the proposed Rietrug WEF. This could also result in additional costs and expenditure, as well as additional timeframes required, as a result of the potential re-design of the Rietrug WEF to align with an alternative substation within the region. Using an alternative substation within the region (dependent on capacity requirements) could result in longer distribution lines and associated gravel roads. This could result in additional negative impacts to the surrounding environment, including avifauna. If re-design is not financially and technically feasible, then the proposed Rietrug WEF will not be able to be constructed as it will not have fundamental infrastructure to link it to the national grid.
- The landowners of the affected farm portions will not be able to derive benefits from the implementation of an additional land-use;
- No additional power will be generated or supplied through means of renewable energy resources by this project at this location;
- There will be no contributions and assistance to the government in achieving its proposed renewable energy target of 17 800 MW by 2030;
- No additional power to the local grid will be provided via the Eskom grid, with approximately 90% coal-based power generation with associated high levels of CO_2 emissions and water consumption;
- Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified;
- Local communities will continue their dependence on agriculture production and government subsidies;
- There will be no opportunity for additional employment in an area where job creation is identified as a key priority;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The local economic benefits associated with the REIPPPP will not be realised, and socio-economic contribution payments into the local community trust will not be realised.

Converse to the above, the following benefits could occur if the "no-go" alternative is implemented:

- There will be no development of electrical infrastructure that is associated with the proposed WEFs at the proposed location;
- The agricultural land use will remain only;
- No threatened vegetation will be removed or disturbed during the development of the proposed electrical infrastructure;
- No potential impact to avifauna present in the area;
- No change to the current landscape will occur; and
- No additional water use and waste generation will occur as a result of the construction phase.

It is important to take into account that the country is facing serious power and water shortages due to its heavy dependency on fossil fuels such as coal. There is therefore a need for additional electricity generation options to be developed throughout the country. The purpose of the proposed Rietrug WEF – Electrical Grid Infrastructure BA Project, is to transmit electricity generated by a renewable energy resource into the national electricity grid. Many other socio-economic and environmental benefits will result from the development of this project such as development of renewable energy resources in the country and contribution to the increase of energy security, employment creation and local economic development (as noted above). The impact assessment undertaken and discussed within Section D of this BA Report shows that no significant residual impacts or risks (high significant impacts) would occur, following the implementation of the required mitigation measures.

Hence, the "no-go" alternative will result in both positive and negative implications, by not going ahead with the project. In addition, by not constructing the proposed electrical grid infrastructure, any positive community development or socio-economic benefits associated with the WEF would not be realised. Since the WEF has already received EA (dated 10 November 2016, which is currently being amended), it is deemed that the impacts associated with the WEF are acceptable in terms of still ensuring environmental sustainability and ecological functioning.

Listed below is a summary of the findings of the no-go option, as discussed in the specialist studies:

- Terrestrial Ecology Impact Assessment: It is evident that should the establishment of the proposed on-site substation, O&M building, distribution line, service road and related infrastructure not arise, that no ecological change will ensue. However, it is clear that with the implementation of avoidance and mitigation measures as described in this specialist study and BA Report, that the "no-go" alternative is undesirable as it fails to achieve the economic and socio-economic benefits that are associated with the broader proposal. As such, it can be forecast that the "no go" alternative will see the maintenance of the prevailing habitat, with no change to the broader eco-morphology of the study area; and habitat and faunal behaviour will continue to be determined by meteorological and the continued prevailing land use, only.
- Aquatic Ecology (Freshwater) Impact Assessment: Should the proposed development not be authorised, no negative impact will occur on the freshwater resources within the study area.
- Visual Impact Assessment: It is important to re-iterate that the proposed electrical infrastructure is required in order to support the proposed Sutherland, Sutherland 2 and Rietrug WEFs, and to enable the electricity that is generated by the WEFs to the national grid. If authorised and built the Sutherland, Sutherland 2 and Rietrug WEFs will dominate the landscape in the vicinity of the proposed electrical infrastructure. Wind turbines will be prominent elements in most views in the surrounding region. The proposed electrical infrastructure is a very minor visual aspect of a WEF landscape. As such the no-go alternative will not make much of a difference to the landscape or views, particularly if wind turbines are seen as a negative impact by visual receptors. In addition, the Western Cape Provincial SDF indicates that there are two shale gas exploration permits issued for the area proposed for this project, while the Hoogland Karoo SDF refers to the possibility of Uranium mining in the Salpeterkop region along the banks of the Rietrivier. Therefore, the no-go Alternative does not guarantee that there will not be pressure to develop the region in the future.
- Heritage Impact Assessment (Archaeology and Cultural Landscape): The no-go alternative has not been specifically assessed because no new impacts would occur through continued use of the landscape according to the status quo (i.e. small stock farming). Impacts would thus be seen as of very low significance.
- Heritage Impact Assessment (Palaeontology): The impact assessment for the no-go option considers future impacts on local fossil heritage that are likely to occur in the absence of the proposed powerline and substation development, using the present status of fossil heritage in the area as a baseline. Destruction of near-surface or surface fossil material by natural bedrock weathering and erosion will be partially counterbalanced by on-going exposure of fresh fossil material by erosion. Improvements in the understanding of palaeontology of the area (a possible positive impact) will depend on whether or not field-based academic or impact studies are carried out, which is inherently unpredictable (There is an on-going research project on the palaeontology of the south-west Karoo by Wits University). The no-go alternative (i.e. no development) will probably have a low (neutral) impact on palaeontological heritage.
- Avifauna Impact Assessment: The no-go option will result in no additional impacts on avifauna and will result in the ecological status quo being maintained (as described in Section 4 of the Avifauna Impact Assessment in Appendix D.5 of this BA Report).

Hence, the "no-go" alternative is not a preferred alternative.

SECTION E. RECOMMENDATION OF PRACTITIONER

This BA Report has investigated and assessed the significance of potential positive and negative direct, indirect and cumulative impacts associated with the proposed Rietrug WEF – Electrical Grid Infrastructure project. No negative impacts have been identified within this BA that, in the opinion of the EAPs who have conducted this BA Process, should be considered "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.

Based on the findings of the specialist studies, the proposed project is considered to have an overall very low to moderate negative environmental impact and an overall moderate positive socio-economic impact (with the implementation of respective mitigation and enhancement measures). All of the specialists have recommended that the proposed project receive EA and that the recommended mitigation measures are implemented.

As noted above, both Alternative 1 and Alternative 2 of the proposed distribution line and connection to the third party substation were assessed in this BA Report. This was undertaken to ensure that the use of both third party substations is permissible, depending on which third party substation is constructed at the time (which is also dependent on the third parties receiving preferred bidder status in terms of the REIPPPP). It is understood, however, that only one alternative of the proposed distribution line routing and connection to the third party substation would be approved and included in an EA (should one be granted), based on the findings of the specialist studies and recommendation from the EAP. **To this end, Alternative 1 is recommended mainly because it displays a shorter route and reduced extent in comparison to Alternative 2. However, as indicated above, the specialists have confirmed that there are no fatal flaws associated with Alternative 2 of the proposed distribution line and connection to the proposed Eskom Nuwerust Substation, and that it cannot be dismissed as a viable alternative.**

Linked to the above, if Alternative 1 of the distribution line and connection to the third party substation is approved and included in the EA (should one be granted by the DEA), and if for any reason the Alternative 1 third party substation (i.e. Collector Hub (132 kV Suurplaat On-site Substation)) does not get constructed, then Mainstream would need to connect to the Eskom Nuwerust Substation instead. If this is the case, Mainstream will need to apply for an Amendment to the EA (should one be granted for this proposed project) to amend the distribution line routing and third party substation from Alternative 1 to Alternative 2. Considering that Alternative 2 of the proposed distribution line routing and third party substation has **already** been assessed in this BA Process by the EAP and specialists, it is understood and likely that a non-substantive EA Amendment Application would be required for submission to the DEA, however this is subject to the environmental legislation promulgated at the time of this proposed amendment, the number of years that has lapsed since the EA was issued (should such authorisation be granted), and provided that the Alternative 2 routing, as assessed in this BA Project, does not change in any way. If it does change, it is expected that a substantive amendment would be required, especially if the proposed change results in impacts of a higher significance as noted in this BA Report.

In terms of the preferred site, as noted above, the location of the proposed distribution line and associated electrical infrastructure is dependent on the location of the proposed Rietrug WEF, third party substation, environmental sensitivities, landowner willingness and feasibility in terms of cost effectiveness. The sites currently assessed as part of this BA Process are considered to be suitable based on the aforementioned factors.

In addition, where applicable the specialists have studied an estimated 500 m buffer area on either side of the proposed distribution line (for both Alternatives 1 and 2) and a 25 ha development envelope for the proposed on-site substation, O&M Building and laydown area in order to identify any development constraints or environmental sensitivities within a larger investigation area, which can be avoided in the final siting and location of the proposed electrical infrastructure. Based on

the findings of the specialist studies, an environmental features and sensitivity map has been produced (and included in Appendix A of this BA Report, as well as the EMPr included in Appendix G of this BA Report).

This BA considered the nature, scale and location of the proposed development as well as the wise use of land (i.e. is this the right time and place for the development of this proposed project). When considering the timing of this project, the IRP2010 proposes to secure 17 800 MW of renewable energy capacity by 2030. In August 2011, the DOE launched the REIPPPP and invited potential IPPs to submit proposals for the first 3 725 MW of various renewable energy projects (including solar and wind). In terms of the REIPPPP, Mainstream intends to bid these projects in the subsequent round of the bidding process to be potentially selected as an IPP. The proposed Rietrug WEF – Electrical Grid Infrastructure project is therefore required as part of the bidding process to confirm that the proposed Rietrug WEF is enabled and equipped with the necessary infrastructure to connect to the national grid. Therefore, overall the proposed Rietrug WEF – Electrical Grid Infrastructure project will fundamentally support and enable the functioning of the proposed Rietrug WEF and it will ensure that it is allowed to contribute to the abovementioned renewable energy targets proposed by the DOE.

The development of wind energy is important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability. On a municipal planning level, the proposed project does not go against any of the objectives set within the Laingsburg Local Municipality IDP (Laingsburg Local Municipality, 2012) and the Karoo Hoogland Local Municipality revised IDP (2016 – 2017) (Karoo Hoogland Local Municipality, 2016). The proposed project will be in line with and supportive of the objectives of the IDP by assisting in local job creation during the construction phase of the project (and ultimately enable job creation as a result of the proposed Rietrug WEF), if approved by the DEA. It should however be noted that employment during the construction phase will be temporary.

Taking into consideration the findings of the BA Process, it is the opinion of the EAP, that the project benefits outweigh the costs and that the project will make a positive contribution to sustainable infrastructure development in the Sutherland region. The proposed project will play a key role in enabling and facilitating the construction of the proposed Rietrug WEF project, which will add electricity to the national grid. Provided that the specified mitigation measures are applied effectively, it is recommended that the proposed project receive EA in terms of the EIA Regulations promulgated under the NEMA.

It is understood that the information contained in this BA Report and appendices is sufficient to make a decision in respect of the activity applied for.

Section 24 of the Constitutional Act states that "everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." Based on this, this BA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures, and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental features present on site and through appropriate monitoring and management plans (refer to the EMPr in Appendix G of this BA Report).

In order to ensure the effective implementation of the mitigation and management actions, an EMPr has been compiled and is included in Appendix G of this BA Report. The mitigation measures necessary to ensure that the project is planned and carried out in an environmentally responsible manner are listed in this EMPr. The EMPr includes the mitigation measures noted in this report and the specialist studies. The EMPr is a dynamic document that should be updated as required and provides clear and implementable measures for the proposed project. Listed below are the main

recommendations that should be considered (in addition to those in the EMPr and BA Report) for inclusion in the EA (should such authorisation be granted by the DEA):

- The final site extent of the proposed on-site substation, O&M Building and laydown area should be surveyed and physically demarcated, including all access roads to assist with further field reconnaissance.
- Careful planning of the location of the proposed on-site substation must be undertaken. The applicable 32 m zone of regulation around the freshwater resources in terms of NEMA must be adhered to in order to assist in minimising impacts on the freshwater resources in close proximity to the proposed on-site substation.
- Prior to the commencement of the construction phase, it is recommended that a suitable specialist is appointed to undertake a field reconnaissance (i.e. search and rescue) of the proposed project footprint to identify any floral or faunal components of value or significance that could potentially be impacted by the proposed project and thus need to be relocated or rescued. If any of the species are identified as being protected, then it is essential that the relevant permits required to remove/disturb the species are obtained from the relevant Authorities (i.e. the relocation of any floral or faunal components within the study area should be subject to consideration in terms of prevailing legislation prior to such relocation). Once the permits are obtained, a search and rescue programme must be implemented to allow for the successful transplantation or relocation of these species. It is anticipated that most species should be relocated to points distal from the construction site, but within the same property In addition, the Provincial Department of Environment and Nature Conservation, Cape Nature and the Provincial DAFF should be contacted to discuss if any protected species are found during the search and rescue.
- A management protocol should be established relating to fauna and the implementation of measures to control the impact of faunal activities on the proposed infrastructure, as well as the impact of the construction and operational phase of the proposed project on the natural environment.
- The footprint required for the proposed project activities must be kept at a minimum. The proposed project footprint must be demarcated to reduce unnecessary disturbance beyond the proposed project area.
- The entire width of the distribution line servitude should not be cleared of vegetation. Vegetation removal should be kept to a minimum and cleared below the distribution line and from either side of the centre line based on the requirements of Eskom and standard operating procedures.
- Clearing of vegetation at all impact sites must be kept to an absolute minimum, and strict alien vegetation controls must be implemented throughout all phases of the project. The re-growth of indigenous vegetation must be encouraged following construction.
- Strict erosion control and soil management measures must be implemented during the construction and operational phases, particularly in areas where vegetation has been removed.
- Proper stockpiling must be implemented during all phases of the proposed project in order to prevent erosion and concomitant impacts on the surrounding drainage lines.
- All construction, operational and decommissioning personnel must be made aware of the sensitivity and importance of the surrounding environment. The construction, operational and decommissioning personnel should be made aware and educated of the presence of fauna and bird species and their reliance on sensitive features, in order to avoid disrupting activities and collisions.
- All areas of increased ecological sensitivity should be marked as no-go areas, with recommended buffer areas, and be off limits to all unauthorised construction and maintenance vehicles and personnel.
- Environmental Awareness Training should be carried out at least once-off during the construction and decommissioning phases to ensure that staff are aware of environmental concerns and proper house-keeping recommendations.
- Waste management must be undertaken rigorously during all phases of the proposed project and any non-compliance must be recorded by the ECO. The designated waste stockpiling areas must be inspected frequently to ensure that the integrity is intact and the condition is not compromised. Waste disposal slips and waybills must be kept for all waste disposed at a

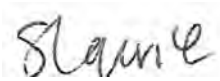
registered waste disposal facility. As a general principle, waste manifests must be obtained to prove legal disposal of waste. A detailed record must be kept to track the amount of hazardous and general waste being temporarily stockpiled on site. Should the on-site stockpiling of general waste and hazardous waste respectively exceed 100 m^3 and 80 m^3, and a period exceeding 90 days, then the National Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) must be adhered to.

- Archaeological and palaeontological mitigation measures stipulated within this BA Report must be implemented during the construction phase. The contact details for SAHRA (for the Northern Cape) and Heritage Western Cape (for the Western Cape) should be included in relevant documents/specifications provided to the Contractor, to ensure that these authorities are contacted timeously in the event of archaeological material and/or fossils being discovered during construction.
- Any areas not yet surveyed should be examined by both an archaeologist and a palaeontologist (as highlighted in the Heritage Impact Assessment (Appendix D.4 of this BA Report)) in order to identify any areas or sites that should be protected or mitigated prior to commencement of construction (this includes parts of the assessed alignments or any alterations made after completion of this report).
- The ECO should be aware of the potential for fossils to be uncovered during excavations. As many excavations as possible should be monitored by the ECO during construction and if any fossils are uncovered they should be protected *in situ* and immediately reported to a palaeontologist in order to plan a way forward.
- The farm road passing through the kraal complex at waypoint 546 (as highlighted in the Heritage Impact Assessment (Appendix D.4 of this BA Report)) may not be widened towards the east and should preferably not be widened at all.
- Significant palaeontological and archaeological sites as listed in the Heritage Impact Assessment (Appendix D.4 of this BA Report) should be identified on project maps and regarded as no-go zones with buffers of at least 30 m around all associated features (the exception is the service road diversion which comes within 20 m of the rock art site but uses an existing farm track). These no-go sites should be examined periodically by the ECO during the construction phase to ensure that they are being respected.
- If any archaeological material, palaeontological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the relevant provincial heritage management authority as soon as possible (i.e. Heritage Western Cape for the Western Cape and SAHRA for the Northern Cape. This may require inspection by an archaeologist or palaeontologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.
- Implement an alien vegetation control program and ensure establishment of indigenous species within areas where alien vegetation is identified.
- Rehabilitation of cleared and disturbed areas must be undertaken. Rehabilitation measures should be instituted around the proposed on-site substation, O&M Building and laydown area that address exotic weed invasion, compaction of soils and maintenance of ecological function.
- Electric fencing, if associated with the proposed project, should be constructed so as to ensure that the lowest wire remains neutral. Electrified fences should be bound externally by a wire mesh fence. Fences should be inspected daily to ensure that no animals are trapped against such fences and any mortalities associated with fences should be recorded.
- Construction activities associated with the proposed powerline (for the preferred and recommended Alternative 1) should not intrude below the 1600m amsl contour.
- Tower positions for the proposed distribution line must be located outside the areas identified as having high or very high sensitivity and should be sited away from points of eco-geomorphological value (i.e. rocky outcrops, ledges etc.) where applicable.
- The proposed service road below the powerline should avoid points of eco-geomorphological significance or value and should be routed around or away from such areas.
- Rehabilitation of points of disturbance along the proposed powerline should be subject to rehabilitation measures and vegetation control procedures.
- The relevant authorisations required must be obtained in terms of Section 21 (c) and (i) of the NWA, and in terms of Regulation 509 of 2016 as it pertains to the NWA.

- Careful planning of the location of monopoles must be undertaken, taking into consideration the locality of riparian habitats and as much as possible, avoid placement of monopoles within riparian habitat, and powerlines are preferably to span the relevant resource. If at all possible, all monopoles should be developed above the relevant zone of regulation in terms of Regulation GN 509 of the NWA.
- Where it is impossible to avoid placing infrastructure within riparian habitat, flow connectivity must be retained by preventing fragmentation of the riparian habitat.
- An Avifaunal Specialist must be appointed to undertake a pre-construction walk-through of the final alignment of the proposed distribution line in order to identify any Red Data nests, sensitive areas and sections that require mitigation. The results of the pre-construction walk-through may inform the final construction schedule in close proximity to a specific sensitive area, including abbreviating the construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.
- An Avifaunal Specialist should be appointed to certify the proposed powerline design as bird-friendly before construction commences.
- Ensure the fitting of Bird Flight Diverters on the pre-identified sections and quarterly line inspections by the Avifaunal Specialist to record collision-related mortality.
- A maintenance plan for buildings and structures should be followed to ensure that structures remain as non-reflective as possible. Maintenance of access and service roads should not cause further disturbance and damage to the surrounding landscape.

Surina Laurie

NAME OF EAP



SIGNATURE OF EAP

20 July 2017

DATE

SECTION F: APPENDICES

The following appendices are attached to this BA Report:

Appendix A	Maps
Appendix B	Photographs
Appendix C	Facility Illustration(s)
Appendix D	Specialist Reports (including Terms of Reference)
Appendix E	Public Participation
Appendix F	Impact Assessment
Appendix G	Environmental Management Programme (EMPr)
Appendix H	Details of EAP and Expertise
Appendix I	Specialist's Declaration of Interest
Appendix J	Additional Information

BASIC ASSESSMENT REPORT

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the Rietrug Wind Energy Facility (WEF), Northern and Western Cape Provinces (Rietrug WEF – Electrical Grid Infrastructure)

SECTION F: APPENDICES

APPENDIX A: SITE LAYOUT PLANS

Appendix A.1: Locality Map
Appendix A.2: Layout Maps/Route Plan
Appendix A.3: Environmental Features Map
Appendix A.4: Sensitivity Maps
Appendix A.5: Approximate Project Co-ordinates

APPENDIX B: PHOTOGRAPHS

Appendix B.1: PHOTOGRAPHS • Cardinal Point 1
Appendix B.2: PHOTOGRAPHS • Cardinal Point 2
Appendix B.3: PHOTOGRAPHS • Cardinal Point 3
Appendix B.4: PHOTOGRAPHS • Cardinal Point 4
Appendix B.5: PHOTOGRAPHS • Cardinal Point 5

APPENDIX C: FACILITY ILLUSTRATIONS

APPENDIX D: SPECIALIST REPORTS

Appendix D.1: Terrestrial Ecology Impact Assessment
Appendix D.2: Aquatic Ecology (Freshwater) Impact Assessment
Appendix D.3: Visual Impact Assessment
Appendix D.4: Heritage Impact Assessment (Palaeontology, Archaeology and Cultural Landscape)
Appendix D.5: Avifauna Impact Assessment

APPENDIX E: PUBLIC PARTICIPATION

Appendix E.1: Proof of Placement of Newspaper Advertisements and Site Notice Boards
Appendix E.2: Correspondence Sent to I&APs, Organs of State and Stakeholders
Appendix E.3: Comments and Response Report
Appendix E.4: Database of I&APs and Organs of State
Appendix E.5: Copies of Comments Received and Minutes of Meetings

APPENDIX F: IMPACT ASSESSMENT

APPENDIX G: ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

APPENDIX H: DETAILS OF EAP AND EXPERTISE

Appendix H.1: Curriculum Vitae of EAP – Surina Laurie
Appendix H.2: EAP Declaration of Interest
Appendix H.3: Curriculum Vitae of Project Manager – Rohaida Abed
Appendix H.4: Curriculum Vitae of Project Officer – Andile Dludla

APPENDIX I: SPECIALIST'S DECLARATION OF INTEREST

APPENDIX J: ADDITIONAL INFORMATION

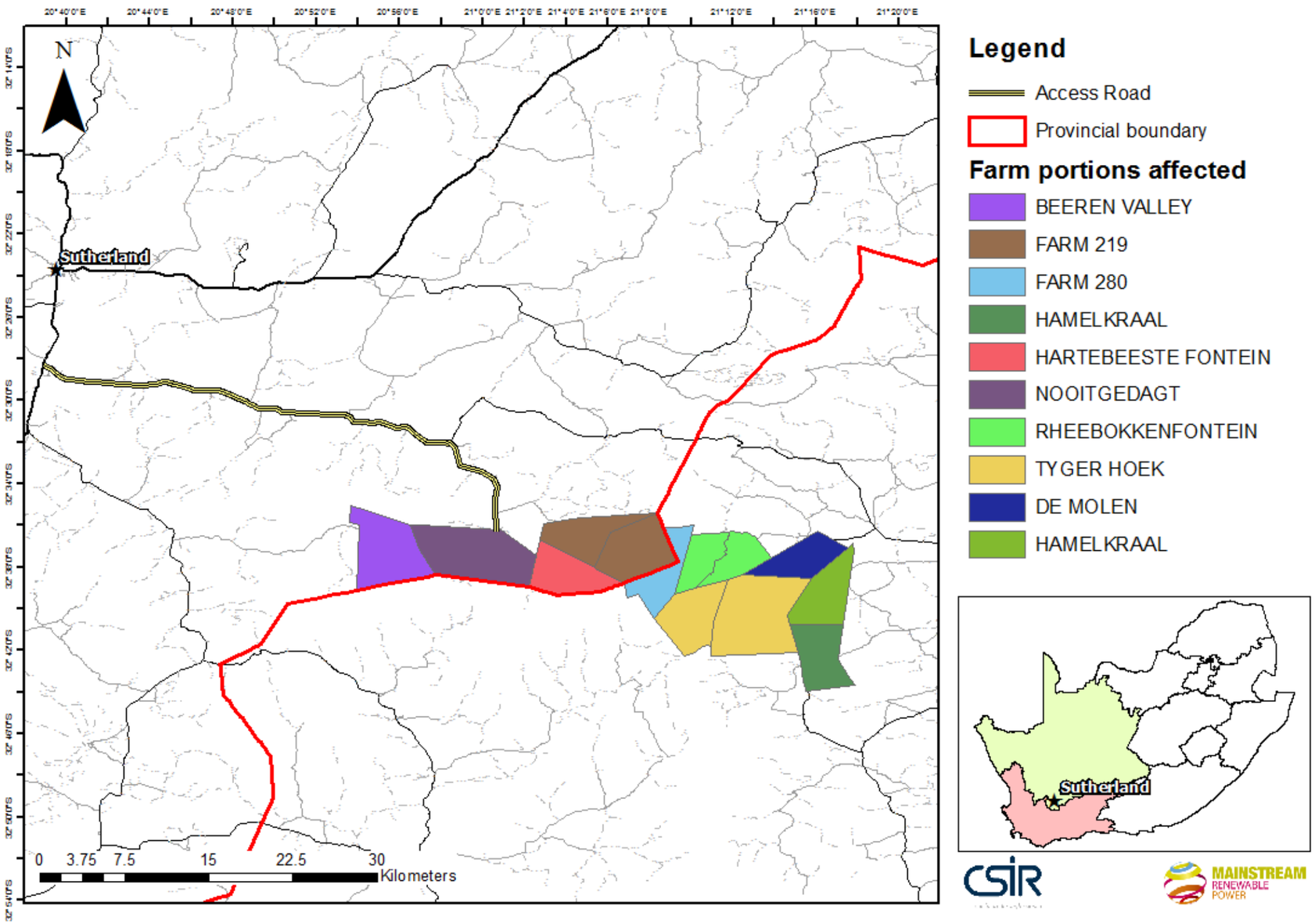
Appendix J.1: References used in the BA Report

BASIC ASSESSMENT REPORT

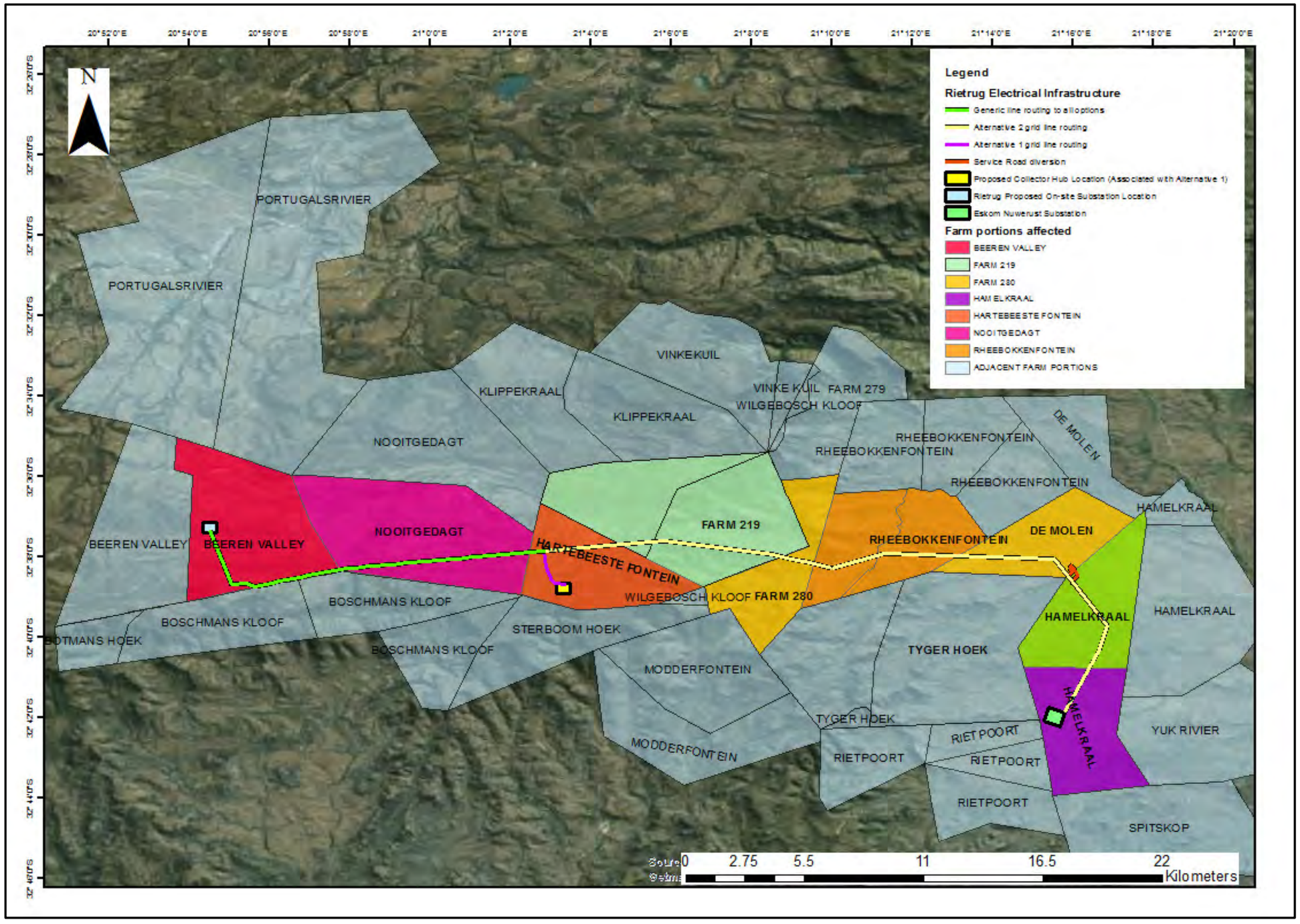
APPENDIX A: SITE LAYOUT PLANS

contents

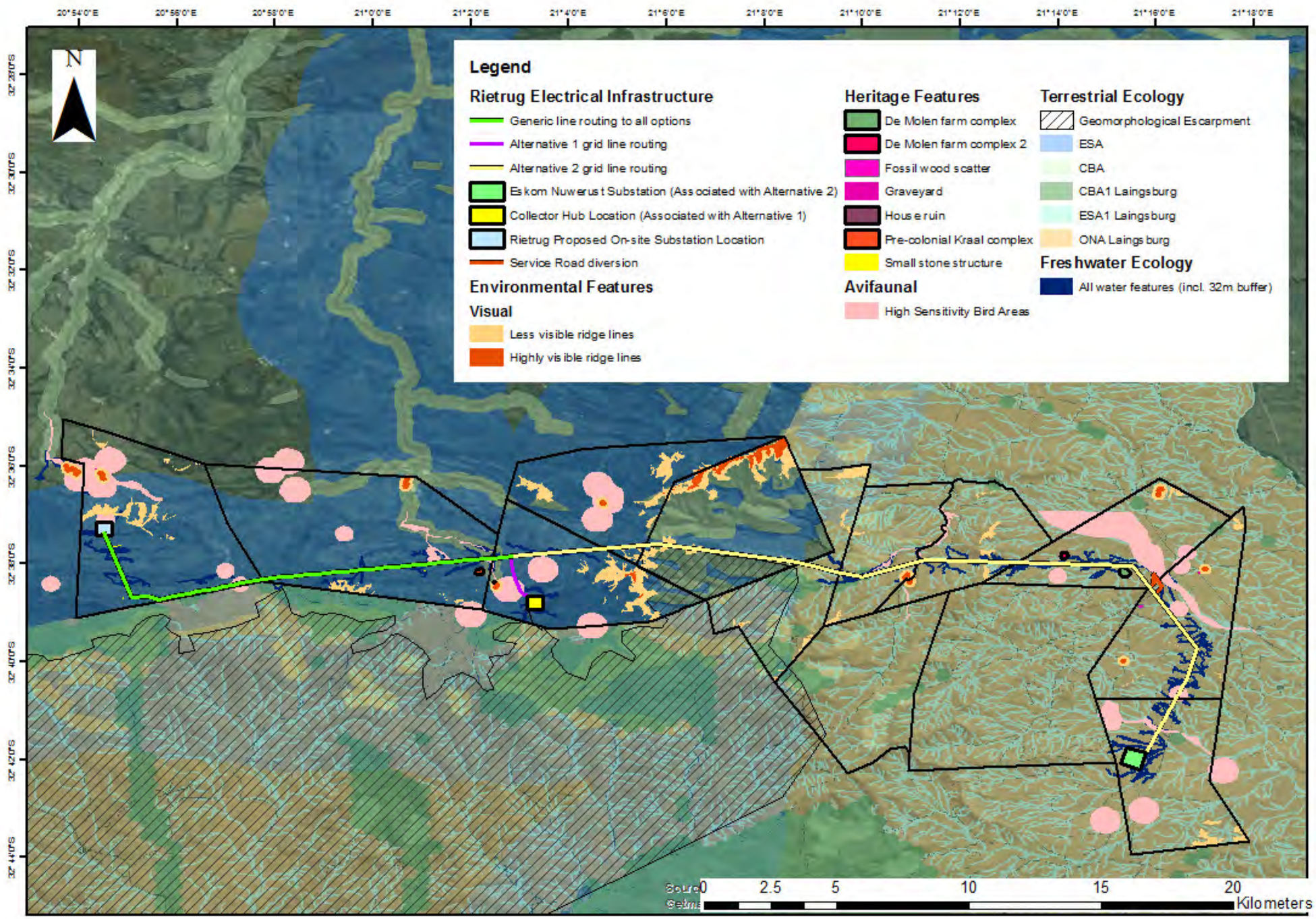
Appendix A.1: Locality Map



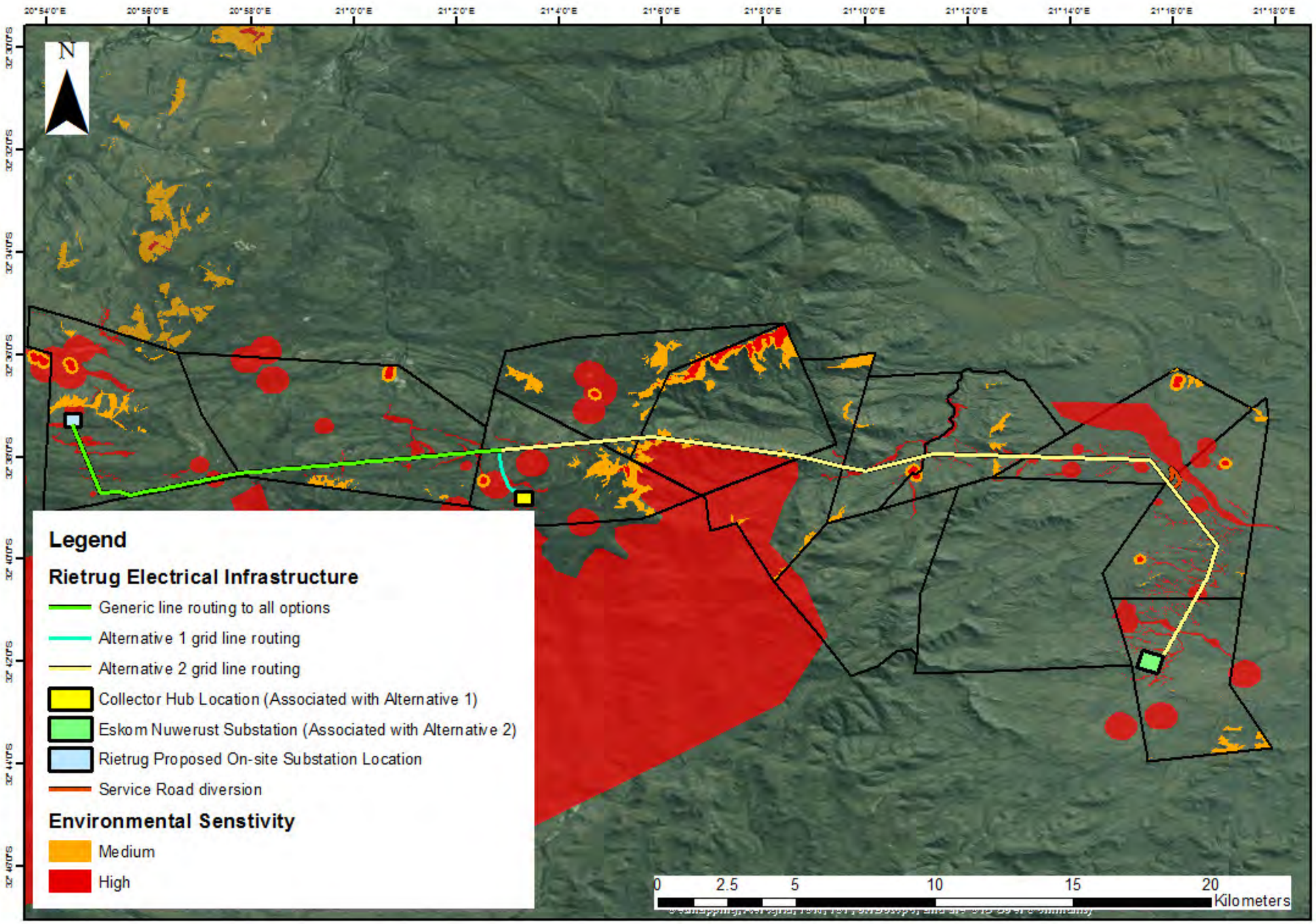
Appendix A.2: Layout Maps/Route Plan



Appendix A.3: Environmental Features Maps



Appendix A.4: Sensitivity Map



Appendix A.5: Approximate Project Co-ordinates

1. Co-ordinates at every 250 m along the proposed distribution line (Alternative 1)

	Degrees Minutes Seconds Format				Degrees Minutes Seconds Format	
Point ID	Latitude	Longitude		Point ID	Latitude	Longitude
1.1	32° 38' 41.289" S	21° 3' 23.376" E		1.35	32° 38' 13.568" S	20° 58' 39.073" E
1.2	32° 38' 39.996" S	21° 3' 13.920" E		1.36	32° 38' 14.421" S	20° 58' 29.549" E
1.3	32° 38' 38.906" S	21° 3' 5.954" E		1.37	32° 38' 15.274" S	20° 58' 20.025" E
1.4	32° 38' 36.159" S	21° 3' 1.240" E		1.38	32° 38' 16.345" S	20° 58' 8.049" E
1.5	32° 38' 26.918" S	21° 2' 57.601" E		1.39	32° 38' 17.534" S	20° 57' 54.766" E
1.6	32° 38' 15.239" S	21° 2' 53.002" E		1.40	32° 38' 18.340" S	20° 57' 45.750" E
1.7	32° 38' 8.501" S	21° 2' 51.357" E		1.41	32° 38' 19.090" S	20° 57' 42.010" E
1.8	32° 38' 0.542" S	21° 2' 49.415" E		1.42	32° 38' 20.960" S	20° 57' 32.690" E
1.9	32° 37' 53.812" S	21° 2' 47.773" E		1.43	32° 38' 22.830" S	20° 57' 23.370" E
1.10	32° 37' 51.809" S	21° 2' 41.341" E		1.44	32° 38' 24.699" S	20° 57' 14.050" E
1.11	32° 37' 53.043" S	21° 2' 27.637" E		1.45	32° 38' 26.568" S	20° 57' 4.729" E
1.12	32° 37' 53.901" S	21° 2' 18.114" E		1.46	32° 38' 28.437" S	20° 56' 55.408" E
1.13	32° 37' 54.758" S	21° 2' 8.591" E		1.47	32° 38' 30.306" S	20° 56' 46.088" E
1.14	32° 37' 55.615" S	21° 1' 59.068" E		1.48	32° 38' 32.175" S	20° 56' 36.767" E
1.15	32° 37' 56.472" S	21° 1' 49.545" E		1.49	32° 38' 34.043" S	20° 56' 27.446" E
1.16	32° 37' 57.329" S	21° 1' 40.022" E		1.50	32° 38' 35.911" S	20° 56' 18.125" E
1.17	32° 37' 58.185" S	21° 1' 30.499" E		1.51	32° 38' 37.779" S	20° 56' 8.804" E
1.18	32° 37' 59.042" S	21° 1' 20.975" E		1.52	32° 38' 39.647" S	20° 55' 59.483" E
1.19	32° 37' 59.898" S	21° 1' 11.452" E		1.53	32° 38' 41.570" S	20° 55' 49.885" E
1.20	32° 38' 0.754" S	21° 1' 1.929" E		1.54	32° 38' 44.005" S	20° 55' 37.732" E
1.21	32° 38' 1.609" S	21° 0' 52.405" E		1.55	32° 38' 41.948" S	20° 55' 31.826" E
1.22	32° 38' 2.465" S	21° 0' 42.882" E		1.56	32° 38' 39.368" S	20° 55' 24.418" E
1.23	32° 38' 3.320" S	21° 0' 33.359" E		1.57	32° 38' 40.252" S	20° 55' 13.319" E
1.24	32° 38' 4.175" S	21° 0' 23.835" E		1.58	32° 38' 41.115" S	20° 55' 2.470" E
1.25	32° 38' 5.030" S	21° 0' 14.311" E		1.59	32° 38' 34.492" S	20° 54' 59.772" E
1.26	32° 38' 5.885" S	21° 0' 4.788" E		1.60	32° 38' 26.814" S	20° 54' 56.631" E
1.27	32° 38' 6.740" S	20° 59' 55.264" E		1.61	32° 38' 19.140" S	20° 54' 53.472" E
1.28	32° 38' 7.594" S	20° 59' 45.740" E		1.62	32° 38' 11.467" S	20° 54' 50.314" E
1.29	32° 38' 8.448" S	20° 59' 36.217" E		1.63	32° 38' 3.794" S	20° 54' 47.156" E
1.30	32° 38' 9.302" S	20° 59' 26.693" E		1.64	32° 37' 56.121" S	20° 54' 43.998" E
1.31	32° 38' 10.156" S	20° 59' 17.169" E		1.65	32° 37' 48.448" S	20° 54' 40.840" E
1.32	32° 38' 11.009" S	20° 59' 7.645" E		1.66	32° 37' 40.775" S	20° 54' 37.682" E
1.33	32° 38' 11.862" S	20° 58' 58.121" E		1.67	32° 37' 30.706" S	20° 54' 33.539" E
1.34	32° 38' 12.716" S	20° 58' 48.597" E		1.68	32° 37' 20.671" S	20° 54' 29.410" E

2. Co-ordinates at every 250 m along the proposed distribution line (Alternative 2)

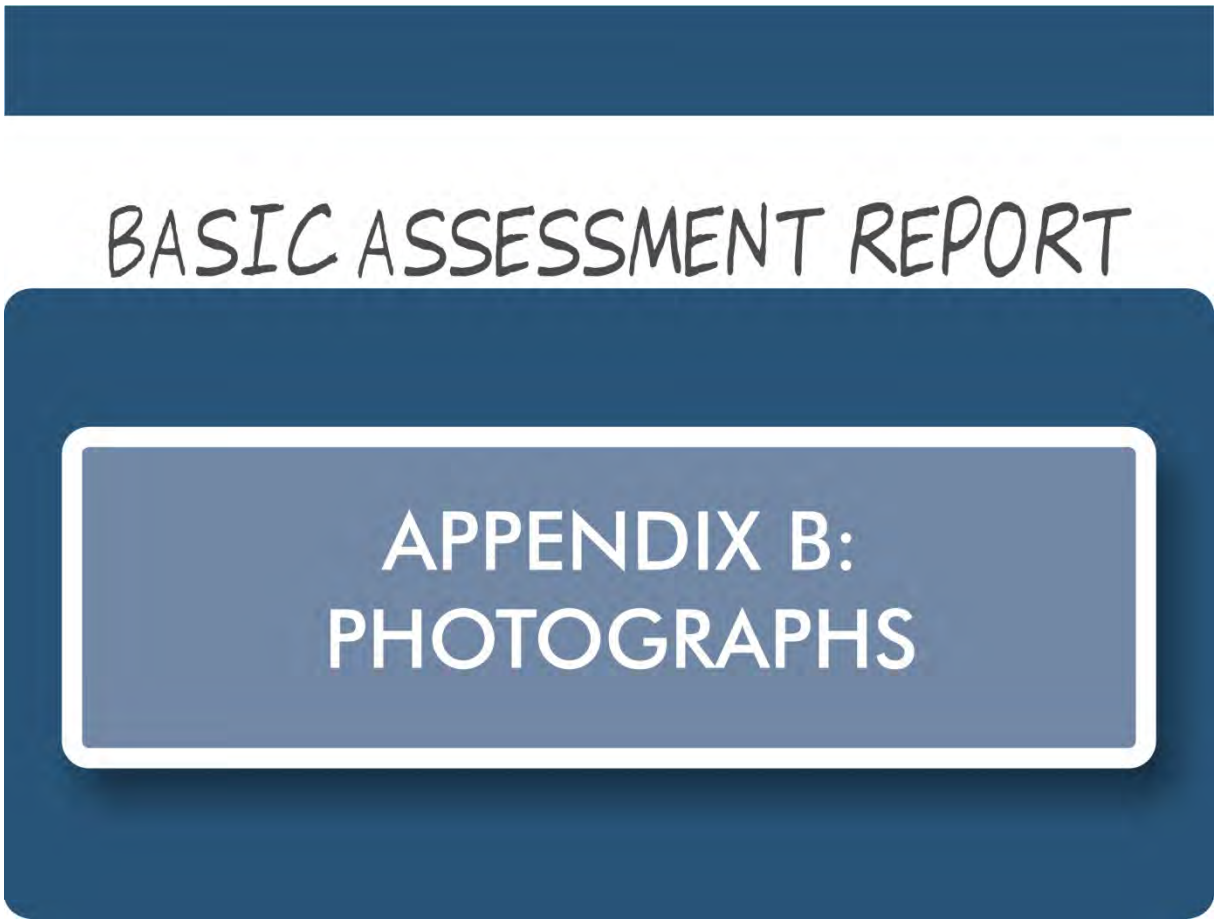
	Degrees Minutes Seconds Format				Degrees Minutes Seconds Format	
Point ID	Latitude	Longitude		Point ID	Latitude	Longitude
2.1	32° 41' 52.506" S	21° 15' 48.325" E		2.88	32° 38' 1.462" S	21° 14' 34.579" E
2.2	32° 41' 45.138" S	21° 15' 52.375" E		2.89	32° 38' 1.746" S	21° 14' 44.150" E

	Degrees Minutes Seconds Format				Degrees Minutes Seconds Format	
Point ID	Latitude	Longitude		Point ID	Latitude	Longitude
2.3	32° 41' 37.771" S	21° 15' 56.424" E		2.90	32° 38' 2.030" S	21° 14' 53.720" E
2.4	32° 41' 30.404" S	21° 16' 0.473" E		2.91	32° 38' 2.314" S	21° 15' 3.291" E
2.5	32° 41' 23.036" S	21° 16' 4.522" E		2.92	32° 38' 2.597" S	21° 15' 12.862" E
2.6	32° 41' 15.669" S	21° 16' 8.571" E		2.93	32° 38' 2.881" S	21° 15' 22.433" E
2.7	32° 41' 8.302" S	21° 16' 12.620" E		2.94	32° 38' 3.170" S	21° 15' 32.211" E
2.8	32° 41' 0.934" S	21° 16' 16.669" E		2.95	32° 37' 34.356" S	21° 5' 49.623" E
2.9	32° 40' 53.567" S	21° 16' 20.717" E		2.96	32° 37' 35.241" S	21° 5' 40.104" E
2.10	32° 40' 46.200" S	21° 16' 24.766" E		2.97	32° 37' 36.170" S	21° 5' 30.591" E
2.11	32° 40' 38.832" S	21° 16' 28.814" E		2.98	32° 37' 37.254" S	21° 5' 21.103" E
2.12	32° 40' 31.465" S	21° 16' 32.862" E		2.99	32° 37' 37.898" S	21° 5' 11.559" E
2.13	32° 40' 24.098" S	21° 16' 36.910" E		2.100	32° 37' 38.932" S	21° 5' 2.062" E
2.14	32° 40' 19.432" S	21° 16' 39.474" E		2.101	32° 37' 39.831" S	21° 4' 52.544" E
2.15	32° 40' 11.200" S	21° 16' 42.128" E		2.102	32° 37' 40.828" S	21° 4' 43.041" E
2.16	32° 40' 0.876" S	21° 16' 45.457" E		2.103	32° 37' 41.688" S	21° 4' 33.518" E
2.17	32° 39' 53.036" S	21° 16' 47.984" E		2.104	32° 37' 42.548" S	21° 4' 23.996" E
2.18	32° 39' 43.270" S	21° 16' 51.133" E		2.105	32° 37' 43.408" S	21° 4' 14.473" E
2.19	32° 39' 38.177" S	21° 16' 47.109" E		2.106	32° 37' 44.268" S	21° 4' 4.951" E
2.20	32° 39' 31.426" S	21° 16' 41.775" E		2.107	32° 37' 45.128" S	21° 3' 55.428" E
2.21	32° 39' 24.675" S	21° 16' 36.441" E		2.108	32° 37' 45.987" S	21° 3' 45.906" E
2.22	32° 39' 17.923" S	21° 16' 31.107" E		2.109	32° 37' 46.846" S	21° 3' 36.383" E
2.23	32° 39' 11.172" S	21° 16' 25.773" E		2.110	32° 37' 47.705" S	21° 3' 26.861" E
2.24	32° 39' 4.421" S	21° 16' 20.439" E		2.111	32° 37' 48.564" S	21° 3' 17.338" E
2.25	32° 38' 57.669" S	21° 16' 15.106" E		2.112	32° 37' 49.423" S	21° 3' 7.815" E
2.26	32° 38' 50.918" S	21° 16' 9.772" E		2.113	32° 37' 50.281" S	21° 2' 58.292" E
2.27	32° 38' 44.167" S	21° 16' 4.439" E		2.114	32° 37' 51.139" S	21° 2' 48.770" E
2.28	32° 38' 37.415" S	21° 15' 59.106" E		2.115	32° 37' 51.997" S	21° 2' 39.247" E
2.29	32° 38' 30.664" S	21° 15' 53.773" E		2.116	32° 37' 52.855" S	21° 2' 29.724" E
2.30	32° 38' 23.912" S	21° 15' 48.441" E		2.117	32° 37' 53.713" S	21° 2' 20.201" E
2.31	32° 38' 17.161" S	21° 15' 43.108" E		2.118	32° 37' 54.570" S	21° 2' 10.678" E
2.32	32° 38' 10.410" S	21° 15' 37.776" E		2.119	32° 37' 55.427" S	21° 2' 1.155" E
2.33	32° 37' 35.098" S	21° 5' 56.779" E		2.120	32° 37' 56.284" S	21° 1' 51.632" E
2.34	32° 37' 36.416" S	21° 6' 6.228" E		2.121	32° 37' 57.141" S	21° 1' 42.108" E
2.35	32° 37' 37.744" S	21° 6' 15.676" E		2.122	32° 37' 57.998" S	21° 1' 32.585" E
2.36	32° 37' 39.072" S	21° 6' 25.123" E		2.123	32° 37' 58.854" S	21° 1' 23.062" E
2.37	32° 37' 40.399" S	21° 6' 34.571" E		2.124	32° 37' 59.710" S	21° 1' 13.539" E
2.38	32° 37' 41.726" S	21° 6' 44.018" E		2.125	32° 38' 0.566" S	21° 1' 4.015" E
2.39	32° 37' 43.053" S	21° 6' 53.466" E		2.126	32° 38' 1.422" S	21° 0' 54.492" E
2.40	32° 37' 44.380" S	21° 7' 2.914" E		2.127	32° 38' 2.277" S	21° 0' 44.969" E
2.41	32° 37' 45.706" S	21° 7' 12.361" E		2.128	32° 38' 3.133" S	21° 0' 35.445" E
2.42	32° 37' 47.033" S	21° 7' 21.809" E		2.129	32° 38' 3.988" S	21° 0' 25.922" E
2.43	32° 37' 48.359" S	21° 7' 31.257" E		2.130	32° 38' 4.843" S	21° 0' 16.398" E
2.44	32° 37' 49.685" S	21° 7' 40.705" E		2.131	32° 38' 5.698" S	21° 0' 6.875" E
2.45	32° 37' 51.011" S	21° 7' 50.153" E		2.132	32° 38' 6.552" S	20° 59' 57.351" E
2.46	32° 37' 52.337" S	21° 7' 59.602" E		2.133	32° 38' 7.407" S	20° 59' 47.827" E

	Degrees Minutes Seconds Format				Degrees Minutes Seconds Format	
Point ID	Latitude	Longitude		Point ID	Latitude	Longitude
2.47	32° 37' 53.662" S	21° 8' 9.050" E		2.134	32° 38' 8.261" S	20° 59' 38.304" E
2.48	32° 37' 54.987" S	21° 8' 18.498" E		2.135	32° 38' 9.115" S	20° 59' 28.780" E
2.49	32° 37' 56.312" S	21° 8' 27.946" E		2.136	32° 38' 9.969" S	20° 59' 19.256" E
2.50	32° 37' 57.457" S	21° 8' 36.111" E		2.137	32° 38' 10.822" S	20° 59' 9.732" E
2.51	32° 37' 59.867" S	21° 8' 46.612" E		2.138	32° 38' 11.675" S	20° 59' 0.208" E
2.52	32° 38' 1.989" S	21° 8' 55.856" E		2.139	32° 38' 12.529" S	20° 58' 50.684" E
2.53	32° 38' 4.110" S	21° 9' 5.101" E		2.140	32° 38' 13.382" S	20° 58' 41.160" E
2.54	32° 38' 6.232" S	21° 9' 14.346" E		2.141	32° 38' 14.234" S	20° 58' 31.636" E
2.55	32° 38' 8.353" S	21° 9' 23.591" E		2.142	32° 38' 15.087" S	20° 58' 22.112" E
2.56	32° 38' 10.474" S	21° 9' 32.836" E		2.143	32° 38' 15.939" S	20° 58' 12.588" E
2.57	32° 38' 12.594" S	21° 9' 42.081" E		2.144	32° 38' 16.791" S	20° 58' 3.064" E
2.58	32° 38' 14.715" S	21° 9' 51.326" E		2.145	32° 38' 17.643" S	20° 57' 53.540" E
2.59	32° 38' 16.431" S	21° 9' 58.807" E		2.146	32° 38' 18.340" S	20° 57' 45.750" E
2.60	32° 38' 13.563" S	21° 10' 9.699" E		2.147	32° 38' 20.235" S	20° 57' 36.306" E
2.61	32° 38' 11.154" S	21° 10' 18.846" E		2.148	32° 38' 22.420" S	20° 57' 25.412" E
2.62	32° 38' 8.746" S	21° 10' 27.993" E		2.149	32° 38' 24.289" S	20° 57' 16.092" E
2.63	32° 38' 6.337" S	21° 10' 37.139" E		2.150	32° 38' 26.159" S	20° 57' 6.771" E
2.64	32° 38' 3.946" S	21° 10' 46.292" E		2.151	32° 38' 28.028" S	20° 56' 57.451" E
2.65	32° 38' 1.624" S	21° 10' 55.470" E		2.152	32° 38' 29.896" S	20° 56' 48.130" E
2.66	32° 37' 59.303" S	21° 11' 4.647" E		2.153	32° 38' 31.765" S	20° 56' 38.809" E
2.67	32° 37' 56.980" S	21° 11' 13.825" E		2.154	32° 38' 33.634" S	20° 56' 29.488" E
2.68	32° 37' 55.629" S	21° 11' 19.166" E		2.155	32° 38' 35.502" S	20° 56' 20.168" E
2.69	32° 37' 55.941" S	21° 11' 29.656" E		2.156	32° 38' 37.370" S	20° 56' 10.846" E
2.70	32° 37' 56.323" S	21° 11' 42.307" E		2.157	32° 38' 39.647" S	20° 55' 59.483" E
2.71	32° 37' 56.610" S	21° 11' 51.878" E		2.158	32° 38' 41.990" S	20° 55' 47.790" E
2.72	32° 37' 56.897" S	21° 12' 1.448" E		2.159	32° 38' 44.005" S	20° 55' 37.732" E
2.73	32° 37' 57.183" S	21° 12' 11.019" E		2.160	32° 38' 41.403" S	20° 55' 30.263" E
2.74	32° 37' 57.469" S	21° 12' 20.589" E		2.161	32° 38' 39.368" S	20° 55' 24.418" E
2.75	32° 37' 57.756" S	21° 12' 30.160" E		2.162	32° 38' 40.252" S	20° 55' 13.319" E
2.76	32° 37' 58.042" S	21° 12' 39.731" E		2.163	32° 38' 41.115" S	20° 55' 2.470" E
2.77	32° 37' 58.328" S	21° 12' 49.301" E		2.164	32° 38' 34.492" S	20° 54' 59.772" E
2.78	32° 37' 58.613" S	21° 12' 58.872" E		2.165	32° 38' 28.495" S	20° 54' 57.323" E
2.79	32° 37' 58.899" S	21° 13' 8.442" E		2.166	32° 38' 20.822" S	20° 54' 54.164" E
2.80	32° 37' 59.184" S	21° 13' 18.013" E		2.167	32° 38' 13.149" S	20° 54' 51.006" E
2.81	32° 37' 59.470" S	21° 13' 27.584" E		2.168	32° 38' 5.475" S	20° 54' 47.848" E
2.82	32° 37' 59.755" S	21° 13' 37.154" E		2.169	32° 37' 57.802" S	20° 54' 44.690" E
2.83	32° 38' 0.040" S	21° 13' 46.725" E		2.170	32° 37' 50.129" S	20° 54' 41.532" E
2.84	32° 38' 0.325" S	21° 13' 56.296" E		2.171	32° 37' 40.775" S	20° 54' 37.682" E
2.85	32° 38' 0.609" S	21° 14' 5.867" E		2.172	32° 37' 30.706" S	20° 54' 33.539" E
2.86	32° 38' 0.894" S	21° 14' 15.437" E		2.173	32° 37' 20.671" S	20° 54' 29.410" E
2.87	32° 38' 1.178" S	21° 14' 25.008" E				

3. Corner Point Co-ordinates and Mid-Point of the Proposed Rietrug On-site Substation

	Degrees Minutes Seconds Format	
Point	**Latitude**	**Longitude**
Mid-Point	32° 37' 16.845" S	20° 54' 29.880" E
A	32° 37' 8.570" S	20° 54' 20.270" E
B	32° 37' 8.584" S	20° 54' 39.457" E
C	32° 37' 24.822" S	20° 54' 39.441" E
D	32° 37' 24.808" S	20° 54' 20.253" E



contents

Appendix B.1 PHOTOGRAPHS

- **Cardinal Point 1**

Appendix B.2 PHOTOGRAPHS

- **Cardinal Point 2**

Appendix B.3 PHOTOGRAPHS

- **Cardinal Point 3**

Appendix B.4 PHOTOGRAPHS

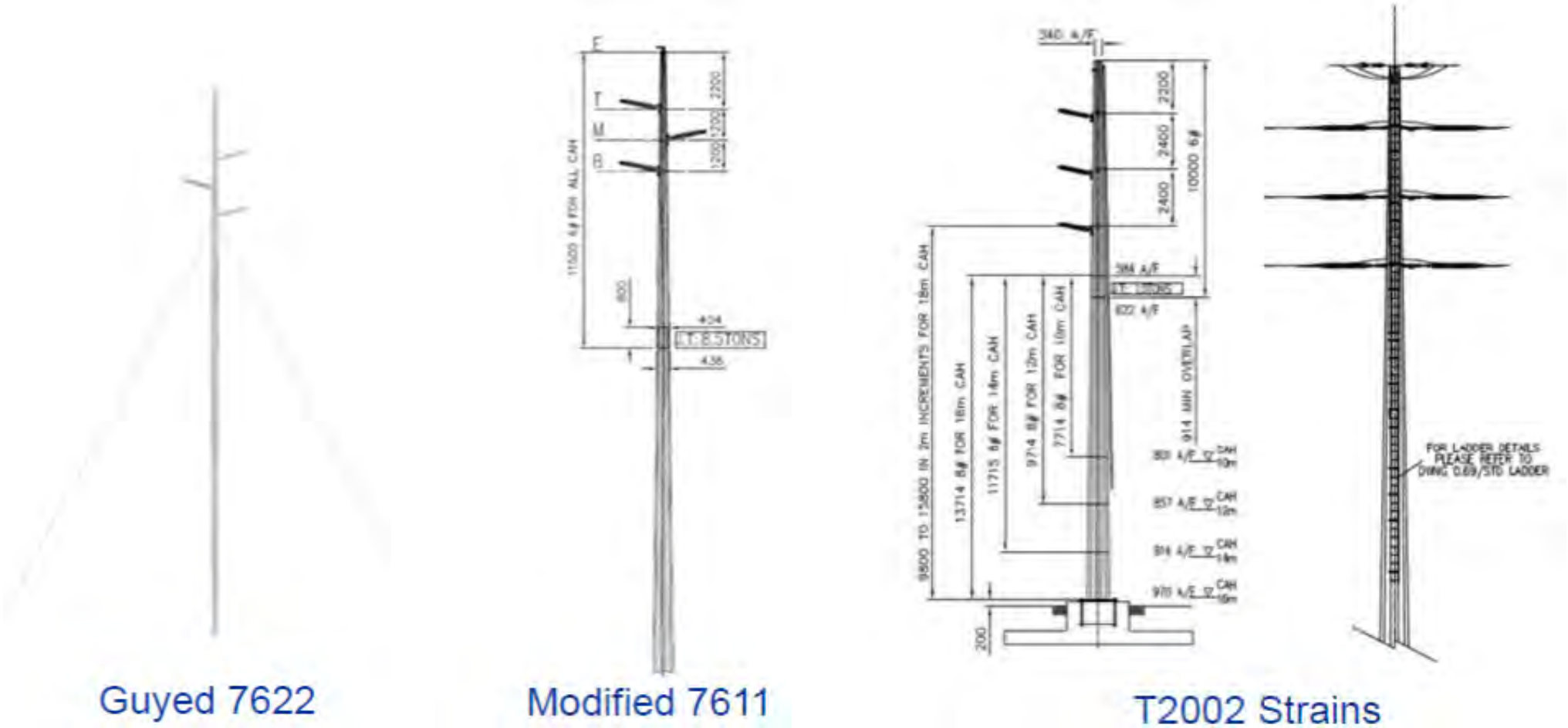
- **Cardinal Point 4**

Appendix B.5 PHOTOGRAPHS

- **Cardinal Point 5**

BASIC ASSESSMENT REPORT

APPENDIX C: FACILITY ILLUSTRATIONS



Option A: Hybrid Monopoles (also known as Guyed Monopoles)

Option B: Self-Supporting Monopoles

The strain structures are still the same for both options of monopoles (132kV)

Figure 1: Indicative drawings of the pylon structures being considered for the proposed 132 kV distribution line

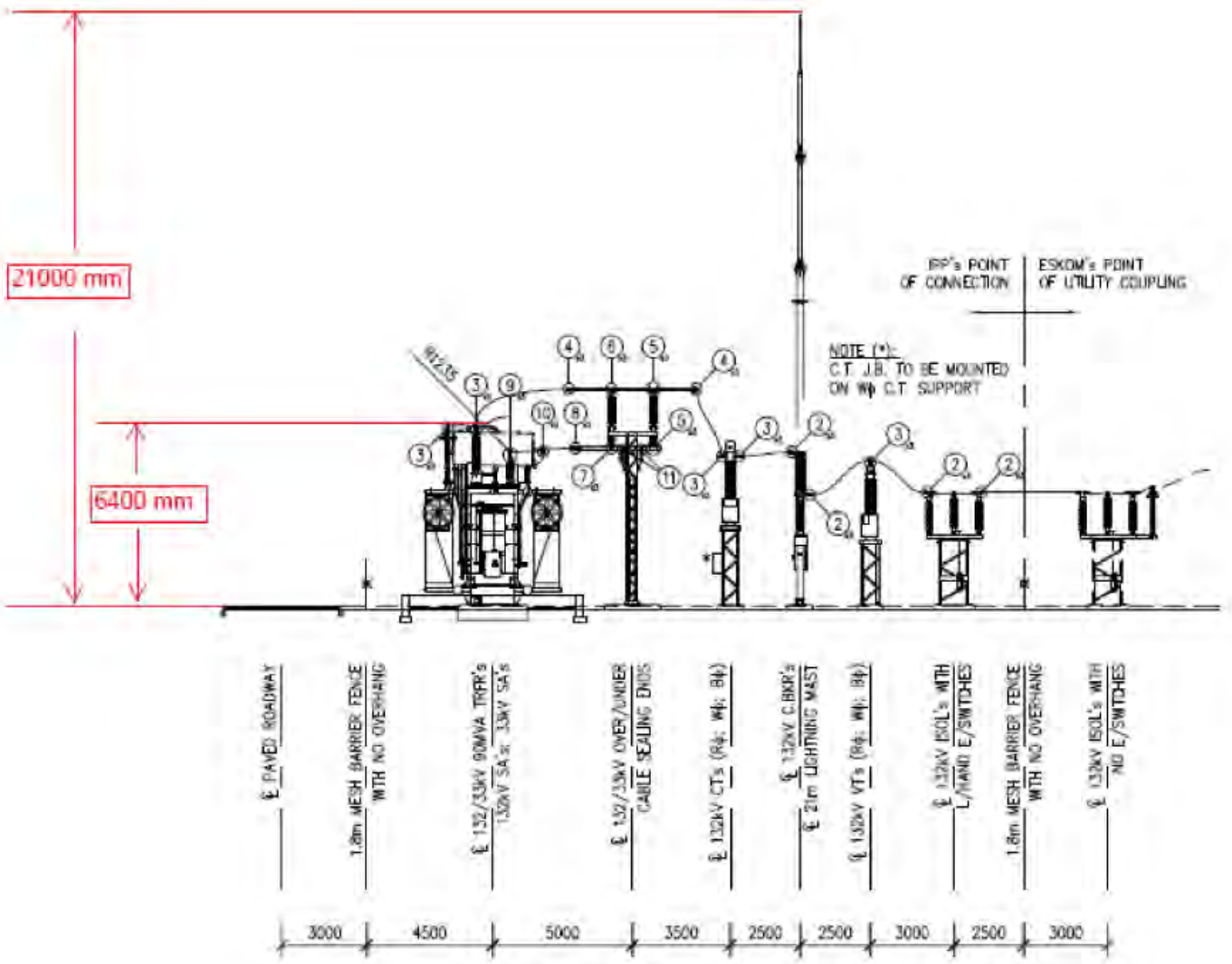


Figure 2: Indicative drawing of the proposed on-site substation

contents

BASIC ASSESSMENT REPORT

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the Rietrug Wind Energy Facility (WEF), Northern and Western Cape Provinces (Rietrug WEF – Electrical Grid Infrastructure)

APPENDIX D.1: Terrestrial Ecology Impact Assessment

ECOLOGICAL IMPACT ASSESSMENT:

Basic Assessment for the proposed Construction of Electrical Grid Infrastructure to support the proposed Rietrug Wind Energy Facility, near Sutherland, in the Northern and Western Cape Provinces

Report prepared for:
CSIR – Environmental Management Services
P O Box 17001
Congella, Durban, 4013
South Africa

Report prepared by:
Simon C Bundy – SDP Ecological
P.O. Box 1016
Ballito 4420
South Africa

March 2017

SPECIALIST CV

Simon Colin Bundy

NAME:	Simon Colin Bundy
PROFESSION:	Ecologist
DATE OF BIRTH:	7 September 1966
PLACE OF BIRTH:	Glasgow, Scotland
NATIONALITY:	South African / British
MEMBERSHIP OF PROFESSIONAL BODIES:	South African Council for Natural Scientific Professions No. 400093/06 – Professional Ecologist

KEY QUALIFICATIONS

Simon Bundy has been involved in environmental and development projects and programmes since 1991 at provincial, national and international level, with employment in the municipal, NGO and private sectors, providing a broad overview and understanding of the function of these sectors. Bundy has a core competency in coastal management and botanical issues and has worked on coastal projects in the Seychelles and Tanzania providing ecological and general environmental advice and support. Bundy has been involved in a number of renewable energy projects including the Kalkbult, Dreunberg and Lindes Solar Parks in the Northern and Eastern Cape, as well as wind energy and solar projects in the Western Cape and Rwanda. In such projects Bundy has provided both technical ecological support, as well as the undertaking of environmental impact assessments.

Allied to the above, Bundy has provided technical assistance to the "Save the Wild Coast" initiative through a technical report outlining the concerns relating to dune mining in and around the Xolobeni prospecting region while also evaluating critically, a number of environmental impact assessments and technical reports for various clients. Such evaluations have included "sea defence structures at Buffalo Bay, Western Cape", through the Nelson Mandela University. Bundy has also assisted iSimangaliso Wetland Park in its initiatives against unlawful developments in the Bangha Nek area. Bundy has also acted as expert witness on ecological issues on a number of legal cases.

From a technical specialist perspective, Bundy is competent in a large number of ecological methodologies and analytical methods including statistical methods; multivariate analysis and ordination. Bundy is competent in wetland delineation and has formulated ecological coastal set back methodologies for EKZN Wildlife and the Oceanographic Research Institute. Bundy acts as botanical specialist for Eskom Eastern Region, with specific interest in coastal habitat forms.

EDUCATION

- 1990 - BSc Biological Science – University of Natal
- 2004: MSc - University of KwaZulu-Natal,
- 1997: Diploma Project Management, Executive Education
- PhD candidate, Department of Engineering, UKZN

- 1998: "Sustainable development initiatives" in Europe. Training Programme in Berlin, Germany
- 2000: Training course: "Environmental Economics and Development". University of Colorado (Boulder) USA.

SELECTED RELEVANT PROJECT EXPERIENCE

Task Team Chair and Project Ecologist: Task Team for Coastal Disaster Management, KwaDukuza 2007 - 2011

Management of coastal clean up programme immediately following March storm event of 2007. Activities included introduction of geofabric bag protection options, coastal retreat implementation and development of policy on coastal management following destruction of coastline.

Ecological Review of Lake Mzingazi for Umhlatuze Water: University of KwaZulu Natal – (2010)

Review of habitat structure and integrity of Mzingazi Lake System at Richards Bay required to interpret transformation of aquatic system over time and evaluate forecast for future reference.

Ecological Review and Agricultural Assessment – Dreunberg Solar Park, Eastern Cape : Scatec Solar – (2012)

Ecological review of proposed solar park near Burgersdorp, with additional evaluation of veld carrying capacity.

Ecological Review and Rehabilitation Planning : Sodwana Bay :iSimanagaliso Wetland Park Authority – (2013 - 2014)

Analysis and review of state of dune cordon in and around Sodwana Bay with consideration of the impacts of removing exotic trees from site to rejuvenate dune and beach dynamics

Ecological Review of Kalkbult Solar Park (2009)

Ecological review and delineation of ecologically significant areas within the proposed Kalkbult Solar Park, near Potsfontein, Northern Cape.

Ecological and Dune retreat investigation of the Kosi Bay Illegal Development Isimangaliso Wetland Park Authority (2011)

Specialist investigation into the impact upon the dune cordon of structures placed in and close to dune cordon near Kosi Bay mouth.

PUBLICATIONS

Bundy, S. C. and Forbes, N. T., 2015. *"Coastal dune mobility and their use in establishing a set back line"* 9th West Indian Ocean Marine Science Conference 2015

Bundy, S. C. and Smith, A. M. 2009 *"Analysis of the Recovery of Two Separate Coastal Dune Systems Following the 2006 – 2007 Marine Erosion Event and Assessment of the Artificial Dune System in Coastal Management"* KZN Marine and Coastal Management Symposium, Durban South Africa.

Bundy, S. C., Smith, A. M., Mather, A. A. 2010. "Dune retreat and stability on the Northern Amanzimtoti Dune Cordon", EKZN Wildlife Conservation Symposium 2010

Smith, A Mather AM Bundy SC, Cooper AS Guastella L, Ramsay PJ and Theron A; 2010 "*Contrasting styles of swell-driven coastal erosion: examples from KwaZulu-Natal, South Africa*" Geology Journal", Cambridge University Press

Smith, AM, L Guastella , SC Bundy and AA Mather 2007 "*Coastal Storm Damage in the March 2007 Storm* SA Journal of Science 2007 "A Synopsis of Recent Storm Events"

Guastella L, Smith A Mather A and Bundy S 2008 "*As Memories Fade - A Review of the Post 2007 Coastal Erosion Events"* African Wildlife 32 / 2008

Smith A, Mather A, Theron A, Bundy S and Guastella L 2008 **"***The 2006-2007 KwaZulu – Natal Coastal Erosion Event in Perspective*" 2009 Contribution to the The South African Environmental Observation Network publication " Climate Change in Southern Africa"

Smith A and Bundy S 2009 "*Coastal erosion: reparative work on the Ballito coastline, KwaZulu-Natal, South Africa, was it enough*?" 2009 International Multi Purpose Reef and Coastal Conference, Jeffrey's Bay South Africa.

Smith AM, SC Bundy 2012 "Review of Coastal Defence Systems in Southern Africa" Article for Springer Scientific Publications through Ulster University, Pilkey and Cooper

Bundy SC AM Smith, L Guastella 2012 "*A Review of Select Dune Rehabilitation Initiatives and a Proposed Methodology towards Ensuring a Prudent Approach towards the "Greening of Dunes*" VI International Sandy Beaches Symposium Emphakweni Port Alfred

Various popular articles including documentaries on coastal and climate change issues.

SPECIALIST DECLARATION

I, S C Bundy, as the appointed independent specialist hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Name of Specialist: S C Bundy

Signature of the specialist

Date: 30 November 2016

EXECUTIVE SUMMARY

The ecological evaluation of the proposed Rietrug on-site substation and its associated 132kV distribution line (including other supporting electrical infrastructure such as the Operation and Maintenance Building, laydown area and service road below the proposed distribution line) incorporated a desktop and site reconnaissance of the affected area across a number of farms within the Sutherland region of the Northern and Western Cape Provinces. The evaluation included consideration of the bio physical state of the subject areas and consideration of topographic features and vegetation in order to establish a holistic view of all components within the ecological landscape. Sites of ecological value or "sensitivity" were identified using eco-geomorphological parameters and such sites were considered with regard to their position in the landscape and their interface with the proposed development. Notably, the assessment was limited to the terrestrial environment and excluded wetlands and aquatic environments, avian and chiropteran fauna (as it is understood that these are the subjects of separate specialist studies, as applicable). Major impacts identified as a consequence of the development proceeding relate to, *inter alia*;

- Changes in the local habitat as a consequence of variation in physical factors within the proposed on-site substation site and along the proposed distribution line route (primarily limited to excavation and the removal of lithic habitat).
- Changes in local surface and possibly sub surface hydrology around the proposed on-site substation site ; and
- The ousting, and in some cases recruitment, of species, with subsequent variation in populations and changes in ecological processes in and around the proposed on-site substation and powerline.

The ecological evaluation has determined that with the application of appropriate management measures that the abovementioned major potential impacts may be mitigated and reduced to *low* or *very low* levels of impact significance. None of the above major potential impacts have been identified as being of high significance (with the implementation of mitigation measures), most impacts arising can be considered to be of *low* to *very low* significance in a holistic evaluation.

Given the above information, it is evident that with adherence to the recommendations contained within this report and the Environmental Management Programme (EMPr) included as Appendix G of the Basic Assessment (BA) Report, as well as the judicious placement of the proposed on-site substation and electrical powerline towers, the proposed development of the substation cannot be precluded from the site. Notably, the establishment of a powerline that connects to **Alternative 1** of the substation (the proposed Suurplaat on-site substation (referred to as the collector hub for this proposed project)) located on the farm Hartebeestefontein is considered as the recommended routing and grid connection from the proposed Rietrug Wind Energy Facility on-site substation. This point of grid connection is preferred over the proposed Eskom Nuwerust substation (i.e. Alternative 2) on account of the reduced footprint associated with the proposed 132kV distribution line and on account of the fact that the powerline to Alternative 1 does not traverse below the 1600m contour, which has been generally identified as an area of improved, comparative ecological value. Howsoever, based on this area of improved ecological value, several options of the Alternative 2 distribution line route from the proposed on-site substation to the Eskom Nuwerust Substation were considered in order to find the most suitable routing from an ecological, visual and heritage perspective. In line with this, the Alternative 2 distribution line route currently included in this assessment and included in the mapping is considered and deemed to be the most suitable line route option to be utilised, should connection with the proposed Eskom Nuwerust substation be required.

Both Alternative 1 and Alternative 2 of the distribution line routing and connection to the third party substation are suitable and no "fatal flaws" that would prevent the utilisation of these routes have been identified. Although Alternative 1 is preferred over Alternative 2 based on its shorter

length and lesser extent, the selected routing for Alternative 2 (despite extending below the 1600 m contour), cannot be dismissed as a "no-go option", from an impact assessment perspective.

A number of management recommendations are suggested in order to mitigate against potential impacts on the terrestrial environment that may arise during the construction and operations phases of the project and these recommendations should be included in the EMPr for the project.

It is our opinion that with the implementation of the above, the project proposal, subject to final design and adherence to the above recommendations, can be accommodated on site and should therefore be sanctioned by the mandated authority.

contents

tables

figures

LIST OF ABBREVIATIONS

DEA	Department of Environmental Affairs
DECORANA	Detrended Correspondence Analysis
EIA	Environmental Impact Assessment
ELP	Electrical light pollution
NEMA	National Environmental Management Act (Act 107 of 1998, as amended)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended)

GLOSSARY

	DEFINITIONS
Arid	Areas which receive low levels of rainfall or there is a moisture deficit.
Crepuscular	Fauna that is active at twilight
Dolerite	Form of igneous rock.
Drainage line	A geomorphological feature in which water may flow during periods of rainfall.
Edaphic	Pertaining to soils.
Ethology	Animal behaviour
Fossorial	Pertaining to burrowing animals or those which live underground.
Geophyte	Plants with underground storage organs.
Graminoid	Grasses or grass-like. Also monocotyledonous plants.
Hydrogeomorphological	The interaction of geomorphic processes, landforms and/or weathered materials with surface and sub-surface waters.
Hygrophilous	Plants growing in damp or wet conditions.
Lithic	Of or pertaining to rock
Rill	Shallow erosion lines less than 30cm deep
Shale	A sedimentary rock derived from mud
Xeric	A dry, as opposed to wet (hydric) or mesic (intermediate) environment.

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS (AS AMENDED)

Requirements of Appendix 6 – GN R326 (7 April 2017)	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Preliminary sections of this report
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Preliminary sections of this report and Appendix I of this BA Report
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 3, 4, 5, and 6
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 1.4 and Section 2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying alternatives;	Section 3
g) an identification of any areas to be avoided, including buffers;	Section 3.2
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 3.2
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Sections 3, 4, 5 and 6
k) any mitigation measures for inclusion in the EMPr;	Sections 5, 6, 8 and 10
l) any conditions for inclusion in the environmental authorisation;	Section 10
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Sections 5, 6, 8 and 10
n) a reasoned opinion- i. whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity and activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Sections 9 and 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 2.3
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 4
q) any other information requested by the competent authority.	Not Applicable
2. Where a government notice gazetted by the Minister provides for any protocol of minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply	Not Applicable

TERRESTRIAL ECOLOGICAL ASSESSMENT

This report presents the findings of the Terrestrial Ecological Assessment undertaken in respect of the proposed establishment of Electrical Grid Infrastructure, including an electrical on-site substation, a distribution line, service road, Operational and Maintenance (O&M) Building, laydown area, and supporting powerline infrastructure that is required in order to serve the proposed and authorised Rietrug Wind Energy Facility (WEF), which is located on the Remaining Extent and Portion 1 of Farm Beeren Valley 150 and the Remaining Extent of Nooitgedacht Farm 148, located near Sutherland. The proposed Electrical Grid Infrastructure (which is the subject of this assessment) is located on several farm portions located in the Northern and Western Cape.

1 INTRODUCTION

1.1 Scope, Purpose and Objectives of this Specialist Report

South Africa Mainstream Renewable Power Developments (Pty) Ltd (Mainstream) received Environmental Authorisation (EA) on 22 February 2012 (DEA Reference Number: 12/12/20/1782), from the National Department of Environmental Affairs (DEA) to construct and operate the proposed Sutherland Renewable Energy Facility (REF) consisting of a WEF and Solar Energy Facility. The EA was amended in October 2015 on a non-substantive basis (DEA Reference Number: 12/12/20/1782/AM1). However, in February 2016, Mainstream appointed the Council for Scientific and Industrial Research (CSIR) to apply for two substantive amendments to the original and amended EA. The first amendment was completed in July 2016, which involved dissecting the REF into three separate WEFs, each with a generation capacity of 140 MW. On 10 November 2016, the National DEA accordingly granted separate EAs for the Sutherland, Sutherland 2, and Rietrug WEFs (respective DEA Reference Numbers: 12/12/20/1782/2; 12/12/20/1782/3; and 12/12/20/1782/1). These EAs replace the original EA (dated 22 February 2012) and the amended EA (dated 6 October 2015). The second substantive amendment is currently underway by the CSIR, which includes an application to amend the turbine and hub specifications of the proposed and authorised Sutherland, Sutherland 2, and Rietrug WEFs. **However, these amendments are the subject of a separate process.**

As part of the design and operation of the WEF, Mainstream has identified the requirement for the establishment of an on-site substation, service road, O&M Building, laydown area and 132kV powerline, as well as connection to a third party substation to support the proposed and authorised Rietrug WEF (Figure 1). The Electrical Grid Infrastructure required to support each WEF (i.e. Sutherland, Sutherland 2 and Rietrug) is being subjected to a separate Terrestrial Ecological Assessment, as part of a Basic Assessment (BA) Process. This report only relates to the proposed **Rietrug WEF – Electrical Grid Infrastructure** BA Project.

1.2 Nature of the Proposed Developments

Therefore, the establishment of three WEFs requires that three on-site substations and the abovementioned supporting infrastructure be constructed to serve each facility and that 132kV distribution lines be established in order to connect the proposed on-site substations to the National Grid. In addition, the establishment of the proposed on-site substation which would require that a laydown area and O&M Building (as discussed above) be established to support the construction of the facility.

The proposed 132kV powerline would be established upon a number of monopole towers or similar structures that would be founded at points of up to 400m apart along the line and would have a

small earthen track (i.e. service road approximately 4 to 6 m wide) established in close proximity to the line, which would allow for maintenance and servicing of the line to be undertaken. The establishment of the proposed on-site substation and the associated project infrastructure would result in the clearance of vegetation and the levelling of areas both within the on-site substation site and adjacent thereto. The construction of the towers would require the clearance of vegetation and excavation at a number of points where founding of the tower structures would take place. The stringing of the powerline may require the clearance of vegetation, depending upon how the stringing operation is performed (i.e. stringing of towers may be performed by the use of a vehicle or in some terrain through the use of a helicopter).

A wide area of approximately 25ha has been identified as the development envelope for the establishment of the proposed on-site substation (inclusive of the O&M Building and laydown area). The entire 25 ha has been assessed, however the actual on-site substation, O&M Building and laydown area would cover a much smaller footprint within this larger assessed area. On the other hand, the route to be followed by the proposed 132kV distribution line and service road may follow one of two alternatives, as noted below:

- Alternative 1 – a powerline of approximately 17km that would connect the proposed on-site substation with the approved 132 kV Suurplaat on-site substation (which is referred to as the *collector hub* for these proposed BA projects); and
- Alternative 2 – a powerline of approximately 44km that would connect the proposed on-site substation with the proposed Eskom Nuwerust substation.

Both Alternative 1 and 2 of the distribution line routing and connection to the third party substation have been assessed in this report. Only one option for Alternative 1 of the distribution line routing was considered in this assessment, as this is considered to be a suitable routing option for connection to the proposed collector hub, thereby not warranting consideration of further options. However, due to areas of improved ecological value, four different powerline route options were given consideration for Alternative 2 (i.e. to connect the Rietrug WEF with Eskom's proposed Nuwerust substation) in order to find the most suitable routing from an ecological, visual and heritage perspective. However, of the route options given consideration, the Alternative 2 distribution line route currently included in this assessment and included in the mapping was found to be worthy of further evaluation and is considered to be the most suitable line route alternative, should connection with the proposed Eskom Nuwerust substation be required. The BA Report provides additional detail of the four options that were considered by the specialists in order to determine the preferred routing for Alternative 2. Figure 1 indicates the position of the proposed Rietrug WEF on-site substation and the two alternative powerline options to the proposed collector hub and proposed Eskom Nuwerust substation.

This Terrestrial Ecological Assessment is therefore being undertaken as part of the BA Process (in terms of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations) associated with the proposed Electrical Grid Infrastructure that will serve the authorised Rietrug WEF. This report forms a component of the more holistic BA Report which will be circulated for public comment, as well as being presented to various authorities for review and consideration The terrestrial ecological evaluation was undertaken during the latter period of November 2016 and February 2017, and entailed both a literature review of the region, as well as an onsite evaluation of the study area, during which specific primary data was collected and evaluated. In addition, the identification of key ecological features within the subject site was undertaken and their significance interpreted, in order to draw conclusions on the nature of the affected power line route, as well as the level of impact that may be associated with the proposed infrastructure.

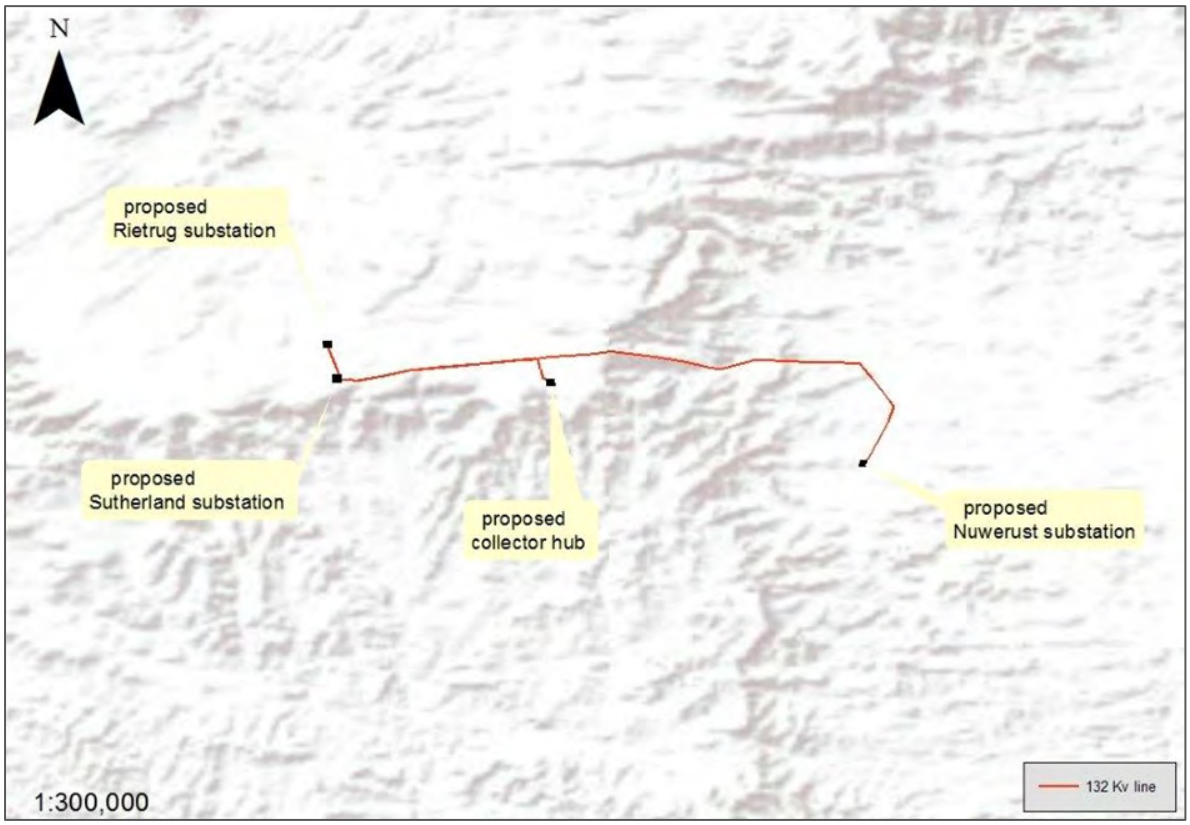


Figure 1: Map depicting the proposed Rietrug on-site substation powerline route alternatives connecting to the proposed on-site substation to the proposed collector hub (i.e. 132 kV Suurplaat on-site Substation) (Alternative 1) and the proposed Eskom Nuwerust substation (Alternative 2).

1.3 Terms of Reference

The overall objectives of this Terrestrial Ecological Assessment are to:

- Identify and establish an understanding of the nature of the study site under consideration at a landscape scale of evaluation with particular consideration being given to important terrestrial features and habitats, as they may be identified.

- Give consideration to the habitat value of the areas affected by the proposed infrastructure and evaluate habitat composition and significance.

- From the above, identify areas of ecological significance that may be affected by the proposed infrastructure and which may require avoidance or particular mitigation measures to be employed.

- Assess the actual and potential impacts arising from the proposed development on both the terrestrial habitat and fauna within the study site. Such impacts may be directly applicable to the sites and contained within the boundaries of the project footprint, or may be indirect impacts, which may have ramifications outside of the footprint of the infrastructure; or may be accumulative in nature in terms of the impacts arising from similar developments or activities within the region.

- Provide guidance on the implementation of mitigation measures that may serve to moderate negative impacts that may arise as a consequence of the development.

The scope of work is based on the following broad terms of reference, which have been specified for this specialist study:

- The provision of a description of the regional and local features that may be encountered within or adjacent to the study area.
- The undertaking of a field survey to search for sensitive areas, receptors or habitats and species of special concern that may be present within the site.
- From the above tasks, areas of ecological significance should be mapped.
- Given the field assessment and mapping process, the identification and ranking of potential impacts on the affected environment should be undertaken.
- Where applicable and given the findings above, the identification of relevant legislation and legal requirements that may pertain to site should be identified.
- The provision of recommendations and possible mitigation measures that may be implemented during construction, as well as rehabilitation procedures/management guidelines that should be implemented following construction should be presented.

1.4 Assessment Details

Type of Specialist Investigation	Terrestrial Ecological Assessment
Date of Specialist Site Investigation	29 November 2016 to 03 December 2016 and 9 and 10 February 2017
Season	Summer
Relevance of Season	Sutherland and the surrounding districts is a winter rainfall region, with warmer temperatures being experienced from October onwards. The period of assessment is considered to be suitable for the identification of emergent plant species, particular annuals within the local vegetation communities. Faunal activity is also expected to have increased following the winter period. Other meteorological factors may influence the floral and faunal state.

2 APPROACH AND METHODOLOGY

A literature review and desktop analysis was undertaken prior to the field investigation, utilizing various sources including data sourced from the South African National Biodiversity Institute (SANBI) and other relevant sources. Recent and historical aerial imagery of the site was considered in order to identify points for investigation during the field survey.

Utilising the above information, a field investigation was undertaken during the early summer period of 2016 (November/December) and in mid-summer (February 2017), whereby:

- Sites of geomorphological or topographic variance were identified across the study area using a Gamin V Montana, where species composition and other bio physical factors were

considered. Species identified within an approximate 50m transect were identified at selected points using the nearest point method and their presence was logged. This data was imported into Microsoft Excel and subjected to multivariate analysis using DECORANA (detrended correspondence analysis) (CAPV software developed by Pisces Conservation), a method of identifying the relationship between a number of sample sites using the data collected. Data was rapidly assimilated using a "presence – absence" method of identifying species at 13 sample sites for all three Electrical Grid Infrastructure BA Projects (Figure 2).

- The results of the analysis were utilized in order to identify variation in species composition and structure according to topographic and other factors which enables the compilation of a spatial plan that identifies areas of differing habitat form and structure (i.e. a "sensitivity map").

- Other factors that may be related to improved habitat form and structure that are of significance in respect of faunal communities were also considered and identified.

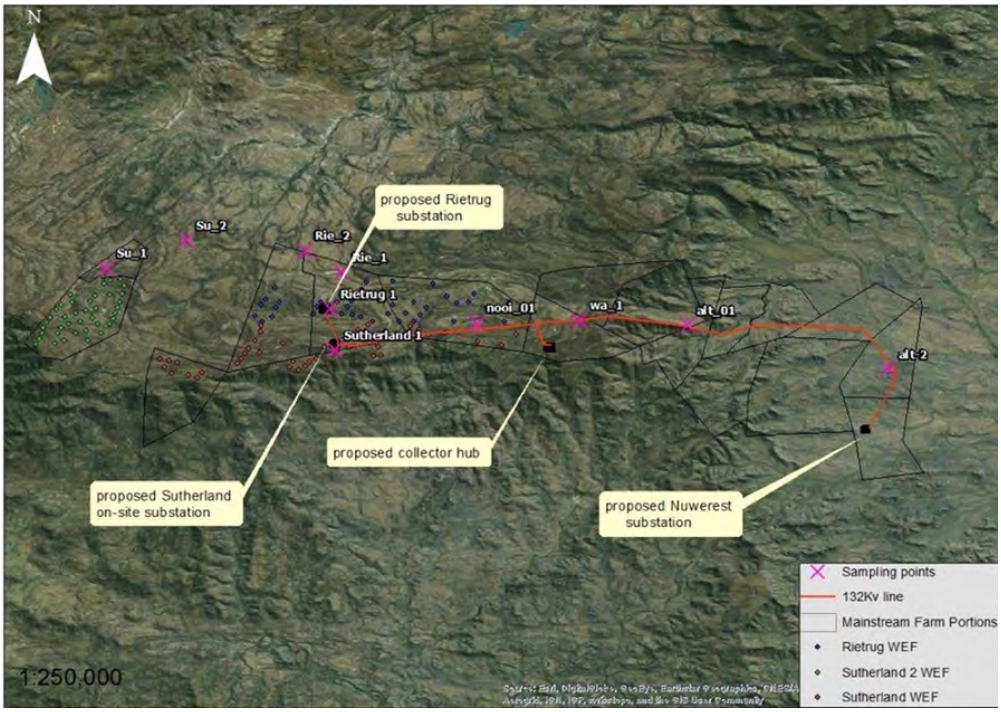


Figure 2. Aerial image indicating the proposed 132kV power lines (for both Alternatives 1 and 2) that connect to the proposed collector hub and proposed Eskom Nuwerust substation, and sample points taken across the study area.

2.1 Information Sources

The following resources were utilised in the field reconnaissance of the area, as well as in the compilation of this assessment report:

- Aerial imagery sourced from Google Earth and the ESRI GIS database;
- Geo-spatial data sourced from the SANBI, including vegetation mapping data;
- General technical literature, as referenced; and
- Documentation associated with the EIA process undertaken by Environmental Resources Management (ERM) on behalf of Mainstream.

2.2 Assumptions, Knowledge Gaps and Limitations

Field reconnaissance was undertaken during the period 29 November to 3 December 2016, during the mid-summer period, which is a period of higher average temperatures and lower rainfall (SA Weather Service, December 2016; van Heerden and Hurry 1987). Further site reconnaissance was undertaken between 9 and 10 February 2017. In addition, rainfall within the region has been lower than the annual average for the period commencing September 2016, following particularly high rainfall during the winter period (Figure 3), and as such, some botanical species, in particular graminoids and geophytes, may not be generally evident. This may affect both the analytical and empirical results of the investigation.

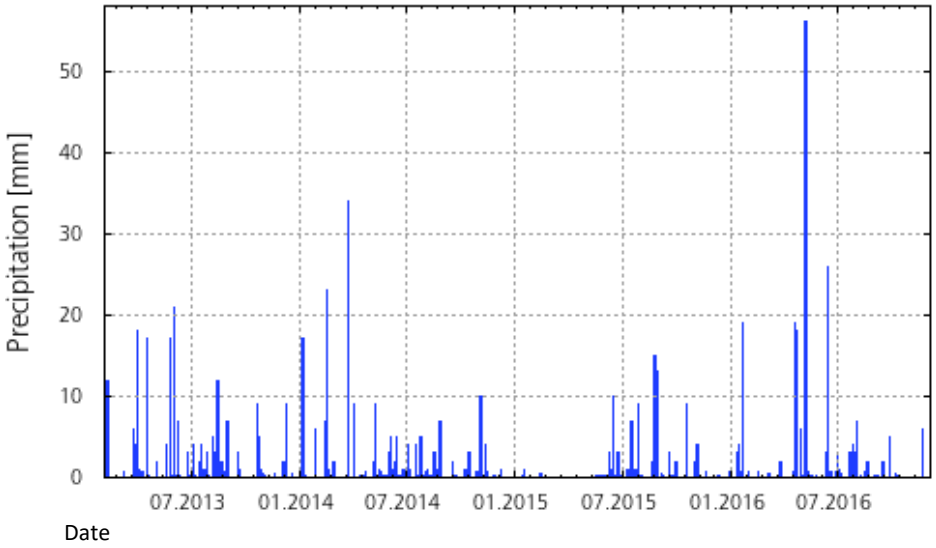


Figure 3. Graph depicting rainfall for Sutherland for the period January 2013 to date. (NCDC – NOAA 2016)

As noted above, the assessment was undertaken using a random sampling method and a site walk over. As such minor outliers within the routes may not have been evaluated. The random sampling method, if correlated to topography and other aspects, is however a robust method of evaluating habitat across a large area. Site specific review of the development footprint, following the completion of the detailed engineering design should be undertaken prior to the commencement of construction.

Given that the period of the site reconnaissance was constrained and the areas under review are considered to be expansive, it is evident that the identification of minor plant communities within the proposed development footprint cannot be accomplished and that the identification of habitat complexity and significance can only be achieved at a coarse scale. In this regard use was made of other indicators (i.e. geology and topography) as a proxy for the identification of "sensitive ecological habitats". It follows that further surveys may be required in order to obtain a more definitive understanding of the sites in question once the footprint of towers and road routings have been finalized and approved.

2.3 Consultation

Interaction was undertaken with a number of landowners during the review of the sites in question, including Mr A Knoop and the farm manager of Nooitgedacht. Interactions related to considerations

of the nature of the land within their farms, the operations of the farms (number and nature of livestock) and other general commentary.

3 DESCRIPTION OF THE RECEIVING ENVIRONMENT

A combination of topographic and meteorological factors within this region has led to the area being subject to climatic extremes, including some of the lowest temperatures on record, relatively common snow falls and average maximum temperatures reaching 28° C in February and dropping to an average minimum temperature of -4 °C in July. Frost is evident in the region on up to 9 months of the year from March through to November. The area in general, can be considered to have a low rainfall (average annual rainfall of 240.3 mm/annum (2008 – 2015)), with the greatest rainfall being experienced between March and September (approximately 65% of the annual precipitation) (World Weather Online; 2016).

The Koppen-Geiger climate classification (Koppen Geiger, 2016) identifies the Sutherland area as lying on the cusp between "BWh", which is indicative of an *arid hot environment*, and "Csb" (*warm temperate, dry and a warm summer*). In addition, the study area lies at an altitude of approximately 1600 m amsl, on the top of a steep escarpment that rises from the lower plains associated with the coastal lowlands of the Cape, that lie to the south. A combination of the above factors has led to the vegetation within the region being driven primarily by the prevailing climate, while the rugged topography and fractured geology of the area establishes a number of niche and micro-environments that support specific floral species and act as refugia for a number of faunal species. Eco-geomorphological features are thus of significant habitat importance within the subject site.

Utilising the SANBI vegetation data (Figure 4), it is evident that the Rietrug WEF on-site substation lies primarily within the Roggeveld Shale Renosterveld (FRs3), while the proposed 132kV powerline if routing Alternative 2 is exercised, sees the Central Mountain Shale Renosterveld and Gamka Karoo vegetation types traversed. Alternative route 1 will see the line route contained primarily within FRs3, with some possible incursion into Central Mountain Shale Renosterveld vegetation form (Figure 4).

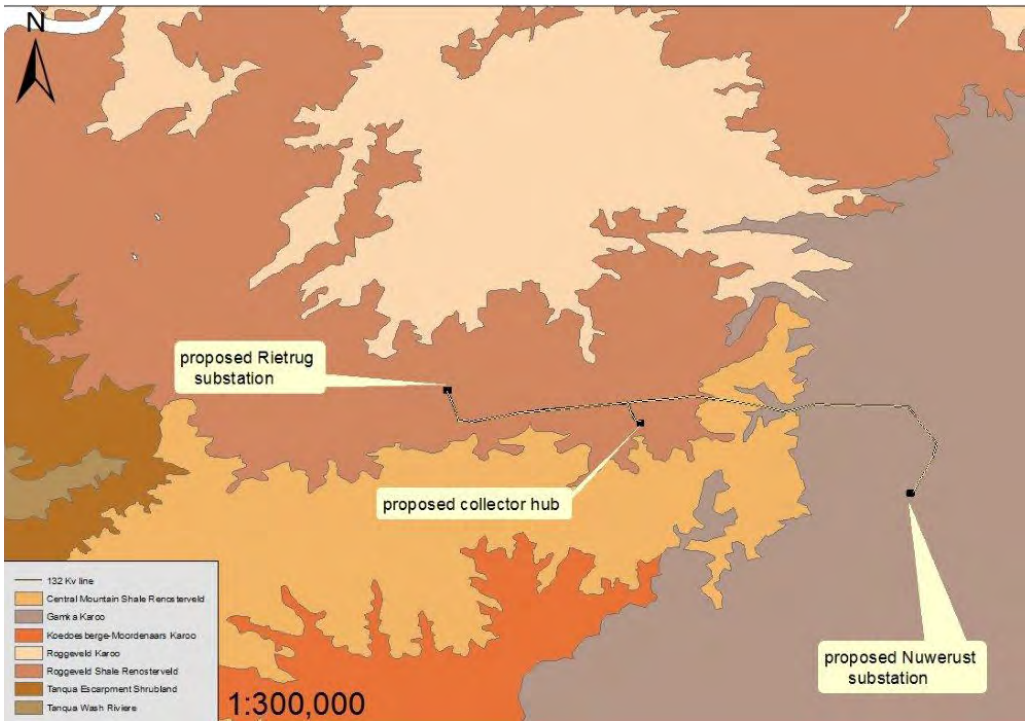


Figure 4. Map showing broad vegetation types in relation to the proposed development (i.e. the Rietrug WEF Electrical Grid Infrastructure BA Project)

Roggeveld Shale Renosterveld is typified by vegetation communities dominated by *Elytropappus rhinocerotis* and *Euryops laterifolius,* as well as *Lyceum cinereum*. While these species dominate within the Roggeveld, a number of endemic geophytes are to be found in the region, particularly in association with dolerite geology. The vegetation type is considered to be "least threatened" from a conservation perspective, with the impact of livestock being the most significant threat to this habitat type.

Roggeveld Karoo is a shrub dominated vegetation form dominated by *Lyceum cinereum*, as well as *Salsola glabrescens* and *S tuberculata*. The veld type is considered to be "least threatened" from a conservation perspective. Central Mountain Shale Renosterveld (FRs5) lies primarily along the steeper slopes and along the lower elevations of the Great Escarpment, below the WEFs, while Gamka Karoo vegetation type, a typical karroid vegetation form, is dominated by Karoo dwarf shrubs and occasional low trees. These vegetation types are all considered to be "least threatened" from a conservation perspective.

Using the work of Skinner & Chimimba (2005), more than 50 mammals have been recorded from the study region, including *Bunolagus monticularis*, the riverine rabbit, which is listed as critically endangered (IUCN 2010) and is considered to be one of the most endangered mammals in South Africa. *B monticularis* is associated with riverine scrub and alluvial fans around river systems. Other mammals that may be considered to be of significance and common to the region include *Orycteropus afer* (aardvark), *Proteles cristatus* (aardwolf), *Caracal caracal* (caracal) and *Oreotragus oreotragus* (klipspringer). A number of the abovementioned species are considered "vermin" by local farmers, disrupting farming activities and preying on livestock. The rugged nature of the terrain in the region is however, conducive to the persistence of these animals in the region and offers refugia from extermination due to the broader inaccessibility of such areas.

A similar number of reptiles are common to the region which includes five tortoise species (Testulllidae), four of which are "protected" (IUCN 2010). Also of interest is the likely occurrence of *Bradypodion karroicum* (Karoo dwarf chameleon) and *Cordylus polyzonus* (Karoo girdled lizard), which are also listed as red data species. A few amphibian species are also common within the region, the most notable of which being *Cacosternum karooicum* (the Karoo dainty frog) which is associated with ephemeral streams and other impoundments.

Perhaps most significantly within the region is the limited anthropogenic transformation of the land. This, coupled with the rugged terrain, allows for outliers of plant community associations, as well as a number of faunal species to persist, despite the significant impact of livestock across much of the area. It follows, that although vegetative associations across site may be uniform in structure, it is eco-geomorphological features that are the greater determining factors in the maintenance of ecological integrity and function within the study area.

3.1 Baseline Environmental Description

As indicated in Section 2, using observed variation and random sampling across the site/line route associated with the project area, consideration was given to the vegetative composition at select points. The purpose of such evaluation was to consider the level of similarity or variance in vegetation composition across the study area and thereby identify points of ecological significance through differentiation of habitat change. Given the nature of the area, and as explained above, topography or eco-geomorphology is also a significant factor determining the functional value of the region and consideration was also given to faunal observations across site and the habitat requirements of endemic or specially protected species that may occur or were observed within the study area. These factors, in line with the results of the vegetation survey were utilised to identify points of ecological significance or value within the broader study area.

3.1.1 Vegetation

Much of the study area falls within Roggeveld Shale Renosterveld and as a general low relief plateau, this area comprises primarily of low, shrub like vegetation interspersed across shallow soils and regular although random, shale and sometimes doleritic rock exposures. Geophytes, in particular species such as *Devia xeromorpha* are associated with the more rugged terrain of the escarpment (Goldblatt and Manning, 1990) and rock exposures. Such species are not only of academic value but of ecological significance too, within the broader region and as such, relief and rocky terrain are evidently of ecological value.

Consideration of the broader vegetation communities across all of the three on-site substation sites and power line routes (as well as the service roads) indicated that much of the area comprised of a uniform vegetation form on the plateau (see Figure 5).

Figure 5. Image indicating typical vegetation structure across region.

Across the study area the most common vegetation includes the following species:

Aristida diffusa	(iron grass)
Chrysocoma oblongifolia	(bitter Karoo bush)
Elytropappus rhinocerotis	(renosterbos)
Erharta calycina	(purple veld *grass)*
Eriocephalus africanus	(wild rosemary)
Eriocephalus ericoides	(kapokbos)
Euryops laterifolius	(resin bush)
Felicia filifolia	(draaibos)
Lessertia frutescens	(cancer bush)
Pentzia incana	(anchor Karoo)
Rhigozum obovatum	(Karoo gold)
Salsola glabrescens	(brakbos)
Schismus inermis	

Many of the abovementioned species are testimony to the impact of grazing in this area, these species being hardy, drought and grazing resistant, and tolerating shallow clay soils. To the east of the study area, species such as *Lyceum cinereum* are more dominant, with evidence of more woody species including *Carissa bispinosa* and *Euclea undulata* being noted (see Figure 6).

Figure 6. Image indicating nature of vegetation to the east of the study area with *Carissa bispinosa* in foreground.

Consideration of the 11 sample points collected during the December 2016 site visit (Figure 2) established across the study area was undertaken using DECORANA, a statistical method of identifying the relationship between sample sites according to species composition. The results of the DECORANA are presented in Figure 7.

Figure 7 indicates that the sites located to the east of the study area, evidently differ significantly from other sites, which show a level of similarity and a (possible) minor trend in vegetation composition from west to east. As such, and in accordance with the SANBI vegetation data, there is a definitive variation in vegetation and habitat between the upper level terrain associated with the plateau and vegetation in areas located below the plateau. SANBI have utilised this information in order to compile a "corridor" which they consider to be a "critical biodiversity area" (CBA), which aligns with the eco-morphological factors discussed below. These eco-morphological factors are considered by SANBI to be important terrestrial corridors, particularly in respect of the movement of fauna. Notably, the proposed Sutherland, Sutherland 2 and Rietrug WEFs fall within much of the CBA support corridor as indicated in Figure 8, below. In addition, within the Western Cape, the infrastructure traverses areas of limited ecological significance, a minor expanse of CBA (approximately 850m) in the north being affected. This area is riparian in nature and can be ostensibly spanned by the powerline.

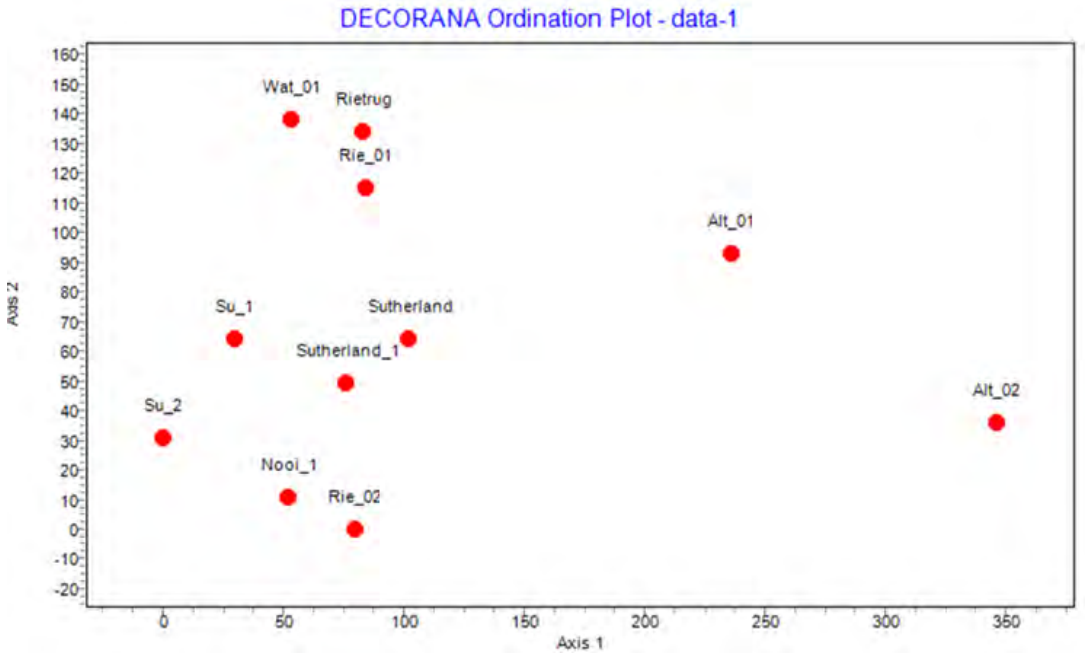


Figure 7. Results of DECORANA showing differentiation in species composition in west of the site (above 1600 m amsl), sample points to left of image and to the east of site (below 1600 m amsl) (points on right of the image).

3.1.2 Fauna

Table 1 below, is a preliminary checklist of fauna that are likely to be associated with the study area. Also identified within the preliminary checklist, which includes a number of invertebrate taxa, are those species that have a habitat requirement relating to rocky (lithic) or rugged terrain.

Of those species identified, just over 30% are reliant upon rocky habitat, which includes species such as the butterfly *Durbaniella clarkii* (Clark's rocksitter) and *Homopus* spp, the padlopers, a genus of endemic tortoise. Of these lithic related species, 27% are afforded some level of statutory protection and may be considered to be worthy of conservation. This includes four scorpion species (*Opistacanthus* spp and *Opistophthalmus* spp) and *Cordylus polyzonus*, the Cape girdled lizard.

The critically endangered riverine rabbit (*Bunolagus monticularis*) is noted from the riparian environments to the east of the study area, and historically, its range included much of the Sutherland region (Smithers 1990). *B monticularis* is generally associated with alluvial floodplains associated with seasonally dry watercourses where *Salsola* sp and *Lyceum* sp dominate (Smithers 1990). In the east of the region deeply incised watercourses such as the Dwyka River are evident, as are minor ephemeral streams associated with the escarpment and these systems are often associated with the *Lyceum -Salsola* associes described by Smithers (1990). These areas thus offer habitat conducive to the presence of *B monticularis*, further indicating the ecological value and significance of the more rugged and rocky terrain evident within the study area.

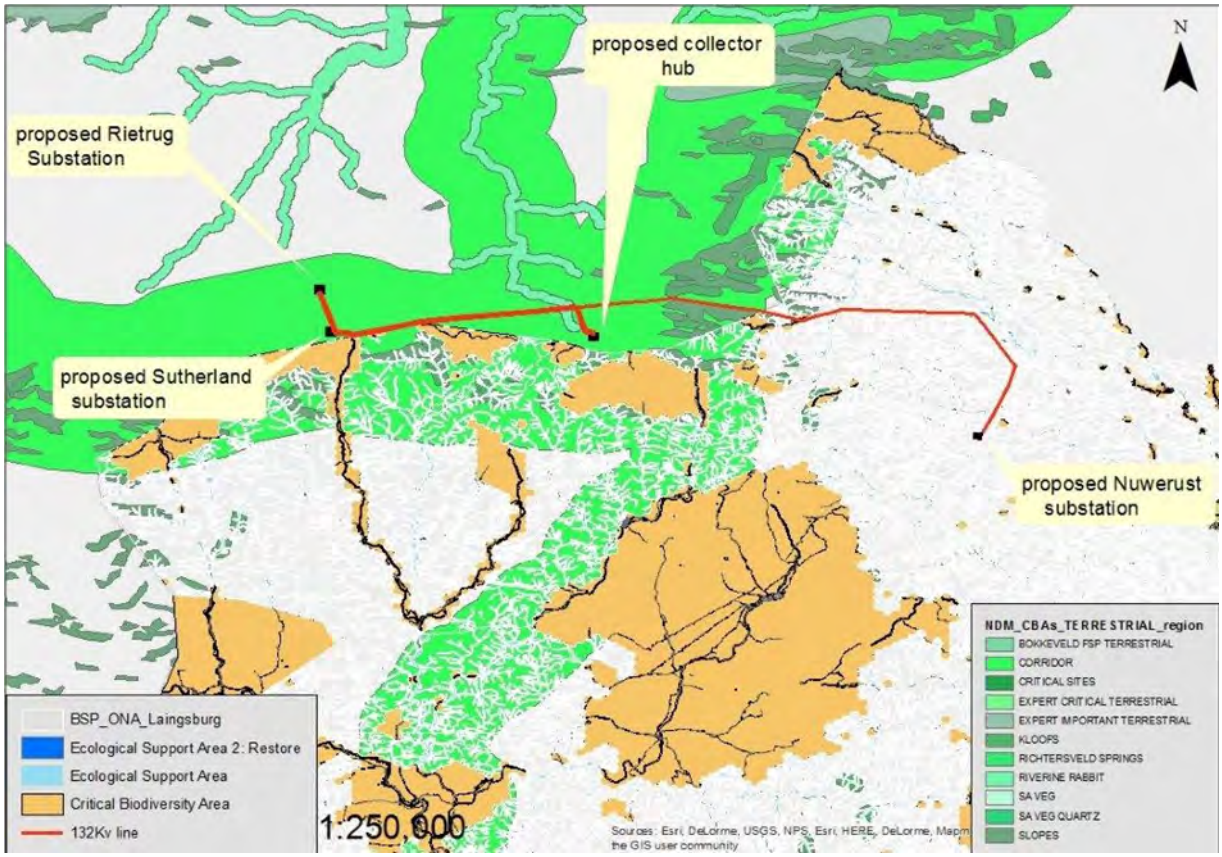


Figure 8. Map indicating powerline routes and substations under consideration in relation to terrestrial corridors in Northern Cape (SANBI, 2007) and CBA Ecological support areas for the Western Cape (Cape Nature 2017).

Site reconnaissance identified a number of faunal species within the region, including the introduced fallow deer (*Dama dama*). Of significance was the presence of *Homopus femoralis* the greater padloper, identified at a number of rock outcrops (Figure 9) and other species, including southern rock Agama (*Agama atra*) (Figure 10). Both the latter species can be considered to have an affinity with lithic dominated environments.

It is evident that while much of the subject site associated with the proposed Rietrug on-site substation (including the O&M Building and laydown area) and the 132kV power line (with its associated service road), comprises of a uniform and generally level environment, it is those points of topographic variability that offer improved ecological significance at the local level. Such points are generally associated with escarpments and rocky outliers that are able to provide a suitable habitat for geophytes, while also offering suitable refugia to a number of endemic species that in some cases rely upon these areas for the continuation of their lifecycle. It follows that in determining ecological importance or "sensitivity" within the study area, points of varying relief and steeper rocky terrain should be considered to be of higher comparative "sensitivity", while those areas that reflect limited botanical diversity and possibly higher levels of anthropogenic disturbance (including significant over-grazing) may be considered to be of lower significance. This would align with the rationale of SANBI in establishing the corridor identified in Figure 8, above

Figure 9. ***Homopus femoralis*** **(padloper tortoise) identified on site.**

Figure 10. Southern rock Agama on lithic exposure within subject site

Table 1. Preliminary list of fauna within study area.

Taxa	Common name	IUCN	TOPS	NC1/2	Taxa	Common name	IUCN	TOPS	NC1/2
Mammalia		RDL			Reptilia		CITES	2007	
Primates					**Testudinoidea (Tortoise)**				
Papio ursinus	Chacma Baboon	LC			Homopus areolatus	Common padloper	Prot.		
Carnivora:					Homopus boulengeri	Karoo padloper	Prot		
Canis mesomelas	Black-backed Jackal	LC			Homopus femoralis	Greater padloper	Prot		
Caracal caracal	Caracal	LC			Psammobate tentorius	Tent tortoise	Prot		
Cynictis penicillata	Yellow Mongoose	LC		2	**Squamata (snakes)**				
Felis nigripes	Black footed cat	LC	Prot	1	Aspidelaps lubricus	Coral shield cobra	DD		
Felis silvestris	African Wild Cat	LC		1	Bitis arietans	Puff adder	DD		
Galerella pulverulenta	Cape grey mongoose	LC		2	Bitis caudalis	Horned adder	DD		
Genetta genetta	Small-spotted genet	LC		2	Dasypeltis scabra	Rhombic egg eater	DD		
Ictonyx striatus	Striped Polecat	LC		1	Dipsina multimaculata	Dwarf beard snake	DD		
Mellivora capensis	Honey badger	LC	Prot	1	Homoroselaps lacteus	Spotted harlequin snake	DD		
Otocyon megalotis	Bat-eared Fox	LC		1	Lamprophis fiskii	Fisk's house snake	V		
Panthera pardus	Leopard	LC		1	Lamprophis fuliginosus	Brown house snake	DD		
Poecilogale albinucha	Striped weasel	LC		1	Lamprophis guttatus	Spotted rock snake	DD		
Proteles cristatus	Aardwolf	LC		1	Leptotyphlops gracilior	Slender thread or worm snake	DD		
Suricata suricatta	Meerkat	LC		2	Naja nivea	Cape cobra	DD		
Vulpes chama	Cape fox	LC	Prot	1	Prosymna sundevallii sundevallii	Sundevall's shovel-snout	DD		
Lagomorpha					Psammophis crucifer	Montane grass snake	DD		
Bunolagus monticularis	Riverine rabbit	CR	CR	1	Psammophis notostictus	Karoo sand snake			
Lepus capensis	Cape hare	LC		2	Psammophylax rhombeatus	Rhombic skaapsteker	DD		
Lepus saxatilis	Scrub hare	LC		2	Pseudaspis cana	Mole snake			
Pronolagus rupestris	Smith's red rock rabbit	LC		2	Telescopus semiannulatus	Tiger snake			
					Skink				
Hyracoidea (Hyraxes)					Acontias meleagris	Cape legless skink	DD		
Procavia capensis	Rock hyrax	LC		2	Mabuya capensis	Cape skink	DD		
Tubulidentata					Mabuya sulcata	Western rock skink	DD		
Orycteropus afer	Aardvark	LC		1	Mabuya variegata	Variegated skink	DD		
Rodentia					**Agama**				
Cryptomys hottentotus	Mole rat	LC		2	Agama atra	Southern rock agama	NL		
Desmodillus auricularis	Short-tailed gerbil	LC		2	Agama hispida	Spiny agama	DD		
Gerbillurus paeba	Hairy-footed gerbil	LC		2	Cordylosaurus subtessellatus	Dwarf Plated Lizard	DD		
Graphiurus ocularis	Spectacled dormouse	LC		2	Cordylus cordylus	Cape girdled lizard	DD		
Hystrix africaeaustralis	Porcupine	LC		2	Cordylus polyzonus	Karoo girdled lizard	Prot		
Malacothrix typical	Large eared mouse	LC		2	Gerrhosaurus typicus	Namaqua Plated Lizard	DD		
Mastromys coucha	Southern multimammate mouse	LC		2	Nucras tessellata tessellate	Striped sandveld lizard	DD		
Mus minutoides	Pygmy mouse	LC		2	Pedioplanis burchelli	Burchells' sand lizard	DD		
Otomys unisulcatus	Bush Vlei Rat	LC		2	Pedioplanis laticeps	Cape sand lizard	DD		
Parotomys littledalei	Littledales Whistling Rat	LC		2	Pedioplanis lineoocellata	Spotted Sand Lizard	DD		
Pedetes capensis	Springhare	LC		2	Pedioplanis namaquensis	Namaqua Sand Lizard	DD		
Rhabdomys pumilio	Striped grass mouse	LC		2	Pseudocordylus microlepidotus	Cape crag lizard	Prot		
Saccostomus campestris	Pouched mouse	LC		2	**Chamaelionidae**				
Xerus inauris	Ground squirrel	LC		2	Bradypodion gutturale	Karoo dwarf chameleon	Prot		
Eulipotyphla (Shrews):					**Gekkonidae**				
Chlorotalpa sclateri	Sclater's Golden Mole	LC		2	Chondrodactylus angulifer	Giant ground gecko	DD		
Crocidura cyanea	Reddish - grey musk shrew	LC		2	Chondrodactylus bibronii	Bibrons tubercled gecko	DD		
Elephantulus edwardii	Cape Rock Elephant Shrew	LC		2	Goggia lineata	Striped leaf-toed Gecko	DD		
Elephantulus ruprestris	Western Rock Elephant Shrew	LC		2	Pachydactylus capensis	Cape gecko	DD		
Macroscelides proboscideus	Round-eared Elephant Shrew	LC		2	Pachydactylus geitje	Oscellated gecko	DD		
					Pachydactylus kladaroderma	Thin-skinned gecko	DD		
Abbreviations					Pachydactylus maculatus	Spotted gecko	DD		
LC	Least concern				Pachydactylus oculatus	Golden spotted gecko	DD		
DD	Data deficient				Pachydactylus serval	Western Spotted Gecko	DD		
V	Vulnerable								
NL	Not listed								
Prot	Protected								
CR	Critically endangered								

Taxa	Common name	IUCN	TOPS	NC1/2
Amphibia		RDL	2007	
Anurans				
Amietia fuscigula	Cape river frog	LC		
Amietophrynus rangeri	Raucous toad	LC		
Cacosternum boettgeri	Common caco	LC		
Cacosternum karooicum	Karoo dainty frog	DD		
Tomopterna delalandii	Cape sand frog	LC		
Tomopterna tandyi	Tandys sand frog	LC		
Vandijkophrynus gariepensis	Karoo toad	LC		
Xenopus laevis	Common platanna	LC		

Data derived from :
Skinner J and M Chimiba (2005) A guide to the mammals of the .
southern African subregion. Cambridge University Press
Smithers R (1998) Mammals of Southern Africa, A field guide
Woodhall S. (2005) A field guide to the butterflies of South Africa; Struik
Marais J and G Alexander (2002) A guide to the reptiles to
southern Africa. University Press
Du Preez L and Carruthers V (2006) A complete guide to the
frogs of southern Africa. Struik

Abbreviations	
LC	Least concern
DD	Data deficient
V	Vulnerable
NL	Not listed
Prot	Protected
CR	Critically endangered

Taxa	IUCN	TOPS	NC1/2
Invertebrates	CITES		
Arachnida			
Pterinochilus spp		Prot	
Scorpiones			
Parabuthus granulatus			
Parabuthus capensis			
Uroplectes carinatus			
Uroplectes lineatus			
Opistacanthus capensis		Prot	
Opistophthalmus macer		Prot	
Opistophthalmus karrooensis		Prot	
Opistophthalmus capensis		Prot	
Coleoptera			
Prothyma sp		Prot	
Pterinichuilus sp		Prot	
Platychile palida		Prot	
Lepidoptera			
Aeriopetes tulbaghii			
Alenia sandaster			
Aloeides depicta			
Aloeides macmasterii			
Aloeides pierus			
Cassionympha detecta			
Charaxes pelias			
Chrysoritis chrysantas			
Durbaniella clarkii			
Durbaniopsis saga			
Iolaus bowkeri			
Lepidochrysops bacchus			
Melampias huebneri			
Pseudonympha hippia			
Pseudonympha trimenii			
Spialliia agyla			
Spialliia sataspes			
Stygionympha vigilans			
Tarsocera dicksonii			
Tasocera fulvina			
Tsitana dicksonii			

3.2 Identification of Environmental Sensitivities

Ascribing a level of ecological "sensitivity" at a spatial level may be considered to be a generally subjective task. The study area is considered to be of limited ecological significance at a broad level (Mucina and Rutherford 2006; SANBI 2006) although much of the region requires further research and investigation. Therefore, as contended above, it is points or areas of topographic variation or those which are more lithic in structure that should be considered to be of greater "sensitivity" in respect of the maintenance of ecological processes within the study area (Figure 11).

As explained in Section 3.1, features of significant relief variation or geomorphologically variable, may be considered to offer micro-environmental variations or localised niches, as well as refugia that supports increased habitat diversity within the study area. Given the above, Table 2 provides parameters that have been applied in developing a preliminary spatial plan for the area, showing differing areas of ecological "sensitivity".

Table 2. Table indicating means of determining *ecological sensitivity* at a preliminary level of assessment within subject area

Ecological "Sensitivity" or "Significance"	Description
Very high sensitivity	Unique regional habitats displaying unique floral and faunal species
High sensitivity	Uncommon localised habitat, displaying variance within the study area
Sensitive	Areas where habitat varies and may offer refugia or points of variance within the study area
Low sensitivity	Commonly occurring habitat structure aligned with general environment

Figure 11. Sites such as the exposed lithic feature indicate above are eco-geomorphologically important areas within the subject site.

From the above, a broad based spatial plan has been compiled for the proposed line route that shows:

1. The proposed position of the on-site substation with the alternative routing options (i.e. Alternatives 1 and 2) for connection to the 132kV substation (i.e. the proposed collector hub or the proposed Eskom Nuwerust Substation).

2. Areas of ecological sensitivity.

   The spatial sensitivity map is provided in Figure 12 below. Notably, areas of improved ecological value or those deemed as "sensitive" to transformation have been identified across the study area (as indicated by the shaded area shown in Figure 12).

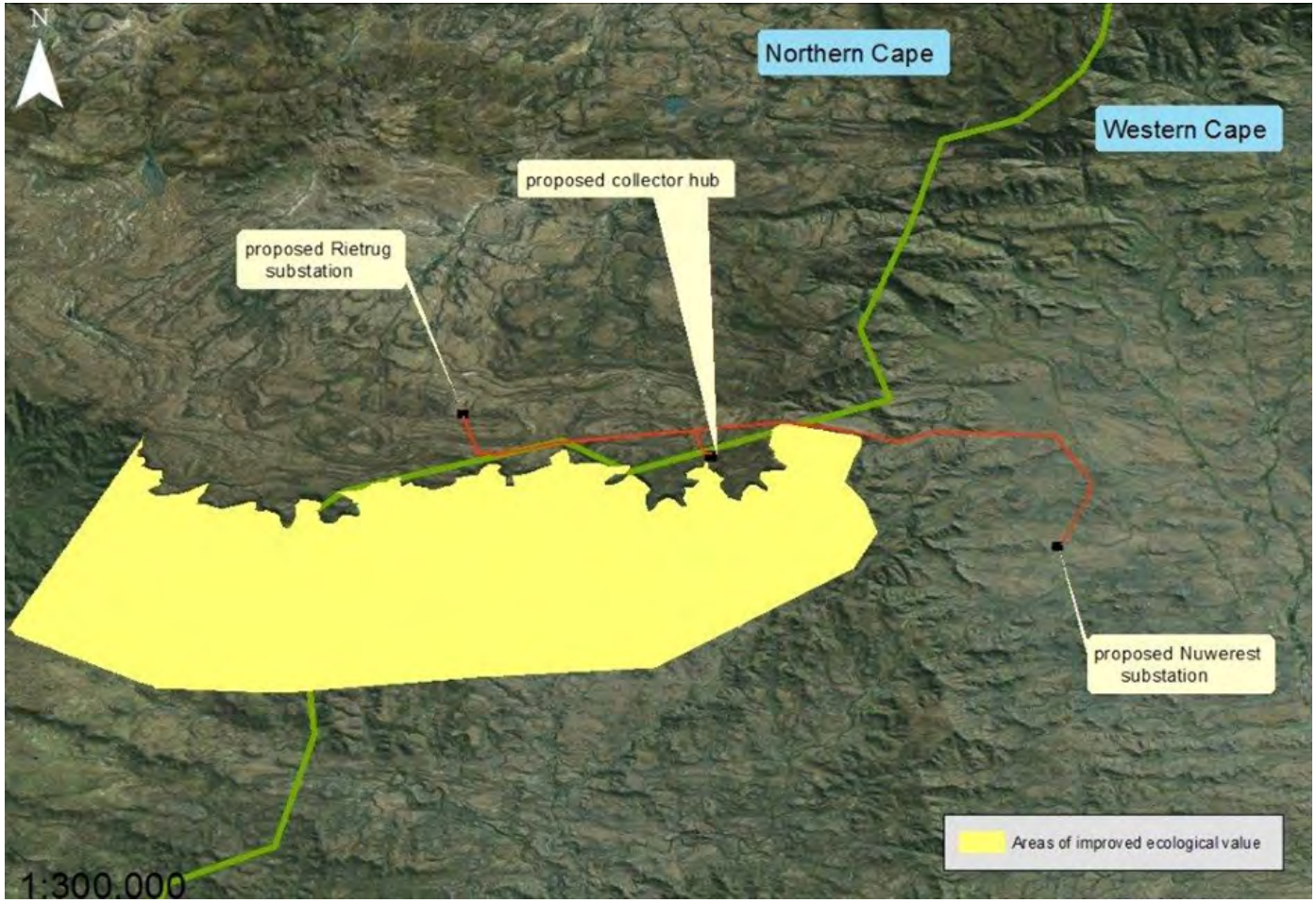


Figure 12. Image indicating position of the Rietrug on-site substation and power line route alternatives in relation to sites deemed to be of ecological value or "sensitivity", linked to the 1600 m amsl contour.

As discussed above, the spatial sensitivity map (Figure 12) indicates that:

1. Areas of ecological "sensitivity" or "value" lie primarily below the 1600 m amsl contour as depicted and include steep "lithic" scarp areas.
2. The area allocated for the siting of the proposed on-site substation (including the O&M Building and laydown area) is of limited ecological sensitivity, showing little topographic variation.
3 No areas within the study site were considered to show a "very high" or "high" ecological sensitivity.

As indicated in Figure 12, the proposed power line route to the proposed collector hub (i.e. Alternative 1), maintains all infrastructure above the 1600 m amsl contour however, the Alternative 2 power line route (to the proposed Eskom Nuwerust Substation) traverses points below this contour as it progresses in an easterly direction. While the establishment of towers and the manner in which the lines are strung between towers may ensure that impacts on the ground are avoided, given the intrusion of such a structure into and across the escarpment, it is clear that the proposed Alternative 2 line route proffers a greater risk to the prevailing habitat than that of the Alternative 1 line route. Notably Alternative 2 would also establish a greater and more expansive footprint than that envisaged for Alternative 1, particularly if a service road accompanies some or all of the route.

As noted above, only one option for Alternative 1 of the distribution line routing was considered in this assessment, as this is considered to be a suitable routing option for connection to the proposed collector hub. However, due to the ecological value of areas primarily below the 1600 m amsl contour, four different options for the Alternative 2 routing of the distribution line (and service road) to the proposed Eskom Nuwerust Substation were considered in this assessment, in order to determine the most suitable route, in consultation with other specialists on the BA Team and the Applicant. The selected routing for Alternative 2, as shown in Figure 1, was determined to be the most suitable route from the four options that were considered for Alternative 2 of the routing to the proposed Eskom Nuwerust Substation. Further to this, the use of the selected Alternative 2 line route to the proposed Eskom Nuwerust substation, as shown in Figure 1, is considered to be a more appropriate option for the routing of the 132kV powerline and service road, in comparison to the other three options considered for Alternative 2, as this route effectively avoids the traversing of steeper ridges and scarps, which may be considered eco-morphologically important areas that are associated with the other three options considered for the routing of Alternative 2 line route. It is important to note that the proposed service road will be located below the distribution line, and as such the service road will follow the same route as that of the distribution line for both Alternatives 1 and 2. However, a small portion of the service road on Farm Hamel Kraal for the selected Alternative 2 routing deviates from the route of the distribution line to follow the route of an existing unused farm track to avoid impacts on the steeper ridges and scarps.

As noted in the BA Report, both alternatives of the third party substation and distribution line routing needed to be considered as a precaution, in the event that one of the third party substations will not be constructed. Additional detail regarding this is provided in the BA Report. It is important to note that from a terrestrial ecological point of view both Alternative 1 and Alternative 2 of the distribution line routing and connection to the third party substation are considered to be suitable and there are no fatal flaws associated with them.

Figure 13 below indicates the nature of the recommended and selected route for Alternative 2 that may be exercised if connection to the proposed Nuwerust substation is required. Of the four powerline options that were considered for Alternative 2 (i.e. connection to the proposed Eskom Nuwerust Substation), the selected and recommended route as shown in Figure 1, displays a comparatively milder and more suitable topographic variation and fewer intersections with the Western Cape CBA Ecological Support Areas.

Figure 13. Image of terrain associated with the selected and recommended Alternative powerline route 2.

4 ISSUES, RISKS AND IMPACTS

The risks and impacts associated with the establishment of the proposed project components are considered to be minimal or of "low to very low" significance in respect of the positioning of the substation structure (including the O&M Building and laydown area) and the establishment of the proposed 132kV powerline and service road. Some consideration of these impacts is provided below.

- **Proposed Rietrug WEF On-site Substation, O&M Building and Laydown Area**

The proposed position of the Rietrug on-site substation (including the O&M Building and Laydown Area) may be considered to offer limited risk and impacts, primarily on account of the low relief and uniform vegetation encountered across the subject area. The clearance of vegetation and general levelling of site would be a significant impact, but such impacts would be isolated and occur within a generally depauperate environment, rendering the level of impact as "low" significance. Most impacts associated with the operation of the proposed on-site substation are considered to be indirect in nature and relate to the operation of the proposed Rietrug WEF, where factors such as Electrical Light Pollution (ELP) and nuisance factors relating to ongoing anthropogenic disturbance, may serve to alter faunal behaviour in and around the facility. Other factors, such as increased mortalities amongst local fauna are also likely to come to the fore during the construction phase and in the long term, during the operations phase.

Notably, these risks may be avoided, or at least diminished, through managerial interventions that would serve to reduce the impacts arising during the construction and operation phases.

- **Alternative Powerline 1:**

The proposed 132kV distribution line that connects from the proposed Rietrug on-site substation to the proposed collector hub (i.e. the proposed Suurplaat on-site substation), will offer reduced risk to the prevailing habitat/ecology, providing that the lines remain distal from the 1600 m contour that marks the upper edge of the escarpment. Towers should be suitably positioned to avoid their placement on rocky terrain and topographically variable areas, rather selecting those areas where a uniform vegetation cover is evident. The supporting maintenance road should also be routed to avoid areas of dense vegetation cover and open lithic terrain.

- **Alternative Powerline 2:**

The alternative option of connecting the proposed Rietrug on-site substation with the proposed Eskom Nuwerust Substation would require an approximate extension of the 132kV powerline by an additional (approximate) 28km. As indicated above, Alternative line route 2 would require the traverse of the 1600m contour and would entail the establishment of towers and access roads in areas that may prove generally rugged and topographically variable. This would see incursion into areas that presently form localised refugia from anthropogenic impacts and may be considered to be of higher ecological value and significance comparative to the upper plateau. It is however, notable that the majority of the line route does traverse points proximal to existing access roads and if stringing of towers across the more rugged terrain can be achieved using helicopters or similar methods, this option may still be pursued without incurring significant alteration or impact on the prevailing and localised habitat. However, as noted above, if there is a requirement to utilise the Alterative line route 2 to the proposed Eskom Nuwerust substation, the selected routing, as shown in Figure 1 (which traverses the farms Hamelkraal, De Molen, Rheebokkenfontein and 280 in the Western Cape) is recommended (despite this routing occurring below the 1600 m contour) as this route traverses areas deemed to be of lower eco-morphological significance than those encountered along line route of the remaining options that were considered for Alternative 2. As noted above, the service road deviates from the power line route for Alternative 2 at a small portion on Farm Hamel Kraal to follow the route of an existing unused farm track to avoid impacts on the steeper ridges and traversing a scarp.

As Alternative 2 entails an increased developmental footprint (due to its longer power line length and the nature of the terrain traversed), comparative to Alternative 1, it is rational to conclude that the impacts and risks of utilising this route are greater than those associated with Alternative 1. Table 3 below, summarises the potential impacts and recommendations in respect of the proposed project components and the recommended powerline route option.

Table 3. Table indicating level of risk to terrestrial ecosystems associated with alternative route options and development of the proposed on-site substation.

Proposed Project Infrastructure	Level of risk to natural terrestrial environment	Avoidance and impact mitigation options	Route/site Recommendation
Rietrug On-site Substation, O&M Building and Laydown Area	Low	Use of recommended site. Implement management measures recommended in Sections 5, 6 and 8 of this report.	Recommended site (i.e. within the 25 ha development envelope that has been assessed).
132kV Powerline Route Alternative 1 with service road	Low to moderate	Route to remain distal of the escarpment edge (1600m contour). Towers to be suitably positioned the along route	Preferred line route
132kV Powerline Route Alternative 2 With service road	Moderate	Route to remain distal of escarpment edge (1600m contour). and traverse below this contour at selected points avoiding scarps and steep, rocky terrain Towers to be positioned proximal to existing road/track routings. Use of aerial stringing measures to establish the line (e.g. helicopter).	Possible route with implementation of mitigation measures and finalisation of tower positions

4.1 Summary of Issues identified during the Project Notification Phase

The Background Information Document (BID) was released to Stakeholders and Interested and Affected Parties (I&APs) for a 30-day comment period, extending from 9 December 2016 to 1 February 2017. The following comments that specifically relate to Terrestrial Ecology, were received during the 30-day comment period during the Project Initiation Phase. Responses have also been provided to these comments. Where applicable, the responses describe how the comments have been addressed in this Terrestrial Ecology Assessment Specialist Study. Appendix E of the BA Report also includes a detailed Comments and Responses Trail.

Cape Nature provided a letter (dated June 2016) detailing their requirements for providing comments on agricultural, environmental, mining, planning and water use related applications. Cape Nature has requested that the proposed Mainstream Electrical Grid Infrastructure project include and address *inter alia*, the following:

- A precautionary and risk-averse approach be adopted towards those projects which may result in substantial detrimental impacts on biodiversity and ecosystems, especially the irreversible loss of habitat and ecological functioning of threatened ecosystems (as identified by the National Biodiversity Assessment, 2011) or designated sensitive areas: i.e. CBAs.
- The appointment of a bio-diversity specialist to give consideration to appropriate matters and aspects of a biodiversity concern that may be affected by the development.
- The investigation should present methods and approaches that seek to minimise impacts from the development on biodiversity.

- The investigation should see the application of methods and approaches that should demonstrate "avoidance" and "mitigation" measures that relate to the maintenance or enhancement of biodiversity aspects.
- Recommend management interventions during the planning and operation stages.

Further to the above, it is clear that the following has been addressed in this report:

1. Alternative line route and infrastructure siting options have been considered and evaluated as to the most appropriate routes and sites are presented in this report.
2. Recommendations on avoidance measures and means of addressing possible impacts are presented in this report
3. Management interventions at construction and operational stages in the proposed development are presented.

As requested in Section 3 (b) of the abovementioned letter from Cape Nature, the following guideline and information was used and informed this assessment:

- Brownlie S (2005). "Guidelines for involving biodiversity specialists in EIA processes, Edition1"; and
- Ecosystem threat status and conservation plan information available on SANBI's Biodiversity GIS website.

Section 4 (a) of the abovementioned letter from Cape Nature explains that activities that may negatively impact on areas that have been identified as CBAs or Ecological Support Areas are not supported, and that appropriate buffers must be determined by a suitably qualified specialist to avoid impacting on these habitats and particular attention should be paid to avoiding the loss of intact habitat, maximizing connectivity at a landscape scale, maximizing habitat heterogeneity and reducing fragmentation at a local and regional scale. CBAs and Ecological Support Areas are discussed in Sections 3.1.1 and 3.2 of this report, where it is to be noted that the powerline routes effectively avoid much of the CBA and CBA support areas within the region.

4.2 Identification of Potential Impacts/Risks

The proposed development of the Rietrug on-site substation, laydown area, O&M Building, 132 kV power line, service road below the power line and connection to the third party substation indicates that a number of potential impacts may arise during the construction and operations phases, in particular. Such impacts are likely to be direct and localised, although some indirect and cumulative impacts have also been identified. These potential negative impacts are presented below.

Construction Phase

- Removal of indigenous vegetation. Site clearance for the commencement of construction will be required, particularly within and around the area required for the proposed on-site substation, laydown area, O&M Building, service road, and at the towers along the powerline. This will entail the clearance of primarily indigenous vegetation.

- Alteration of lithic structures and clearance of minor features will have to be undertaken for the establishment of the proposed on-site substation, laydown area, O&M Building, service road, and pylon towers along the powerline. The towers, substation and its associated built structures, during construction, will require the levelling of areas which may include eco-geomorphologically important points. The service road will also traverse level to steeper ground and require some level of clearance of vegetation and disturbance

along the powerline route. It is evident that some areas will however not be able to accommodate such roadway.

- Loss, disturbance or alteration of botanical communities at a localised level, particularly geophytes and uncommon to rare species will arise. With the clearance of land, localised vegetation communities may be destroyed or may not be able to re-establish on account of a change in drivers or other factors e.g. edaphics.

- Loss of refugia, particularly in respect of fauna associated with lithic habitats (e.g. *Homopus* spp). Rock ledges and other geological structures are intrinsic habitat for species such as padlopers (tortoises). The removal of these features will see the loss of such habitat.

- Direct faunal mortalities. The construction activities may directly and indirectly result in fauna such as and in particular tortoise, or other animals being killed or injured through traffic movement or general disturbance to site and beyond the site.

- Hardpanning of the upper soil horizon, thereby altering surface hydrology. The movement of traffic across site and around the construction areas, as well as intentional use of materials to establish a sound working platform, will result in the compaction of soils and concomitant changes in surface water discharge.

- Import of earth materials and the general disturbance of the site, may give rise to the invasion and a prevalence of exotic vegetation. Exotic weeds and other vegetation may establish and flourish within a disturbed environment such as a construction site. The import of soils and other materials may facilitate such invasion through the inadvertent import of seed and other propagules. The subject area may be subject to some invasion by exotic or in some cases, indigenous plants during and after the construction phase.

- General erosion through, primarily the movement of construction traffic. As traffic in particular, moves across the site, disturbance to surfaces and compaction may facilitate erosion of soils, particularly on steeper slopes where the trampling and compaction of vegetation ensues. Such impacts may be localised but evident both during and post construction.

- Solid waste and its impact on fauna through ingestion or ensnarement. Construction of both the substation and towers will result in solid waste generation. While all waste may be somewhat unsightly, it is that waste that has the potential to harm or kill animals through ingestion or ensnarement that has the most significance (e.g. small bolts, wires etc.).

- General change in faunal behaviour. Construction activities will alter faunal behaviour in and around the site through effects such as altering corridors associated with movement, herbivory and predation. Certain species will benefit from the various changes in land use, while others will be ousted from areas. Consider for example the impact of improved perch positions for raptors and their impact on rodent population around powerlines.

- The construction phase will result in increased human presence within presently unencumbered areas, leading to increased noise, dust and changes in prevailing bio physical factors within the study area; increased light pollution from the proposed site camp and related areas of the site; import of materials not associated with the surrounding environment, resulting in increased risks of a localised nature, if not managed (e.g. fuels, construction materials etc.); changes in edaphic form and structure; and solid and liquid waste associated with construction activities including sewage and solid waste. These

factors, through impacts on both flora and fauna will serve to alter local ecological processes through the introduction of nutrients and other materials which may impact directly or indirectly on flora and faunal components of region.

Operational Phase

- Disturbance as a result of general activities associated with the operation and maintenance of the proposed on-site substation and O&M Building, which will include replacing of parts and infrastructure, as well as use of materials such as hydrocarbons, which may find their way into the broader environment through spillage and loss.

- Disturbance as a result of general activities during the power line and service road maintenance processes.

- Alteration of vegetation community structure through maintenance operations around the on-site substation, O&M building, service road and powerline. As human traffic, vehicles and general maintenance procedures commence, vegetation will be affected by such disturbance and over time, habitat form and structure may change, particularly around towers and the on-site substation and its associated infrastructure.

- Introduction of exotic vegetation through movement of vehicles within the study area. As vehicles move along, in particular the powerline, locally exotic plant propagules carried by the vehicles may be introduced into areas within the study site. The potential for such introductions to change or alter the local ecology is evident.

- Increase in terrestrial mortalities through the movement of vehicles along line route (particular tortoises). Electric fencing also offers a potential threat to some species. As with the construction phase, components such as electric fences, moving vehicles and other activities have the potential to inflict lethal consequences on smaller and less mobile species such as tortoises.

- Change in faunal behaviour on account of increased lighting around the proposed on-site substation (ELP). The proposed on-site substation will be lit at night. As a consequence, some, in particular invertebrate species, may be attracted to such lights which have concomitant influences on other species' behavioural patterns in the area. Alternatively, hunting and other behaviours may alter as a consequence of additional lighting within an area previously devoid of such factor.

- Change in faunal community structure as a consequence of increased perching points for raptors. Powerlines will afford some birds of prey that hunt from perched positions improved opportunities for the detection and capture of prey. Such increases in predation pressures on potential prey species (e.g. *Mastomys coucha*) in and around the proposed powerline may have consequences for localised ecological processes and for example, small mammal populations.

Decommissioning Phase

- Vegetation and Habitat Alteration:
  - Removal of powerlines and related infrastructure will alter the localised topography at points, which may prevent successional processes establishing at these points on account of intrinsic changes in edaphics, lithic or other factors. Excavation undertaken during the construction phase may alter the intrinsic drivers of habitat form and structure at select points. Following the decommissioning of structures, the emergence of habitat that prevailed prior to construction may not arise and differing vegetation

structures may establish. This may have consequences for the more expansive habitat (e.g. bush encroachment may be a consequential outcome of disturbance).
  - The decommissioning of the construction laydown area around the proposed on-site substation will result in a cleared and altered bio-physical environment (edaphics and vegetation will have been altered through activities), which will give rise to differing surface and sub surface ecological drivers (differing percolation rates, surface run off, emergent vegetation etc.). Such state is likely to give rise to altered surface hydrology, erosion, differing percolation and edaphic nature comparative to the prevailing environment, and exotic weed invasion or changes to emergent vegetation communities.

- Recruitment and behavioural change in fauna. This will arise primarily on account of the above changes as well as possible lag factors that may be effected through the construction and operation phases.

- Solid waste and the impact on fauna through ingestion or ensnarement. As indicated, with solid waste materials being left on site following the demolition or removal of structures, the potential to inflict lethal injury to local fauna remains.

Cumulative Impacts

The cumulative impacts associated with the proposed Rietrug Electrical Grid Infrastructure project must be seen against the background of the establishment of a WEF across much of the subject area. It follows that the turbines and related infrastructure are likely to elicit a far greater and more pervasive impact on the local ecological processes and systems within the study area, than the isolated and less expansive proposed electrical infrastructure (including the on-site substation (including the O&M Building and laydown area), powerline, service road and connection to the third party substation). Given this situation, it follows that cumulative impacts associated with the proposed Rietrug on-site substation, powerline and the associated infrastructure are comparatively minor in comparison to the proposed Rietrug WEF.

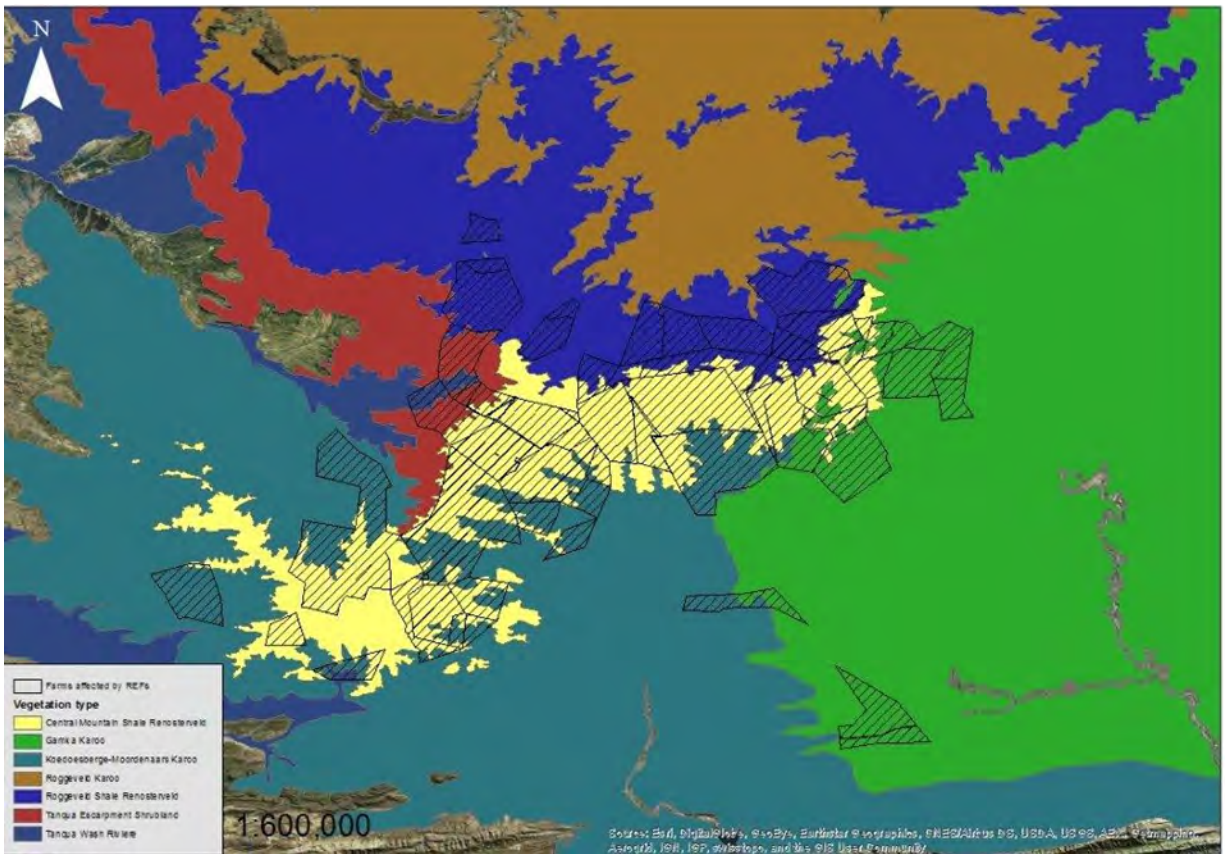


Figure 14. Map indicating all proposed and/authorised REF projects within 50 km radius in the region in relation to veld types.

From an ecological perspective a preliminary, *cumulative ecological impact assessment* was undertaken, whereby the impact on veld types of approved and/or proposed renewable energy projects within a 50 km radius of the proposed electrical infrastructure projects were given consideration in respect of the transformation of lands within farm boundaries. Figure 14 above, indicates at a regional scale, those areas with pending or approved renewable projects. This spatial information was considered from an ecological perspective in respect of:

1. Areas affected in their entirety by renewable energy projects.
2. The contribution of the Mainstream Sutherland, Sutherland 2 and Rietrug WEF projects, as well as the associated Electrical Infrastructure BA projects, to the transformation of these particular veld types.

All veld types are considered to be "least threatened" in terms of their conservation value and as such, are comparative in respect of their conservation significance or value. As noted in the BA Report, the existing and proposed developments that were taken into consideration in respect of their individual impacts include:

- Proposed Suurplaat WEF, Northern and Western Cape Provinces - Applicant: Moyeng Energy (PTY) Ltd.
- Proposed Sutherland REF, Western and Northern Cape Province (Replaced by the Rietrug, Sutherland and Sutherland 2 WEFs approved in November 2016) – Applicant: Mainstream.
- Proposed Roggeveld Wind Farm, Northern and Western Cape Provinces – Applicant: G7 Renewable Energies Pty Ltd.

- Proposed Sutherland Photovoltaic (PV) Solar Energy Facility, Northern Cape Province – Applicant: Inca Sutherland Solar Pty Ltd.
- Three Proposed Hidden Valley WEFs, Northern Cape Province – Applicant: ACED Renewables Hidden Valley, Northern Cape.
- Proposed Renewable Gunsfontein WEF, Northern Cape Province, Networx Renewables (Pty) Ltd.
- Proposed Renewable Gunsfontein Solar Energy Facility, Northern Cape Province, Networx Renewables (Pty) Ltd.
- Proposed Renewable Gunsfontein 132 kV Powerlines, Northern Cape Province, Networx Renewables (Pty) Ltd.
- Proposed Renewable Gunsfontein Substation, Northern Cape Province, Networx Renewables (Pty) Ltd.
- Proposed Gunsfontein Switching Station, Northern Cape Province, Networx Renewables (Pty) Ltd.
- Proposed Sutherland 2 WEF Electrical Grid Infrastructure Project, Western and Northern Cape Province – Applicant: Mainstream.
- Proposed Sutherland WEF Electrical Grid Infrastructure Project, Western and Northern Cape Province – Applicant: Mainstream.
- Proposed Maralla West WEF, near Sutherland, Northern Cape Province – Applicant: Biotherm Energy (PTY) Ltd.
- Proposed Maralla East WEF, near Sutherland, Northern and Western Cape Province – Applicant: Biotherm Energy (PTY) Ltd.
- Proposed Esizayo WEF, near Laingsburg, Western Cape Province – Applicant: Biotherm Energy (PTY) Ltd.
- Proposed Komsberg East WEF and Grid Connection, Northern and Western Cape Provinces – Applicant: Komsberg Wind Farms (PTY) Ltd.
- Proposed Komsberg West WEF and Grid Connection, Northern and Western Cape Provinces – Applicant: Komsberg Wind Farms (PTY) Ltd.

It must be noted that this evaluation is preliminary and that the level of impact is NOT accounted for in the identification of affected farmsteads. Thus the establishment of powerlines does not warrant the establishment of expansive infrastructure, in the same manner that a solar park would require similar expansive areas. Figure 15, below presents the findings of this spatial evaluation, indicating those habitats most affected by transformation pressures within the Northern and Western Cape Provinces centred around Sutherland.

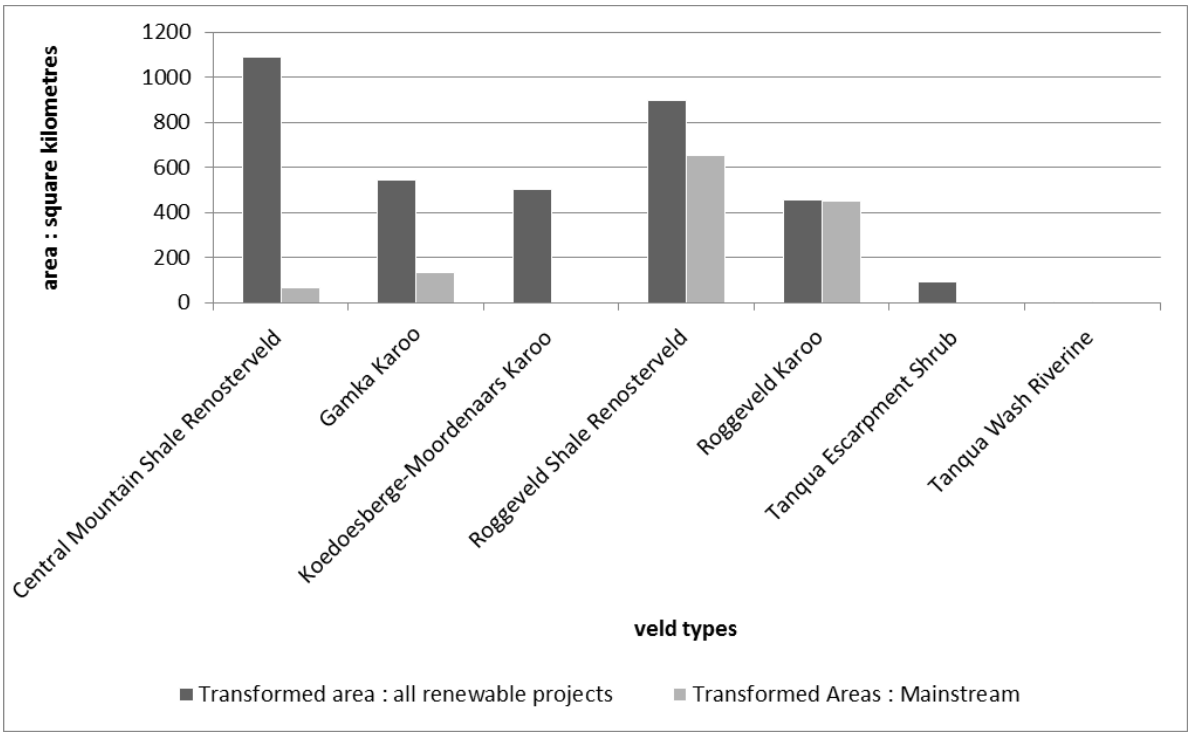


Figure 15. Graph showing habitats to be subject to transformation by proposed and/or authorised REFs in study region (50 km radius) and the contribution of the Mainstream projects to such transformation.

From Figure 15, it is clear that the proposed Mainstream Projects contribute significantly to the transformation of Roggeveld Shale Renosterveld and Roggeveld Karoo veld types, while other veld types within the region are either not affected at all by the proposed Mainstream Projects or only at a minor scale. In evaluating the impact of other approved and/or proposed REF projects within a 50 km radius, it is evident that these particular developments lie within Central Mountain Shale Renosterveld, which when considering Figure 14, appears to be subject to significant transformation going forward. It can therefore be suggested that the cumulative impact of the proposed Mainstream Projects are confined to two veld types, with limited intrusion into a third, the Gamka karoo veld type, as a consequence of requirements to establish powerline connectivity along powerline route Alternative 2 (i.e. for connection to the proposed Eskom Nuwerust Substation). Such evaluation indicates that connection to the proposed collector hub (i.e. for Alternative 1 of the distribution line routing and connection to the third party substation) is to be recommended in favour of establishing connection to the proposed Eskom Nuwerust substation (for Alternative 2). As stated below, the connection to the proposed Nuwerust substation cannot however, be precluded.

In addition to the above, the following impacts may be considered to be accumulative:

- Increased dissection of habitat on account of increasing levels of infrastructure. The proposed powerline and associated service road, as well as the on-site substation will give rise to the further dissection of habitat within the study area. Such dissection will have already arisen as a consequence of the establishment of the proposed turbines and road network across the site (as a result of the proposed Sutherland, Sutherland 2 and Rietrug WEFs), effectively dividing the properties into numerous dissected habitats.

- Increased presence of exotic and disturbance driven plant species. With increasing levels of anthropogenic activity on site and within the surrounding area, the propensity for plant invasion or the dominance of species that are tolerant of higher levels of disturbance will see such species dominating and perhaps ousting other less tolerant species.

- Altered surface hydrology and impact on plant community structure. Increasing levels of areas dominated by built structures will see localised changes in surface hydrology across the subject site. The associated road network will add to this impact. These changes affect habitat structure and form within the terrestrial environment.

- Increased and expanded anthropogenic influences across the region. The nature of the surrounding proposed WEFs, electrical infrastructure and Solar Energy Facilities (as noted above) suggests that human activity will arise at points that are presently only intermittently visited by a farmer or his staff. With the proposed projects listed above, as well as the proposed Rietrug WEF Electrical Grid Infrastructure (i.e. this project), greater levels of human activity can be anticipated across the area, with the likely influence of ousting particular species of fauna.

- Increased ELP levels. Light pollution may be associated with all built structures of the proposed project and the projects listed above, including the wind turbines of the various proposed WEFs listed above. The cumulative level of increased lighting in the area will serve to alter the behaviour of a number of nocturnal (and possibly crepuscular and diurnal) species and alter ecological processes in and around these points.

- Increased noise pollution levels with concomitant impact on faunal behaviour. Allied to increasing human presence across the site, increase noise levels, in particular the low level sound emanating from buzz bars and the proposed on-site substation, together with the other electrical infrastructure proposed by the projects listed above, may influence behaviour in respect of smaller mammals and other fauna that utilise sound in their various behavioural patterns (prey detection, social interaction).

- Vegetation and habitat alteration - change in ecological processes and habitat – reversion to secondary habitat structure at transformed sites.

- Recruitment and behavioural change in fauna - change in ecological processes and habitat.

5 IMPACT ASSESSMENT

The above potential impacts all relate to either the construction, operational, or decommissioning stages of the proposed project. It is clear, and as described above, that the impacts on localised ecological systems in the region as a consequence of the implementation of Alternative 1 or Alternative 2 are all very similar **and therefore proffer the same level of impact (i.e. the impact significance does not differ)**. However, from a spatial level of consideration it is also clear that Alternative 1 will impact upon a far smaller area, than that forecast for Alternative 2 and is unlikely to traverse areas that are considered to be eco-morphologically significant, in particular scarps and steeper areas. Cumulative impacts are also likely to arise, as indicated above and in this instance it is the scale of impact, rather than the nature of the impact that is to be considered and as a consequence shows a preference for Alternative 1. The potential impacts identified and the specific mitigation or avoidance measures that may be introduced are presented below.

Some broad consideration of the "no go alternative" or the maintenance of the "ecological status quo" is provided. It is quite evident that should the establishment of the substation, O&M

buildings, powerlines and roads and related infrastructure not arise, that no ecological change will ensue. However, it is clear that with the implementation of avoidance and mitigation measures as described in this report, that the "no go" alternative is undesirable as it fails to achieve the economic and socio-economic benefits that are associated with the broader proposal. As such, it can be forecast that the "no go" alternative will see:

- The maintenance of the prevailing habitat, with no change to the broader eco-morphology of the study area.
- Habitat and faunal behaviour will continue to be determined by meteorological and the continued prevailing land use, only.

5.1 Potential Impacts during the Construction Phase

Potential Impact 1:

Aspect/Activity	**Site Clearance, Levelling, Tower Construction, Powerline Stringing and Site Establishment**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	• Removal of Indigenous Vegetation and Site Clearance: A laydown area and the areas for the proposed on-site substation (including the O&M Building), and service road will be cleared of vegetation using plant machinery and labour. Minor to moderate level earthworks will be used to establish level ground, with the compaction of the construction site and laydown areas. Fencing of the laydown area is likely to arise. In addition, clearance around the powerline towers will be required at points. • Towers will be constructed using monopole structures and will entail accessing the tower footprints, minor clearance of the footprint and founding of structures using earth screws or concrete plinths (or similar). Vegetation clearance and possible levelling of rocky ground may be required for both access and the tower footprints. Waste material may arise during construction including concrete waste and steel discards. • The stringing of the powerline will require the clearance of vegetation for road access and to ensure that the powerline is not entangled or snagged. As such impacts relating to stringing may include the clearance of vegetation and levelling of areas in order to facilitate the stringing of the towers from the ground. Incursion into areas of improved ecological value or sensitivity is to be expected. • Loss, disturbance or alteration of botanical communities at a localised level, particularly geophytes and uncommon to rare species. Destruction of localised vegetation communities as a result of site clearance, which may not be able to re-establish due to a change in drivers or other factors e.g. edaphics.
Status	Negative – change in ecological processes, habitat form and alteration of bio physical factors at a localised level. Localised extinction or ousting of species with concomitant change in ecosystem function.

Mitigation Required	• Survey of work space around substation site and laydown area (delimiting through demarcation of the construction area). • Identification of access routes prior to the construction phase, and ensure clear demarcation for use throughout the construction phase. • Site review and possible removal/relocation of flora and fauna of value within affected site (i.e. undertake search and rescue operations, where such specimens may be relocated/removed or avoided (with the relevant permits and approvals in place)). • Containment of construction and laydown areas (fencing of the site is an option). • Compile and implement a Vegetation Rehabilitation Plan for the construction phase. • Incorporation or avoidance of lithic environments into sites. • A survey of each tower point should be undertaken at the final survey stage prior to construction, taking measures to avoid more sensitive terrain, while meeting stringing distance between towers. • Access roads should be surveyed prior to construction of towers and follow routes that avoid unnecessary large scale clearance of vegetation and avoid "sensitive habitats". • Stringing of towers may be performed using aerial methods (e.g. helicopter) if and where possible, to avoid undue disturbance to habitat.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 2:

Aspect/Activity	**Site Levelling**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Alteration of lithic structures and clearance of rock and minor features due to the construction of the proposed infrastructure; and site levelling (including areas that are eco-geomorphologically important) for the construction of towers and the on-site substation. The service road will also traverse level to steeper ground and require some level of clearance of vegetation and disturbance along the powerline route.
Status	Negative – change in ecological processes and habitat.
Mitigation Required	Avoidance of lithic environments
Impact Significance (Pre-Mitigation)	High (Level 2)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 3:

Aspect/Activity	**Site Clearance and Levelling**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Loss of refugia particularly in respect of fauna associated with lithic habitats (e.g. *Homopus* spp). Rock ledges and other geological structures are intrinsic habitat for species such as

	padlopers (tortoises), and removal of these features will result in the loss of this habitat.
Status	Negative – localised ousting of species and change in ecosystem function.
Mitigation Required	None
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Moderate (Level 3)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 4:

Aspect/Activity	**General activities on site (vehicle movement and construction activities)**
Type of Impact (i.e. Impact Status)	Direct and indirect
Potential Impact	Direct faunal mortalities as a result of construction activities such as traffic movement or general disturbance on site.
Status	Negative – local extinction of species leading to ecosystem change.
Mitigation Required	Management of traffic movement and labour conduct
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4) (Direct Impact) and Very Low (Level 5) (Indirect Impact)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 5:

Aspect/Activity	**Site Levelling and Earthworks**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Alteration of surface hydrology as a result of hardpanning of the upper soil horizon (i.e. soil compaction) due to traffic movement within and around the construction area, as well as use of materials to establish a sound working platform.
Status	Negative – change in habitat form and structure.
Mitigation Required	Ripping of disturbed areas and managed environment.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 6:

Aspect/Activity	**General activities on site and importing of construction material**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Increased spread of invasive alien vegetation as a result of import of earth materials and general disturbance of the site during the construction phase. Indigenous vegetation may also serve to alter habitat form and structure.
Status	Negative – change in habitat form and structure.
Mitigation Required	Exotic weed control and broader vegetation management of source materials and site through monitoring.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 7:

Aspect/Activity	General activities on site (vehicle movement and construction activities)
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	General erosion primarily as a result of the movement of construction traffic, which causes compaction and surface disturbance. Erosion may occur particularly on steeper slopes where the trampling and compaction of vegetation occurs.
Status	Negative – change in habitat structure.
Mitigation Required	Site management and timeous redress of evident wind and water erosion.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 8:

Aspect/Activity	General activities on site and importing of construction material
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Impact of solid waste generation on fauna as a result of potential ingestion or ensnarement. Solid waste (e.g. small bolts, wires etc.) has the potential to harm or kill animals through ingestion or ensnarement.
Status	Negative – impact on fauna with possible mortalities
Mitigation Required	Waste management on site with "from cradle to grave approach".
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 9:

Aspect/Activity	On-site substation construction, towers and roads
Type of Impact (i.e. Impact Status)	Direct and indirect
Potential Impact	The construction phase will result in: • Increased human presence within presently unencumbered areas, leading to increased noise, dust and changes in prevailing bio physical factors within the study area; • Increased light pollution from the proposed site camp and related areas of the site; • Import of materials not associated with the surrounding environment, resulting in increased risks of a localised nature, if not managed (e.g. fuels, construction materials etc.); • Changes in edaphic form and structure will arise; and • Solid and liquid waste associated with construction activities including sewage and solid waste. The above factors, through impacts on both flora and fauna will serve to alter local ecological processes through the introduction

	of nutrients and other materials which may impact directly or indirectly on flora and faunal components of region (i.e. vegetation and habitat alteration). Construction activities will alter faunal behaviour in and around the site through effects such as altering corridors associated with movement, herbivory and predation. Certain species will benefit from the various changes in land use, while others will be ousted from areas.
Status	Negative
Mitigation Required	• Containment and demarcation of the construction area, labour workforce and related activities. Construction activities should be confined to the laydown area and construction footprints. • Implementation of control measures relating to conduct of staff and contractors on site and in relation to the prevailing natural environment. Staff should be managed and maintained within construction areas, and educated on waste management and conduct on site. • Control of all imported materials including concrete and hazardous materials to ensure that materials are managed on site and within the construction footprint. • Control of all waste materials to ensure that ALL materials are removed from site, including sewage, for disposal at an appropriate point (i.e. a licenced facility). • Ensure a well-managed and timeous construction schedule to avoid prolonged period of construction and disturbance. • Use of appropriate lumen within all lighting and appropriate establishment of lighting will prevent undue ELP. • Compile and implement a Vegetation Rehabilitation Plan for the construction phase in order to improve habitat diversity.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

5.2 Potential Impacts during the Operational Phase

Potential Impact 1:

Aspect/Activity	**On-site substation (including O&M Building) operations and maintenance**
Type of Impact (i.e. Impact Status)	Direct
Potential Impacts	The operation of the proposed on-site substation and O&M Building will be included in the regular maintenance of the proposed Rietrug WEF (not assessed as part of this BA Project), with replacing of parts and infrastructure. Materials such as hydrocarbons and other solid materials may be utilised on a daily basis generating potential waste and the spillage of hazardous materials. In addition, light (ELP) and noise will affect faunal behaviour around the proposed on-site substation. Light will alter both invertebrate and vertebrate behaviour and activity around the proposed on-site substation, while, should an electric fence be

	established around the proposed on-site substation, it is possible that there may be an increase in animal mortalities (electrocution). Occasional vehicular traffic may impact on fauna through collision (in particular tortoise). Note that the impact of ELP and terrestrial mortalities as a result of increased driving and electric fencing, linked to the on-site substation, operations and maintenance is discussed and assessed separately below.
Status	Negative
Mitigation Required	• Implement sound and appropriate management of the Electrical Infrastructure site including storm water management, vegetation management and related aspects around the site. • Containment of maintenance activities to within the on-site substation and O&M Building site to avoid unnecessary disturbance outside of the footprint. • Implementation of control measures relating to the conduct of maintenance staff and contractors on site and in relation to the prevailing natural environment. Staff should be educated on correct procedures to be used in waste disposal, conduct on site and operations of vehicles and machinery. • Control of all imported material (where applicable) to ensure that all materials are managed on site and within the footprint of the proposed on-site substation and O&M Building. • Control of all waste materials to ensure that ALL materials are removed from site, including sewage, for disposal at an appropriate facility (i.e. a licenced facility). • Appropriate lighting of the O&M Building and on-site substation should be provided in order to avoid unnecessary illumination of the surrounding environment. • Ensure the appropriate establishment of electric fencing around the proposed on-site substation (neutral line lowest). Inter alia, a neutral line should be established at ground level, while methods to prevent perching of birds on upper stands should be explored. • Monitoring of the fence line on a daily basis will alleviate impacts on smaller fauna, such as tortoise, that may become entrapped by the electric fence.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 2:

Aspect/Activity	**Powerline operations and maintenance**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	General maintenance of the powerline routes will include regular inspection of the powerline by foot and vehicle (by use of the proposed service road), repairs to structures and lines and possibly aerial cleaning of conductors on an irregular basis. Potential impacts that are expected to arise include:

	• Disturbance of emergent and established vegetation; • Changes in edaphic and other drivers in and around towers and possibly lines; • Ousting of fauna in and around site and particularly adjacent to powerlines – including mortalities of species such as tortoise; and • Changes in bio-physical drivers along the proposed powerline route (soil, vegetation cover, surface hydrology etc.).
Status	Negative
Mitigation Required	• Implement sound and appropriate management of points around the proposed towers including storm water management and vegetation control. • Containment of maintenance activities to the proposed powerline servitude and points around towers to avoid unnecessary disturbance outside of the footprint. • Implementation of control measures relating to the conduct of maintenance staff and contractors on site and in relation to the prevailing natural environment. Staff should be educated on waste management, while on site, adherence to speed limits and general conduct on site. • Control of all imported material to ensure that materials are managed during operations along the proposed powerline route. • Control of all waste materials to ensure that ALL materials are removed from along the proposed powerline route and disposed of correctly at a licenced facility.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 3:

Aspect/Activity	**On-site substation (including O&M Building) operations and maintenance**
Type of Impact (i.e. Impact Status)	Direct
Potential Impacts	Disturbance of vegetation and alteration of vegetation community structure and habitat form as a result of maintenance operations around the proposed on-site substation and O&M building, as well as increased human and vehicle traffic levels.
Status	Negative – change in ecological processes and habitat
Mitigation Required	• Implement vegetation management and conservation initiatives which includes exotic weed control; vegetation management around fence lines and within the site; and monitoring and maintenance of larger plant associations in proximity to infrastructure.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 4:

Aspect/Activity	Power line and service road operations and maintenance
Type of Impact (i.e. Impact Status)	Direct
Potential Impacts	Disturbance of vegetation and alteration of vegetation community structure and habitat form as a result of maintenance operations of the power line and service road, as well as increased human and vehicle traffic levels.
Status	Negative – change in ecological processes and habitat
Mitigation Required	• Implement vegetation management and conservation initiatives which includes exotic weed control; vegetation management along the power line and service road route; and monitoring and maintenance of larger plant associations in proximity to infrastructure.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 5:

Aspect/Activity	On-site substation (including O&M Building), Service Road and Powerline operations and maintenance
Type of Impact (i.e. Impact Status)	Direct
Potential Impacts	Increased spread and introduction of exotic vegetation as a result of the movement of vehicles within the study area, particularly along the powerline and service road. Exotic plant propagules will tend to be carried by the vehicles using the service road during maintenance and operations, which may change or alter the local ecology.
Status	Negative – change in ecological processes and habitat.
Mitigation Required	• Implement vegetation management and conservation initiatives. This would include: • Control of exotic vegetation along roads and the powerline; and • Avoid unnecessary disturbance to ground which promotes exotic weed invasion and vegetation change.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 6:

Aspect/Activity	On-site substation (including O&M Building), Service Road and powerline operations and maintenance
Type of Impact (i.e. Impact Status)	Direct
Potential Impacts	Increase in terrestrial mortalities as a result of vehicle movement, electric fencing and other activities that have the potential to inflict lethal consequences on smaller and less mobile species such as tortoises.
Status	Negative - Localised extinction or ousting of species with concomitant change in ecosystem function.
Mitigation Required	• Conservation management planning to include protocols on movement of vehicles, labour conduct and operations in respect of resident wildlife. • The lower string of electric fence to be neutral.

	• Conduct daily monitoring of fence line to address fauna that may be trapped by electric fence.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 7:

Aspect/Activity	**On-site substation (including O&M Building) operations and maintenance**
Type of Impact (i.e. Impact Status)	Indirect
Potential Impacts	Change in faunal behaviour due to increased lighting around the proposed on-site substation and O&M Building (ELP), which will be lit at night. In particular, invertebrate species may be attracted to lights which have concomitant influences on the behavioural patterns of other species in the area. Alternatively, hunting and other behaviours may alter as a consequence of additional lighting within an area previously devoid of such factor.
Status	Negative - Localised change in species composition and ethology with concomitant change in ecosystem function.
Mitigation Required	• Apply suitable lumens and ensure direction of lighting is within the proposed on-site substation. The direction of lighting should not be focussed outside of the subject area, while the level of lumens should be such that the necessary lighting to achieve its objective is achieved (security, operations etc.).
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 8:

Aspect/Activity	**Power line and service road operations and maintenance**
Type of Impact (i.e. Impact Status)	Indirect
Potential Impacts	Change in faunal community structure as a consequence of increased perching points for raptors due to the powerline, which will afford some birds of prey that hunt from perched positions improved opportunities for the detection and capture of prey. Such increases in predation pressures on potential prey species (e.g. *Mastomys coucha*) in and around the proposed powerline may have consequences for localised ecological processes and for example, small mammal populations.
Status	Negative - Changes in population structure of prey species.
Mitigation Required	• None
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

While the operations of the proposed infrastructure (i.e. the on-site substation, O&M Building, service road and powerline) are to be noted as having impacts on the localised, natural environment; consideration should also be given to the impact that local fauna in particular, may have on the operations. In particular, note should be made of the impact of burrowing or fossorial species, in particular porcupine (*Hystrix africaeaustralis*) and aardvark (*Orycteropus afer*), which regularly penetrate fencing and cause the collapse of road infrastructure. The striped mouse

(*Rhabdomys pumilio*) is also noted for its propensity to establish "nests" within electrical boxes and other infrastructure, often leading to electrical shorts and other failures. A protocol should be adopted by the operator of the proposed Electrical Infrastructure and associated WEFs that would allow for a legal and ethical approach to dealing with so-called "nuisance animals", if and when such issues arise.

5.3 Potential Impacts during the Decommissioning Phase

Potential Impact 1:

Aspect/Activity	**Removal and decommissioning of all infrastructure associated with the proposed project (including the laydown area, the on-site substation, O&M Building, service road and 132 kV powerline (including pylons and foundations)).**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Vegetation and Habitat Alteration: Removal of powerlines and related infrastructure will alter the localised topography at points, which may prevent successional processes establishing at these points on account of intrinsic changes in edaphics, lithic or other factors. Excavation undertaken during the construction phase may alter the intrinsic drivers of habitat form and structure at select points. Following the decommissioning of structures, the emergence of habitat that prevailed prior to construction may not arise and differing vegetation structures may establish. This may have consequences for the more expansive habitat (e.g. bush encroachment may be a consequential outcome of disturbance). The decommissioning of the construction laydown area around the proposed on-site substation will result in a cleared and altered bio-physical environment (edaphics and vegetation will have been altered through activities), which will give rise to differing surface and sub surface ecological drivers (differing percolation rates, surface run off, emergent vegetation etc.). Such state is likely to give rise to: • Altered surface hydrology; • Erosion; • Differing percolation and edaphic nature comparative to the prevailing environment; and • Exotic weed invasion or changes to emergent vegetation communities.
Status	Negative - Change in ecological processes and habitat – reversion to secondary habitat structure at transformed sites.
Mitigation Required	• Establish rehabilitation protocols and management interventions for site that would include post construction remediation and rehabilitation. • Rip and manage compacted surface soils at areas. Areas that have been subject to compaction should be ripped mechanically, or by hand in order to promote vegetative colonisation of the affected areas. • Undertake topographic sculpting of site. If and where required, areas should be sculpted to mimic the prevailing habitat. • Undertake management of secondary emergent vegetation communities to ensure that emergent vegetation is aligned to prevailing habitat.

	• Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 2:

Aspect/Activity	**General activities on site during decommissioning**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Recruitment and behavioural change in fauna.
Status	Negative - Change in ecological processes and habitat
Mitigation Required	• Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity. Improved habitat complexity will buffer transformation and reduce impacts on faunal behaviour and populations.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 3:

Aspect/Activity	**General activities on site during decommissioning**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Impact of solid waste generation on fauna as a result of potential ingestion or ensnarement. Solid waste (e.g. small bolts, wires etc.), and solid and derelict structures left on site following the demolition and removal of structures has the potential to harm or kill animals (local fauna) through ingestion or ensnarement.
Status	Negative
Mitigation Required	• Ensure thorough survey of site following clearance and decommissioning. All material to be removed from site.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

5.4 Cumulative Impacts

Potential Impact 1:

Aspect/Activity	**Electrical and support infrastructure including substations, O&M building, powerlines and service roads.**
Type of Impact (i.e. Impact Status)	Cumulative
Potential Impacts	Increased ELP levels. Light pollution may be associated with all built structures of the proposed project and the projects considered within the 50 km radius, including the wind turbines of the various proposed WEFs listed in Section 4 above. The cumulative level of increased lighting in the area will serve to alter the behaviour of a number of nocturnal (and possibly crepuscular and diurnal) species and alter ecological processes in and around these points.
Status	Negative - Localised change in species composition and ethology with concomitant change in ecosystem function

Mitigation Required	• Apply suitable lumens and ensure direction of lighting is within the proposed on-site substation. The direction of lighting should not be focussed outside of the subject area, while the level of lumens should be such that the necessary lighting to achieve its objective is achieved (security, operations etc.).
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 2:

Aspect/Activity	**Electrical and support infrastructure including substations, O&M building, powerlines and service roads.**
Type of Impact (i.e. Impact Status)	Cumulative
Potential Impacts	Increased presence of exotic and disturbance driven plant species. With increasing levels of anthropogenic activity on site and within the surrounding area, the propensity for plant invasion or the dominance of species that are tolerant of higher levels of disturbance will see such species dominating and perhaps ousting other less tolerant species.
Status	Negative
Mitigation Required	• Implement vegetation management and conservation initiatives. This would include: • Control of exotic vegetation along roads and the powerline; and • Avoid unnecessary disturbance to ground which promotes exotic weed invasion and vegetation change.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 3:

Aspect/Activity	**Electrical and support infrastructure including substations, O&M building, powerlines and service roads.**
Type of Impact (i.e. Impact Status)	Cumulative
Potential Impacts	Increased dissection of habitat on account of increasing levels of infrastructure. The proposed powerline and associated service road, as well as the on-site substation will give rise to the further dissection of habitat within the study area. Such dissection will have already arisen as a consequence of the establishment of the proposed turbines and road network across the site (as a result of the proposed Sutherland, Sutherland 2 and Rietrug WEFs), effectively dividing the properties into numerous dissected habitats.
Status	Negative
Mitigation Required	Implementation of control measures relating to conduct of staff and contractors on site and in relation to the prevailing natural environment.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 4:

Aspect/Activity	Electrical and support infrastructure including substations, O&M building, powerlines and service roads.
Type of Impact (i.e. Impact Status)	Cumulative
Potential Impact	Altered surface hydrology and impact on plant community structure. Increasing levels of areas dominated by built structures will see localised changes in surface hydrology across the subject site. The associated road network will add to this impact. These changes affect habitat structure and form within the terrestrial environment.
Status	Negative – change in habitat form and structure.
Mitigation Required	Ripping of disturbed areas and managed environment.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 5:

Aspect/Activity	Electrical and support infrastructure including substations, O&M building, powerlines and service roads.
Type of Impact (i.e. Impact Status)	Cumulative
Potential Impact	Increased and expanded anthropogenic influences across the region. The nature of the surrounding proposed WEFs, electrical infrastructure and Solar Energy Facilities (as noted above) suggests that human activity will arise at points that are presently only intermittently visited by a farmer or his staff. With the proposed projects listed in Section 4 above, as well as the proposed Rietrug WEF Electrical Grid Infrastructure (i.e. this project), greater levels of human activity can be anticipated across the area, with the likely influence of ousting particular species of fauna.
Status	Negative – Localised ousting of species and change in ecosystem function
Mitigation Required	Control and management procedures relating to operations in and around the powerlines and associated infrastructure to be implemented as per the Environmental Management Programme (EMPr) (e.g. management relating to disturbance of flora and fauna).
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 6:

Aspect/Activity	Electrical and support infrastructure including substations, O&M building, powerlines and service roads.
Type of Impact (i.e. Impact Status)	Cumulative
Potential Impact	Increased noise pollution levels with concomitant impact on faunal behaviour. Allied to increasing human presence across the site, increase noise levels, in particular the low level sound emanating from buzz bars and the proposed on-site substation, together with the other electrical infrastructure proposed by the projects listed in Section 4 above, may influence behaviour in respect of smaller mammals and other fauna that utilise sound in

	their various behavioural patterns (prey detection, social interaction).
Status	Negative – Localised change in species composition and ethology with concomitant change in ecosystem function
Mitigation Required	Control and management procedures relating to operations in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 7:

Aspect/Activity	**Electrical and support infrastructure including substations, O&M building, powerlines and service roads.**
Type of Impact (i.e. Impact Status)	Cumulative
Potential Impact	Vegetation and habitat alteration - change in ecological processes and habitat – reversion to secondary habitat structure at transformed sites.
Status	Negative with some potential positive aspects. Positive impacts may include increased variability in habitat (i.e. secondary habitat and present primary habitat form; increased grassland communities etc.).
Mitigation Required	Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

Potential Impact 8:

Aspect/Activity	**Electrical and support infrastructure including substations, O&M building, powerlines and service roads.**
Type of Impact (i.e. Impact Status)	Cumulative
Potential Impact	Recruitment and behavioural change in fauna - change in ecological processes and habitat.
Status	Negative
Mitigation Required	Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity and maintenance of improved habitat within areas subject to change as a consequence of the proposed development.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	Refer to Appendix E of the BA Report for comments received from I&APs to date.

6 IMPACT ASSESSMENT TABLES

Table 4 indicates the various impacts that have been identified for the construction, operational and decommissioning phases of the project. In addition, the Tables 4 to 9 identify the following:

- The nature of the potential risk/impact: This is indicative of what ecological factor will be affected.
- Status: Does the impact enhance the functioning of the system (positive) or detract and depreciate the functioning of the system (negative).
- Spatial extent: Whether the impact is confined to the development footprint (site specific), areas around the development site, less than 10 km (local), areas of a regional extent (areas less than 100 km from site), or beyond this to national and international levels of impact.
- Duration: Whether the impact has a time frame associated with the construction phase (generally less than but up to 2 years), which is determined as "very short term (instantaneous)" or "short term (less than one year)"; medium term being periods somewhat beyond the construction phase or during the lifetime of the project (i.e. one to 10 years); long term (i.e. timeframes for the lifetime of the project); and permanent (i.e. impact will occur beyond the project decommissioning).
- Consequence: This is a subjective evaluation of the severity of the impact, ranging from "slight" to "extreme". Extreme consequence would relate to where environmental functions and processes are altered such that they permanently cease.
- Probability: A measure of the likelihood of the impact arising, ranging from extremely unlikely to very likely.
- Reversibility: An indication as to whether the impact consequences can be reversed through interventions.
- Irreplaceability: A measure of how significant the loss of the attribute would be as a result of the impact. Attributes of high irreplaceability cannot be reinstated and may only be avoided or offset.
- Potential mitigation measures: Proposed means of mitigating or ameliorating impacts.

The outcome of the above parameters provides an indication of the significance of the impact (ranging from "very low" to "very high") with such significance being measured before and after the application of mitigation measures. The complete impact assessment methodology applied for this BA Process and the specialist assessments is detailed in Section D of the BA Report.

Table 4: Impact Assessment Summary Table for the Construction Phase – Direct Impacts

Construction Phase												
Direct Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Site clearance, levelling, tower construction, powerline stringing and site establishment: Removal of indigenous vegetation, site clearance and levelling for the establishment of the laydown area, on-site substation, O&M Building, service road, pylons, and stringing of the powerline, as well as earthworks.	Change in ecological processes and habitat	Negative	Site Specific	Medium-to long term	Substantial	Very likely	Moderate	Moderate	1. Site survey and habitat identification/relocation and demarcation of construction area. 2. Containment of construction and laydown areas. 3. Avoidance of lithic environments 4. Survey of towers at the final survey stage prior to construction with plant and fauna rescue 5. Access road routing and clear demarcation, and fauna/plant rescue prior to construction 6. Powerline stringing options (such as aerial methods, if and where possible). 7. Compile and implement Vegetation Rehabilitation Plan. 8. Incorporation or avoidance of lithic environments into sites.	Moderate	Low	4	High

Construction Phase												
Direct Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Site clearance: Loss, disturbance or alteration of botanical communities at a localised level, particularly geophytes and uncommon to rare species as a result of site clearance, as well as destruction of localised vegetation communities.	Localised extinction or ousting of species with concomitant change in ecosystem function	Negative	Site Specific	Long term	Substantial	Very Likely	Low	Low	Incorporation or avoidance of lithic environments. Undertake plant rescue operations.	Moderate	Low	4	Moderate
Site levelling: Alteration of lithic structures and clearance of rock and minor features due to the construction of the proposed infrastructure; and site levelling (including areas that are eco-geomorphologically important.	Change in ecological processes and habitat	Negative	Site Specific	Long term	Severe	Very likely	Low	High	Avoidance of lithic environments	High	Low	4	High

Construction Phase												
Direct Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Site clearance and levelling: Loss of refugia, particularly in respect of fauna associated with lithic habitats (e.g. *Homopus* spp). Removal of rock ledges and other geological structures resulting in loss of intrinsic habitat for species such as padlopers (tortoises.	Localised ousting of species and change in ecosystem function	Negative	Site Specific	Long term	Substantial	Very Likely	Low	Low	None	Moderate	Moderate	3	Moderate
General activities on site (vehicle movement and construction activities): Direct faunal mortalities as a result of construction activities such as traffic movement and general disturbance on site.	Local extinction of species leading to ecosystem change	Negative	Local	Short to long term	Substantial	Likely	Low	Low	Management of traffic movement and labour conduct	Moderate	Low	4	Moderate

Construction Phase													
Direct Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Site levelling and Earthworks: Hardpanning of topsoil layer (i.e. soil compaction) resulting in alteration of surface hydrology due to traffic movement and use of materials to establish a working platform.	Change in habitat form and structure	Negative	Site Specific	Short to medium term	Moderate	Very likely	High	Low	Ripping of disturbed areas and managed environment	Low	Very Low	5	High
General activities on site and import of earth materials and general disturbance giving rise to prevalence of exotic vegetation. Indigenous vegetation may also serve to alter habitat form and structure.	Change in habitat form and structure	Negative	Local to regional	Medium to long term	Moderate	Likely	Moderate	Low	Vegetation control and management of source materials through monitoring	Low	Very low	5	Moderate

Construction Phase												
Direct Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
General activities on site (vehicle movement and construction activities): General erosion through, primarily movement of construction traffic, earth and plant operations	Change in habitat structure	Negative	Site specific to local	Medium term	Moderate	Likely	High	Low	Site management and timeous redress of evident wind and water erosion	Low	Very low	5	High
General activities: Solid waste and impact on fauna through ingestion or ensnarement	Impact on fauna with possible mortalities	Negative	Site specific to local	Short to Medium-Term	Moderate	Likely	High	Low	Waste management on site with from cradle to grave approach	Low	Very low	5	High
On site substation and powerline construction: Vegetation and habitat alteration through the introduction of nutrients and other materials	Change in ecological processes and habitat	Negative	Site Specific	Medium-to long term	Substantial	Very likely	Moderate	Moderate	Compile and implement a Vegetation Rehabilitation Plan	Moderate	Low	4	High

Construction Phase												
Direct Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
On site substation and powerline construction: Ousting and behavioural change in fauna through effects such as altering corridors associated with movement, herbivory and predation	Change in ecological processes and habitat	Negative	Local	Long term	Substantial	Very likely	Moderate	Moderate	Compile and Implement a Vegetation Rehabilitation Plan to improve habitat diversity	Moderate	Low	4	High

Table 5: Impact Assessment Summary Table for the Construction Phase – Indirect Impacts

Construction Phase												
Indirect Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
General activities on site (vehicle movement and construction activities): Faunal mortalities as a result of construction activities such as traffic movement and general disturbance on site.	Local extinction of species leading to ecosystem change	Negative	Local	Short to long term	Substantial	Likely	Low	Low	Management of traffic movement and labour conduct	Moderate	Very Low	5	Moderate
On site substation and powerline construction: Vegetation and habitat alteration through the introduction of nutrients and other materials	Change in ecological processes and habitat	Negative	Site Specific	Medium-to long term	Substantial	Very likely	Moderate	Moderate	Compile and implement a Vegetation Rehabilitation Plan	Moderate	Low	4	High

Construction Phase													
Indirect Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
On site substation and powerline construction: Ousting and behavioural change in fauna through effects such as altering corridors associated with movement, herbivory and predation	Change in ecological processes and habitat	Negative	Local	Long term	Substantial	Very likely	Moderate	Moderate	Compile and implement a Vegetation Rehabilitation Plan to improve habitat diversity	Moderate	Low	4	High

Table 6: Impact Assessment Summary Table for the Operational Phase – Direct Impacts

Operational Phase													
Direct Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Disturbance as a result of general activities associated with the operation and maintenance of the proposed on-site substation and O&M Building, which will include replacing of parts and infrastructure, as well as use of materials such as hydrocarbons.	Change in ecological processes and habitat	Negative	Site Specific	Long term	Substantial	Very likely	Moderate	Moderate	1. Implement sound and appropriate management of the Electrical Infrastructure site including storm water management, vegetation management and related aspects around the site. 2. Containment of maintenance activities to within the on-site substation and O&M Building site. 3. Implementation of control measures relating to the conduct of maintenance staff and contractors on site. 4. Control of all imported material (where applicable). 5. Control of all waste materials 6. Appropriate lighting of the O&M Building and on-site substation. 7. Ensure the appropriate establishment of electric fencing around the proposed on-site substation (neutral line lowest). Inter alia, a neutral line should be established at ground level, while methods to prevent perching of birds on upper stands should be explored. 8. Monitoring of the fence line on a daily basis will alleviate impacts on smaller fauna, such as tortoise, that may become entrapped by the electric fence.	Moderate	Low	4	Medium

Operational Phase												
Direct Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Disturbance as a result of general activities during the power line and service road maintenance processes.	Change in ecological processes and habitat	Negative	Site Specific	Long term	Substantial	Very likely	Moderate	Moderate	1. Implement sound and appropriate management of points around the proposed towers including storm water management and vegetation control. 2. Containment of maintenance activities to the proposed powerline servitude and points around towers. 3. Implementation of control measures relating to the conduct of maintenance staff and contractors on site. 4. Control of all imported material to ensure that materials are managed during operations along the proposed powerline route. 5. Control of all waste materials.	Moderate	Low	4	Medium
Alteration of vegetation community structure through maintenance operations around the proposed on-site substation and O&M Building.	Change in ecological processes and habitat	Negative	Site Specific	Long term	Moderate	Very likely	Moderate	Moderate	Implement vegetation management and conservation initiatives which includes exotic weed control; vegetation management around fence lines and within the site; and monitoring and maintenance of larger plant associations in proximity to infrastructure.	Low	Low	4	High
Alteration of vegetation community structure through maintenance operations along the power line and service road.	Change in ecological processes and habitat	Negative	Site Specific	Long term	Moderate	Very likely	Moderate	Moderate	Implement vegetation management and conservation initiatives which includes exotic weed control; vegetation management along the power line and service road route; and monitoring and maintenance of larger plant associations in proximity to infrastructure.	Low	Low	4	High

Operational Phase												
Direct Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Introduction of exotic vegetation through movement of vehicles within study area. The introduction of exotic plant propagules carried by vehicles may change or alter the local ecology.	Change in ecological processes and habitat	Negative	Site Specific	Long term	Substantial	Likely	Low	Low	Implement vegetation management and conservation operations such as control of exotic vegetation along roads and the powerline, and avoid unnecessary disturbance to ground which promotes exotic weed invasion and vegetation change.	Moderate	Low	4	High
Increase in terrestrial mortalities through the movement of vehicles along line route (particularly tortoises). Electric fencing also offers a potential threat to some species. This has the potential to inflict lethal consequences on smaller and less mobile species such as tortoises.	Localised extinction or ousting of species with concomitant change in ecosystem function	Negative	Site Specific	Long term	Substantial	Very Likely	Low	Low	Conservation management planning to include protocols on movement of vehicles, labour conduct and operations in respect of resident wildlife. The lower string of electric fence to be neutral. Conduct daily monitoring of fence line to address fauna that may be trapped by electric fence.	Moderate	Low	4	High

Table 7: Impact Assessment Summary Table for the Operational Phase – Indirect Impacts

Operational Phase													
Indirect Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Change in faunal behaviour on account of increased lighting around the proposed on-site substation (ELP).	Localised change in species composition and ethology with concomitant change in ecosystem function	Negative	Site	Long term	Moderate	Very Likely	Low	Low	Apply suitable lumens and ensure direction of lighting is within the boundary of the proposed on-site substation. The direction of lighting should not be focussed outside of the subject area, while the level of lumens should be such that the necessary lighting to achieve its objective is achieved (security, operations etc.).	Low	Low	4	Mode rate

Operational Phase													
Indirect Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Change in faunal community structure as a consequence of increased perching points for raptors on the proposed powerline.	Changes in population structure of prey species.	Negative	Local	Long term	Moderate	Very likely	Low	Low	None	Low	Low	4	Moderate

Table 8: Impact Assessment Summary Table for the Decommissioning Phase – Direct Impacts

Decommissioning Phase													
Direct Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Vegetation and habitat alteration	Change in ecological processes and habitat – reversion to secondary habitat structure at transformed sites.	Negative	Site Specific	Long term	Moderate	Very likely	Moderate	Moderate	Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity.	Low	Very Low	5	High
Recruitment and behavioural change in fauna	Change in ecological processes and habitat	Negative	Local	Long term	Moderate	Very likely	Moderate	Moderate	Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity. Improved habitat complexity will buffer transformation and reduce impacts on faunal behaviour and populations.	Low	Very Low	5	High

Decommissioning Phase													
Direct Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Solid waste impact on fauna	Mortalities through ensnarement of fauna as a consequence of derelict structures, solid materials and other waste remaining on site.	Negative	Local	Long term	Moderate	Very likely	Moderate	Moderate	Ensure thorough survey of site following clearance and decommissioning. All material to be removed from site at the end of decommissioning.	Low	Very Low	5	Moderate

Table 9: Cumulative Impact Assessment Summary Table

Summary of construction, operation and decommissioning phases												
Cumulative Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Increased ELP levels as a result of light pollution that may be associated with all built structures for projects within the 50 km radius. The cumulative level of increased lighting in the area will serve to alter the behaviour of a number of nocturnal (and possibly crepuscular and diurnal) species and alter ecological processes in and around these points.	Localised change in species composition and ethology with concomitant change in ecosystem function	Negative	Site Specific	Long term	Substantial	Very Likely	Low	Low	Apply suitable lumens and ensure direction of lighting is within the boundary of the proposed on-site substation. The direction of lighting should not be focussed outside of the subject area, while the level of lumens should be such that the necessary lighting to achieve its objective is achieved (security, operations etc.).	Moderate	Low	4	Moderate
Dissection of habitat on account of increasing levels of infrastructure	Changes in plant community structure and species composition	Negative	Local	Long term	Substantial	Likely	Low	Moderate	Implementation of control measures relating to conduct of staff and contractors on site and in relation to the prevailing natural environment.	Moderate	Low	4	Moderate

Summary of construction, operation and decommissioning phases													
Cumulative Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Increased presence of exotic, disturbance driven plant species	Change in ecological processes and habitat	Negative	Site Specific	Long term	Substantial	Likely	Low	Low	Vegetation management and conservation operations such as control of exotic vegetation along roads and the powerline, and avoid unnecessary disturbance to ground which promotes exotic weed invasion and vegetation change	Moderate	Low	4	High
Altered surface hydrology and impact on plant community structure	Change in habitat form and structure	Negative	Site Specific	Short to medium term	Moderate	Very likely	High	Low	Ripping of disturbed areas and managed environment	Low	Very Low	5	High
Increased and expanded anthropogenic influences across the region	Localised ousting of species and change in ecosystem function	Negative	Local	Long term	Substantial	Very Likely	Low	Low	Control and management procedures relating to operations in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).	Moderate	Low	4	Moderate
Increased noise pollution levels	Localised change in species composition and ethology with concomitant change in ecosystem function	Negative	Site Specific	Long term	Moderate	Very Likely	Low	Low	Control and management procedures relating to operations in and around the powerlines and associated infrastructure to be implemented as per the EMPr (e.g. management relating to disturbance of flora and fauna).	Low	Low	4	Moderate

Summary of construction, operation and decommissioning phases													
Cumulative Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Vegetation and habitat alteration	Change in ecological processes and habitat – reversion to secondary habitat structure at transformed sites	Negative(with possible positive benefits).	Site Specific	Long term	Moderate	Very likely	Moderate	Moderate	Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity.	Low	Very Low	5	High
Recruitment and behavioural change in fauna	Change in ecological processes and habitat	Negative	Local	Long term	Moderate	Very likely	Moderate	Moderate	Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat diversity and maintenance of improved habitat within areas subject to change as a consequence of the proposed development.	Low	Very Low	5	High

6.1 Impact Assessment Summary

Table 10 indicates in summary the overall impact significance for the construction and operation of the proposed infrastructure, as well as the decommissioning stage. The impact significance is based on the findings contained in Sections 5 and 6 above and serves to identify phases where the highest level of impact may be affected and therefore identify that period requiring increased impact management and environmental control interventions.

Table 10: Overall Impact Significance (Post Mitigation)

Phase	Overall Impact Significance
Construction	Low
Operational	Low
Decommissioning	Very low
Nature of Impact	**Overall Impact Significance**
Cumulative - Construction	Very low
Cumulative - Operational	Low
Cumulative - Decommissioning	Very low

From Table 10, it is evident that the construction and operational phases offer generally low level impacts to site provided the recommended mitigation options are exercised. It is however, to be noted that such impacts are considered to be of low significance, primarily on account of the generally confined spatial extent of such impacts (i.e. proposed on-site substation, O&M Building, laydown area, service road, powerline and tower footprints), as well as the generally low level of habitat diversity associated with the proposed substation site and powerline route. Notably, the highest risk or impact is associated with the construction phase, where lithic habitat forms such as ledges and rocky outcrops may have to be removed to facilitate construction. Mitigation options will reduce such impacts to "low" where implemented.

It is evident when considering the "cumulative impacts" across the site, that the proposed on-site substation (including the O&M Building and laydown area), and the majority of the proposed powerline and service road route alternatives lie primarily amidst the approved REFs and associated electrical infrastructure. If impacts are determined according to this approved and expectant land use, then the cumulative level of impact associated with the substation and powerlines must be considered to vary between "low" to "very low" significance. If however, cumulative impacts are determined according to the prevailing land use (*sans* approved REFs and associated electrical infrastructure), then such impacts should be determined to be a magnitude greater in terms of significance. The former land use was utilised in determining the levels of cumulative impact.

From Table 10 it is evident that the potential cumulative impacts associated with the operational phase of the proposed project may be considered to be greater, in terms of significance, than the potential impacts arising during the construction phase This increased impact significance is primarily associated with the increased temporal period associated with the maintenance operations and the high likelihood of latent but ongoing changes arising in habitat form and structure, behavioural changes in fauna and increased anthropogenic – faunal interactions with possible mortalities. Nonetheless, it is clear that such cumulative impacts rank as "low" to "very low" significance, with the implementation of mitigation measures. As indicated within Section 6, an appropriate method of addressing and mitigating all impacts of an ecological nature within the WEF and associated electrical infrastructure sites would be to place the areas in their entirety, under an integrated conservation management programme. Similar initiatives have been implemented in other energy projects, such as the Ingula Pump Station in the Free State-KwaZulu-Natal region. Such protection and management would cater for the prevailing land uses but it is

clear that as a multi role player initiative the Department of Environmental Affairs or a similar governmental authority would be required to facilitate such an initiative.

7 LEGISLATIVE AND PERMIT REQUIREMENTS

Should the proposed Rietrug WEF Electrical Grid Infrastructure project be established, the following legislative requirements should be given consideration in the environmental management procedures to be implemented on site.

1. The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA, 2004)
2. The National Forest Act (Act 84 of 1998)
3. The Northern Cape Nature Conservation Act (Act 9 of 2009).
4. The Conservation of Agricultural Resources Act (Act 43 of 1983)
5. The Western Cape Nature Conservation Laws Amendment Act (Act 3 of 2000)

In addition, the Western Cape Biodiversity Framework (2014) is a policy document underpinned by the NEMBA (2004) which serves to guide land use planning within the region in order to moderate effects upon the prevailing habitats. This document underpins ecologically sound planning in the Western Cape. The potential applicability of the abovementioned acts to the subject site is provided below:

1. NEMBA (Act 10 of 2004)

This Act serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. The proposed development, taking place in the identified Roggeveld habitats, may not necessitate any particular application for a change in land use from an ecological perspective, however the effective disturbance and removal of species identified in Table 1, as well as possible other species (i.e. TOPS species), will require specific permission from the applicable authorities.

In addition, the planting and management of exotic plant species on site, if and where required, will be governed by the Alien and Invasive Species (AIS) regulations, which were gazetted in 2014. These regulations compel landowners to manage exotic weeds on land under their jurisdiction and control.

The affected properties associated with the Mainstream projects do not fall within regionally protected areas, nor within 5 km of a protected are, or 10 kilometres of a World Heritage Site. In addition, the projects does encroach within a minor section of a CBA in the Western Cape, some 850m in extent, which is an area of primarily riparian habitat. In addition, the projects ostensibly do not fall within listed CBAs; however, as indicated above, the projects do span a CBA which is associated with riparian habitat. The powerline would effectively traverse over this point.

2. The National Forest Act (Act 84 of 1998)

The National Forest Act (Act 84 of 1998) governs the removal, disturbance, cutting or damage and destruction of identified “protected trees”. It is unlikely that any listed trees will be encountered in the construction of the proposed powerline, nor would the clearing of “natural forest”, as defined within the Act, be required on the proposed on-site substation site and its associated O&M building and other areas in question.

3. The Northern Cape Conservation Act (Act 9 of 2009)

The Northern Cape Conservation Act under its pertinent regulation, governs the disturbance of species listed in Table 1 above, or possibly other species not yet identified on site. A permit from the Provincial Department of Environment and Nature Conservation will be required in order to disturb or translocate such species. Species likely to require relocation include the padlopers (*Homopsus* sp) and possibly *Opisthophthalmus* spp, which may be encountered at points subject to clearance.

4. The Conservation of Agricultural Resources Act (Act 43 of 1983)

Invasive plant species that should be removed or maintained only under certain commercial or related situations are identified in terms of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA). This Act will be applicable to the project if and where such plants arise within or adjacent to the project area. Notably most listed alien invasive species are propagated and driven by the disturbance of land during and following construction. It is however also to be noted that given the harsh environment prevalent within the area that the propensity for alien exotic plant species to establish in the area is limited and allows for ease of management, should exotic weed species be identified.

5. The Western Cape Nature Conservation Laws Amendment Act (Act 3 of 2000)

As noted in the correspondence from Cape Nature (dated June 2016), received during the review of the Background Information Document, according to Section 63(1) of the Western Cape Nature Conservation Laws Amendment Act (Act 3 of 2000), no person shall a) uproot the plant in the process of picking the flower of any flora; (b) without a permit (i) pick any endangered or protected flora, or (ii) pick any flora on a public road or on the land on either side of such road within a distance of ninety metres from the centre of such road, or (c) pick any protected or indigenous unprotected flora on land of which he or she is not the owner, without the permission of the owner of such land or of any person authorised by such owner to grant such permission.

If any of the above activities will be undertaken, an application must be made to Cape Nature to obtain a permit to carry out these activities.

8 ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

Utilising the above information the following broad issues are considered within the Environmental Management Programme (EMPr) that would be associated with the proposed development.

Pre-Construction:

- Pre-construction evaluation and possible plant and fauna rescue operations;
- Identification of intrusion of the proposed construction site and development footprint, into minor drainage lines (if any);
- Identification of laydown areas, roadways etc. on site and evaluation of affected points within site, particularly in respect of floral and faunal presence; and
- Permitting requirements in terms of the Northern Cape Conservation Act and Western Cape Nature Conservation Laws Amendment Act (Act 3 of 2000).

Construction Phase:

- Site induction and interaction within management on ecological aspects;
- Site inspection of any fauna within the construction area during post fencing completion;
- Monitoring of operations, including faunal species presence within site, mortalities and sitings;
- Maintenance of vegetation and avoidance of unnecessary clearance of site;
- Exotic weed management; and
- Erosion control measures to be implemented where applicable.

Post Construction and Operational Phase:

- Monitoring of faunal activities within the fenced area of the site and immediate proximity of site;
- Management of faunal intrusion through the fencing, including possible mortalities;
- Consideration of lighting regime around the site and the impact of ELP.
- Vegetation management on site – consideration of redress methods of growth and habitat form around site;
- Exotic weed management; and
- Erosion control measures.

Appendix G of the BA Report provides specific consideration of these issues and the implementation of the mitigation measures.

9 CONCLUSION AND RECOMMENDATIONS

The ecological evaluation of the proposed Rietrug WEF Electrical Grid Infrastructure project incorporated desktop and site reconnaissance of the affected area across a number of farms within the Sutherland region of the Northern and Western Cape Provinces. The evaluation included consideration of the bio physical state of the subject areas and consideration of topographic features and vegetation in order to consider a holistic review of all components within the ecological landscape. The evaluation indicated specific areas that may be considered to be of moderate to high ecological significance and identified the levels of impact associated with the proposed development, based on proximity or the level of interface between the development and the identified habitat. Notably, the assessment was limited to the terrestrial environment and excluded wetlands and aquatic environments, avian and chiropteran fauna (as it is understood that these are the subjects of separate specialist studies, as applicable). Major potential impacts identified as a consequence of the proposed development proceeding relate to, *inter alia*;

- Changes in the broader habitat as a consequence of variation in physical factors within the proposed on-site substation site and along the proposed power line route (primarily limited to excavation and the removal of lithic habitat);
- Changes in the broader surface and possibly sub surface hydrology around the proposed on-site substation site; and
- The ousting, and in some cases recruitment of species, with subsequent variation in populations and changes in ecological processes in and around the proposed on-site substation and powerline.

The ecological evaluation has determined that with the application of appropriate management measures, that the abovementioned major potential impacts may be mitigated and reduced to low or very low levels of impact significance. Most significantly, the 1600m contour and topographically

variable lithic features across the site are determined to be of eco-geomorphological value and importance, while the potential impact of construction and operations are likely to see subtle changes in the vegetative and faunal composition of sites adjacent to the development footprint.

None of the above potential impacts have been identified as being of high significance (with the implementation of mitigation measures); most impacts arising can be considered to be of low to very low significance in a holistic evaluation.

Given the above information, it is evident that with adherence to the recommendations contained within this report and the EMPr (included as Appendix G of the BA Report), as well as the judicious placement of the proposed on-site substation, O&M Building, laydown area, service road, power line and electrical towers, the proposed development cannot be precluded from the site. As noted above, one option was considered and assessed for the distribution line connection to the proposed collector hub (i.e. Alternative 1), and four options were considered for the distribution line connection to the proposed Eskom Nuwerust Substation (Alternative 2). Notably, the establishment of a powerline that serves **Alternative 1** (i.e. the proposed Suurplaat on-site substation (referred to as the collector hub for this proposed project)) located on the farm Hartebeestefontein is proposed as the recommended routing and grid connection from the proposed Rietrug WEF on-site substation. This point of grid connection is preferred over the proposed Eskom Nuwerust substation (i.e. Alternative 2) on account of the reduced footprint associated with the proposed 132kV power line and on account of the fact that the power line to Alternative 1 does not traverse below the 1600m contour, which is the case if connection to the proposed Eskom Nuwerust substation (Alternative 2) were exercised. As noted above, areas below the 1600m contour have been generally identified as an area of improved comparative ecological value. However, as indicated above, based on this area of improved ecological value, several options of the Alternative 2 distribution line route from the proposed on-site substation to the proposed Eskom Nuwerust Substation were considered in order to find the most suitable routing from an ecological, visual and heritage perspective, in consultation with other specialists on the team. In line with this, the Alternative 2 distribution line route currently included in this assessment and included in the mapping is considered and deemed to be the most suitable line route option to be utilised, should connection with the proposed Eskom Nuwerust substation be required. Notably, the most suitable Alterative 2 route as included in Figure 1 of this report, was selected as it aligns with existing roads and traverses areas deemed to be of lower eco-morphological significance comparative to those encountered along the line route of the remaining options that were considered for Alternative 2. These findings thus do not negate the use of the proposed Eskom Nuwerust substation as a point of connection with the grid. If this option is exercised the abovementioned powerline route should be utilised.

Judicious management of the site during construction and operation would include:

- Avoidance of major earthworks and the removal of topographic or eco morphologically significant features;
- Avoidance of excessive clearance of vegetation adjacent to the proposed on-site substation, O&M Building, laydown area, and across the route of the proposed 132kV line and service road;
- Management of exotic weed invasion that may arise;
- Management of activities in and around the subject site to reduce faunal mortalities and changes in faunal behaviour that may influence ecological processes; and
- General land management practices to avoid excessive erosion, dust emissions and other nuisance factors.

The above, along with the various mitigation measures espoused in this report should be incorporated as conditions, into any authorisation granted by the relevant authority.

10 FINAL SPECIALIST STATEMENT AND AUTHORISATION RECOMMENDATION

It is our opinion that with the implementation of the proposed Rietrug WEF Electrical Grid Infrastructure project, particularly **Alternative 1** of the proposed on-site substation and its associated 132kV powerline serving the proposed collector hub (i.e. the 132 kV Suurplaat on-site substation or collector hub) should be sanctioned by the Department of Environmental Affairs and related authorities. Furthermore, should Alternative 2 become a requirement for connection to the grid, via the proposed Nuwerust substation, the use of the identified line route as described above is recommended as the preferred traverse. Notably, no fatal flaws were identified in either Alternative line routes 1 or 2. The implementation of management recommendations as espoused above and in the EMPr should be associated with such authorisation, if forthcoming.

10.1 Recommendations

The following conditions may be considered for inclusion in such an authorisation (should one be granted) at the construction and operation phases.

Proposed On-site Substation, O&M Building and Laydown Area:

1. The final site extent of the proposed on-site substation, O&M Building and laydown area should be surveyed and physically demarcated, including all access roads to assist with further field reconnaissance.
2. A field reconnaissance (i.e. search and rescue) of the footprint should be carried out following such survey and prior to construction, to identify any floral or faunal components of value or significance that may require relocation.
3. The relocation of any floral or faunal components within the study area should be subject to consideration in terms of prevailing legislation prior to such relocation. It is anticipated that most species should be relocated to points distal from the construction site, but within the same property.
4. The construction of the proposed on-site substation should be subject to the management directives contained within the EMPr.
5. Rehabilitation measures should be instituted around the proposed on-site substation, O&M Building and laydown area that address exotic weed invasion, compaction of soils and maintenance of ecological function.
6. Electric fencing, if associated with the proposed project, should be constructed so as to ensure that the lowest wire remains neutral. Electrified fences should be bound externally by a wire mesh fence. Fences should be inspected daily to ensure that no animals are trapped against such fences and any mortalities associated with fences should be recorded.

Powerline and Service Road:

7. All towers along the proposed line route should be established at points above the 1600m amsl contour.
8. Construction activities associated with the proposed powerline (for the preferred and recommended Alternative 1) should not intrude below the 1600m amsl contour.
9. Tower positions should be sited away from points of eco-geomorphological value (rocky outcrops, ledges etc.) where applicable.
10. The proposed service road below the powerline should avoid points of eco-geomorphological significance or value and should be routed around or away from such areas.
11. Rehabilitation of points of disturbance along the proposed powerline should be subject to rehabilitation measures and vegetation control procedures.

12. Notably, if powerline route Alternative 2 linking with the proposed Eskom Nuwerust substation is to be utilised, this route will traverse areas which lie below 1600m amsl. However, despite falling below the 1600m contour, of the four options considered for the Alternative 2 routing, the selected routing shown in Figure 1 of this report is considered to be the most suitable as it aligns with existing roads and traverses areas deemed to be of lower eco-morphological significance than those encountered along the line route of the remaining options that were considered for Alternative 2.

In addition:

- A management protocol should be established relating to fauna and the implementation of measures to control the impact of faunal activities on the proposed infrastructure, as well as the impact of the construction and operational phase of the proposed project on the natural environment.

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World Weather Online: www.worldweatheronline.com

BASIC ASSESSMENT REPORT

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the Rietrug Wind Energy Facility (WEF), Northern and Western Cape Provinces (Rietrug WEF – Electrical Grid Infrastructure)

APPENDIX D.2: Aquatic Ecology Impact Assessment

FRESHWATER ASSESSMENT FOR THE PROPOSED RIETRUG DISTRIBUTION LINE:

Basic Assessment for the proposed Construction of Electrical Grid Infrastructure to support the proposed (split) Rietrug Wind Energy Facility, near Sutherland, in the Northern Cape and Western Cape Provinces

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Report prepared for:
CSIR – Environmental Management Services
P O Box 320
Stellenbosch
7599
South Africa

Report prepared by:
SAS Environmental
PO Box 751779
Gardenview
2047
South Africa

23rd February 2017

Specialist Expertise

Details of the specialist who prepared the report

Stephen van Staden MSc (Environmental Management) (University of Johannesburg)
Amanda Mileson NDip Nature Conservation (UNISA)

The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Aquatic Services		
Name / Contact person:	Stephen van Staden		
Postal address:	P O Box 751779 Gardenview		
Postal code:	2047	Cell:	083 415 2356
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	stephen@sasenvironmental.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Natural Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum		

SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

Position in Company	Managing member, Ecologist, Aquatic Ecologist
Date of Birth	13 July 1979
Nationality	South African
Languages	English, Afrikaans
Joined SAS	2003 (year of establishment)
Other Business	Trustee of the Serenity Property Trust

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO)
Member of the Gauteng Wetland Forum

EDUCATION

Qualifications

MSc (Environmental Management) (University of Johannesburg)	2002
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2000
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	1999

COUNTRIES OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe
Eastern Africa – Tanzania
West Africa – Ghana, Liberia, Angola, Guinea Bissau
Central Africa – Democratic Republic of the Congo

SELECTED PROJECT EXAMPLES OUT OF OVER 2000 PROJECTS WORKED ON

Development compliance studies

- Project co-leader for the development of the EMP for the use of the Wanderers stadium for the Ubuntu village for the World Summit on Sustainable Development (WSSD).
- Environmental Control Officer for Eskom for the construction of an 86Km 400KV power line in the Rustenburg Region.
- Numerous Environmental Impact Assessment (EIA) and EIA exemption applications for township developments and as part of the Development Facilitation Act requirements.
- EIA for the extension of mining rights for a Platinum mine in the Rustenburg area by Lonmin Platinum.
- EIA Exemption application for a proposed biodiesel refinery in Chamdor.
- Compilation of an EIA as part of the Bankable Feasibility Study process for proposed mining of a gold deposit in the Lofa province, Liberia.
- EIA for the development of a Chrome Recovery Plant at the Two Rivers Platinum Mine in the Limpopo province, South Africa.
- Compilation of an EIA as part of the Bankable Feasibility Study process for the Mooihoek Chrome Mine in the Limpopo province, South Africa.
- Mine Closure Plan for the Vlakfontein Nickel Mine in the North West Province.

Specialist studies and project management

- Development of a zero discharge strategy and associated risk, gap and cost benefit analyses for the Lonmin Platinum group.
- Development of a computerised water balance monitoring and management tool for the management of Lonmin Platinum process and purchased water.
- The compilation of the annual water monitoring and management program for the Lonmin Platinum group of mines.
- Analyses of ground water for potable use on a small diamond mine in the North West Province.

- Project management and overview of various soil and land capability studies for residential, industrial and mining developments.
- The design of a stream diversion of a tributary of the Olifants River for a proposed opencast coal mine.
- Waste rock dump design for a gold mine in the North West province.
- Numerous wetland delineation and function studies in the North West, Gauteng and Mpumalanga Kwa-Zulu Natal provinces, South Africa.
- Hartebeespoort Dam Littoral and Shoreline PES and rehabilitation plan.
- Development of rehabilitation principles and guidelines for the Crocodile West Marico Catchment, DWAF North West.

Aquatic and water quality monitoring and compliance reporting

- Development of the Resource quality Objective framework for Water Use licensing in the Crocodile West Marico Water management Area.
- Development of the Resource Quality Objectives for the Local Authorities in the Upper Crocodile West Marico Water management Area.
- Development of the 2010 State of the Rivers Report for the City of Johannesburg.
- Development of an annual report detailing the results of the Lonmin Platinum groups water monitoring program.
- Development of an annual report detailing the results of the Everest Platinum Mine water monitoring program.
- Initiation and management of a physical, chemical and biological monitoring program, President Steyn Gold Mine Welkom.
- Aquatic biomonitoring programs for several Xstrata Alloys Mines and Smelters.
- Aquatic biomonitoring programs for several Anglo Platinum Mines.
- Aquatic biomonitoring programs for African Rainbow Minerals Mines.
- Aquatic biomonitoring programs for several Assmang Chrome Operations.
- Aquatic biomonitoring programs for Petra Diamonds.
- Aquatic biomonitoring programs for several coal mining operations.
- Aquatic biomonitoring programs for several Gold mining operations.
- Aquatic biomonitoring programs for several mining operations for various minerals including iron ore, and small platinum and chrome mining operations.
- Aquatic biomonitoring program for the Valpre bottled water plant (Coca Cola South Africa).
- Aquatic biomonitoring program for industrial clients in the paper production and energy generation industries.
- Aquatic biomonitoring programs for the City of Tshwane for all their Waste Water Treatment Works.
- Baseline aquatic ecological assessments for numerous mining developments.
- Baseline aquatic ecological assessments for numerous residential commercial and industrial developments.
- Baseline aquatic ecological assessments in southern, central and west Africa.
- Lalini Dam assessment with focus on aquatic fish community analysis.
- Musami Dam assessment with focus on the FRAI and MIRAI aquatic community assessment indices.

Wetland delineation and wetland function assessment

- Wetland biodiversity studies for three copper mines on the copper belt in the Democratic Republic of the Congo.
- Wetland biodiversity studies for proposed mining projects in Guinea Bissau, Liberia and Angola in West Africa.
- Terrestrial and wetland biodiversity studies for developments in the mining industry.
- Terrestrial and wetland biodiversity studies for developments in the residential commercial and industrial sectors.
- Development of wetland riparian resource protection measures for the Hartebeespoort Dam as part of the Harties Metsi A Me integrated biological remediation program.
- Priority wetland mammal species studies for numerous residential, commercial, industrial and mining developments throughout South Africa.

Terrestrial ecological studies and biodiversity studies

- Development of a biodiversity offset plan for Xstrata Alloys Rustenburg Operations.
- Biodiversity Action plans for numerous mining operations of Anglo Platinum throughout South Africa in line with the NEMBA requirements.
- Biodiversity Action plans for numerous mining operations of Assmang Chrome throughout South Africa in line with the NEMBA requirements.
- Biodiversity Action plans for numerous mining operations of Xstrata Alloys and Mining throughout South Africa in line with the NEMBA requirements.
- Biodiversity Action plan for the Nkomati Nickel and Chrome Mine Joint Venture.

- Terrestrial and wetland biodiversity studies for three copper mines on the copperbelt in the Democratic Republic of the Congo.
- Terrestrial and wetland biodiversity studies for proposed mining projects in Guinea Bissau, Liberia and Angola in West Africa.
- Numerous terrestrial ecological assessments for proposed platinum and coal mining projects.
- Numerous terrestrial ecological assessments for proposed residential and commercial property developments throughout most of South Africa.
- Specialist Giant bullfrog (*Pyxicephalus adspersus*) studies for several proposed residential and commercial development projects in Gauteng, South Africa.
- Specialist Marsh sylph (*Metisella meninx*) studies for several proposed residential and commercial development projects in Gauteng, South Africa.
- Project management of several Red Data Listed (RDL) bird studies with special mention of African grass owl (*Tyto capensis*).
- Project management of several studies for RDL Scorpions, spiders and beetles for proposed residential and commercial development projects in Gauteng, South Africa.
- Specialist assessments of terrestrial ecosystems for the potential occurrence of RDL spiders and owls.
- Project management and site specific assessment on numerous terrestrial ecological surveys including numerous studies in the Johannesburg-Pretoria area, Witbank area, and the Vredefort dome complex.
- Biodiversity assessments of estuarine areas in the Kwa-Zulu Natal and Eastern Cape provinces.
- Impact assessment of a spill event on a commercial maize farm including soil impact assessments.

Fisheries management studies

- Tamryn Manor (Pty.) Ltd. still water fishery initiation, enhancement and management.
- Verlorenkloof Estate fishery management strategising, fishery enhancement, financial planning and stocking strategy.
- Mooifontein fishery management strategising, fishery enhancement and stocking programs.
- Wickams retreat management strategising.
- Gregg Brackenridge management strategising and stream recalibration design and stocking strategy.
- Eljira Farm baseline fishery study compared against DWAF 1996 aquaculture and aquatic ecosystem guidelines.

SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF AMANDA MILESON

PERSONAL DETAILS

Position in Company	Ecologist
Date of Birth	15 February 1978
Nationality	Zimbabwean
Languages	English
Joined SAS	2013

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member South African Wetland Society
Member Gauteng Wetland Forum

EDUCATION

Qualifications

N.Dip Nature Conservation (UNISA)	2017
Tools for Wetland Assessment (Rhodes University)	2016
Wetland Rehabilitation (University of the Free State)	2015

COUNTRIES OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, Free State, North West, Limpopo, Northern Cape, Eastern Cape
Zimbabwe

SELECTED PROJECT EXAMPLES

Wetland/ Freshwater Assessments

- Freshwater resource delineation and ecological assessment as part of the proposed expansion of the Kudumane Mining Project, Northern Cape Province
- Freshwater assessment as part of the environmental assessment and authorisation process for associate electrical infrastructure and a proposed pipeline for the Rooipunt Solar Thermal Power Park Project near Upington, Northern Cape
- Present Ecological State of the Wetlands Report: Jukskei and Klip River Catchments: Monitoring and Managing the Ecological State of the Wetlands in the City of Johannesburg Metropolitan Area
- Wetland assessment as part of the environmental assessment and authorisation process for the proposed Leandra underground coal mine
- Freshwater ecological assessment as part of the water use licence application process for the proposed waste rock dump expansion for Impala Platinum Mine in Rustenburg, North-West Province
- Wetland assessment as part of the water use licence application process for the Marula Platinum Mine, Limpopo Province
- Wetland assessment as part of the environmental authorisation process for the Anglo Platinum Der Brochen Project, Limpopo Province
- Wetland assessment as part of the environmental authorisation process for the proposed Tharisa North eastern waste rock dump, North West Province
- Wetland assessment as part of the environmental authorisation process for the proposed Yzermyn Coal Mining Project near Dirkiesdorp, Mpumalanga
- Wetland assessment as part of the environmental authorisation process for the Mzimvubu Water Project, Eastern Cape
- Wetland assessment as part of the environmental authorisation process for the proposed expansion of mining operations at the Langkloof Colliery, Mpumalanga
- Wetland assessment as part of the proposed water management process at the Assmang Chrome Machadodorp Works, Mpumalanga

- Wetland ecological assessment as part of the Section 24G application process for the Temba Water Purification Plant

Terrestrial Assessments

- Investigation of specialist biodiversity aspects required by GDARD in the vicinity of the Apies River, downstream of the proposed construction of new outlet works at the Kudube (Leeuwkraal) Dam in Temba, Gauteng
- Terrestrial Ecological Scan as part of the environmental authorisation process for three proposed bridge upgrades near Edenvale, Gauteng
- Terrestrial Ecological Scan as part of the environmental authorisation process for the proposed Dalpark Ext 3 filling station development, Gauteng

Rehabilitation Projects

- Wetland rehabilitation and management plan for The Hills EcoEstate, Midrand, Gauteng
- Riparian rehabilitation and management plan for The Diepsloot River, Riversands, Gauteng
- Riparian rehabilitation and management plan for the Apies River in the vicinity of the proposed construction of new outlet works at the Kudube (Leeuwkraal) Dam in Temba, Gauteng

Environmental Control Officer

- Monthly specialist Environmental Control Officer (ECO) function for the monitoring of riparian crossings at Riversands Country Estate Development, Gauteng province
- Weekly specialist Environmental Control Officer (ECO) function for the monitoring of emergency desilting and rehabilitation of existing stormwater retention dams on ERF 836 Kosmosdal ext 1, and portion 5 of ERF 115 Kosmosdal ext 4, near Centurion, Gauteng province

Specialist Declaration

I, **Stephen van Staden**, as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Name of Specialist: **Stephen van Staden**

Signature of the specialist: 

Date: **08/02/2017**

Executive Summary

Based on the findings of this study, it is the opinion of the ecologists that the project is regarded as having 'low' levels of impact on the surrounding freshwater resources identified, even if less than desirable mitigation of impacts occurs. It is nevertheless strongly recommended that strict implementation of mitigation measures throughout all phases of the proposed project takes place in order to ensure that perceived impacts can be reduced to, and remain at, 'very low' significance levels. It is the opinion of the ecologists that, provided strict enforcement of mitigation measures takes place, the proposed project should, from a freshwater resource conservation perspective, be authorised for development.

The following proposed project components as provided by the proponent, which are associated with the proposed electrical infrastructure of the Rietrug Wind Farm project, were considered within this Freshwater Assessment specialist study as part of a Basic Assessment Process:

- An on-site substation (including an operation and maintenance building and laydown areas);
- A 132 kV distribution line from the proposed on-site substation to a third party substation (two Alternatives);
- Connection to a third party substation (two Alternatives); and
- A service road below the distribution line.

In order to identify all potential freshwater resources that may potentially be impacted by the proposed development, a 500m zone of investigation ("investigation area") around the proposed distribution line and substations was used as a guide in which to assess possible sensitivities of the receiving environment.

The purpose of this report is to define the aquatic ecology of the study area in terms of riparian and other freshwater resources associated with the proposed development within the investigation area, in order to provide supplementary, detailed information to guide the activities associated with the proposed development, to ensure the ongoing functioning of the freshwater ecosystems in such a way as to support local and regional conservation requirements, and the provision of ecological services in the local area. The study also aimed to identify and quantify any potential impacts on the freshwater resources associated with the study area, based on the proposed electrical infrastructure layout provided by the proponent, and to present a set of mitigatory measures which could be employed to minimise potential impacts on the receiving aquatic environment.

The assessment took the following approach:

- A desktop study was conducted, in which freshwater resources and other points of interest were identified for on-site investigation, and relevant national and provincial databases were consulted. The results of the desktop study are contained in Section 4.1 of this report;
- Two field assessments were undertaken, in November 2016, and February 2017, in order to groundtruth the identified freshwater resources within the investigation area;
- Three main rivers, with associated riparian characteristics were identified, namely the Riet, Van Wyk's and Juk Rivers, along with their associated tributaries and their applicable riparian zones. In addition, unnamed tributaries of the Portugal's River were identified in the western portion of the investigation area, although the Portugal's River itself is not located within the investigation area;
- Several smaller, ephemeral drainage lines without riparian vegetation were also identified; however, these features were not assessed as they do not have any true riparian characteristics (i.e. vegetation of the terrestrial zone does not differ from that of the vegetation found within the adjacent terrestrial areas) and thus from an ecological point of view cannot be defined as watercourses as defined by the National Water Act (Act 36 of 1998). It must however be noted that, should any of these ephemeral drainage lines have a floodline applicable to them they would be defined as a watercourse and therefore require protection as such. This should be verified by a suitably qualified hydrologist. It is recommended that a surface water baseline study should be undertaken as part of the Water Use Licence Application (WULA) process and

in consultation with the Department of Water and Sanitation (DWS), and where applicable, should be used to guide the layout of the proposed development, planned mitigation and conditions of authorization;

- The detailed results of the field assessment are contained in Section 4.3 of this report, and are summarised in the table below:

Table A: Summary of the results of the field assessment.

Resource	Vegetation Ecostatus and PES (VEGRAI)	Ecoservice Provision	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Category (REC)
Riet River	B/C (largely natural to moderately modified)	Intermediate	A	B
Riet River: tributaries	B/C (largely natural to moderately modified)	Intermediate	A	B
Van Wyk's River	C (Moderately modified)	Intermediate	B	C
Juk River	C (Moderately modified)	Intermediate	B	C
Portugal's River: tributaries	B/C (largely natural to moderately modified)	Intermediate	A	B

Following the assessment of the freshwater resources, an impact assessment was undertaken to ascertain the significance of perceived impacts on the receiving environment which may arise as a result of the proposed development.

Significant impacts which may occur include, but are not limited to, loss of vegetation due to clearing prior to construction, potential risk of increased erosion as a result of soil disturbances within the active channel of freshwater resources or within close proximity thereof, possible movement of vehicles within the active channel and potential disposal of waste materials within the riparian zone or active channel. Whilst the placement of monopoles or support structures for the proposed distribution line within active channels of the freshwater resources has the potential to impact on the flow patterns, due to the ephemeral nature of the resources, this is not considered to have a significant impact. Nevertheless, wherever possible, the proposed distribution line must span the freshwater resources and placement of any infrastructure within riparian zones and active channels is strongly discouraged and must be avoided as far as feasible.

The results of the impact assessment indicate that prior to mitigation, impact significance is deemed to be 'low', whilst the strict implementation of well-developed, cogent mitigation measures (as provided in Section 6 of this report) can reduce the impact significance to 'very low' levels.

Based on the findings of this study, it is the opinion of the ecologists that the proposed project is regarded as having low levels of impact on the surrounding freshwater resources identified, even if less than desirable mitigation of impacts occurs. With strict implementation of mitigation measures throughout all phases of the proposed project, impacts can be reduced to very low significance levels and the proposed project should, from a freshwater resource conservation perspective, be authorised for development.

Contents

List of Figures

List of Tables

List of abbreviations

BA	Basic Assessment
BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EC	Ecological Class
EI	Ecological Importance
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Program
ES	Ecological Sensitivity
ESA	Ecological Support Area
EWR	Ecological Water Resource
FEPA	Freshwater Ecosystem Priority Area
GA	General Authorisation
GIS	Geographic Information System
GPS	Global Positioning System
HGM	Hydrogeomorphic
IHI	Index of Habitat Integrity
MAP	Mean Annual Precipitation
NAEHMP	National Aquatic Ecosystem Health Monitoring Programme
NEMA	National Environmental Management Act (Act 107 of 1998 as amended)
NFEPA	National Freshwater Ecosystem Priority Areas
NPSDF	Northern Cape Provincial Spatial Development Framework
NWA	National Water Act (Act 36 of 1998)
PES	Present Ecological State
REC	Recommended Ecological Category
RHP	River Health Program
RQIS	Resource Quality Information Services
SANBI	South African National Biodiversity Institute
SQR	Sub-Quaternary Reach
VEGRAI	Riparian Vegetation Response Assessment Index
WCBF	Western Cape Biodiversity Framework
WEF	Wind Energy Facility
WMA	Water Management Area
WMS	Water Management System

Glossary

Definitions	
Alien vegetation:	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.
Alluvial soil:	A deposit of sand, mud, etc. formed by flowing water, or the sedimentary matter deposited thus within recent times, especially in the valleys of large rivers.
Biodiversity:	The number and variety of living organisms on earth, the millions of plants, animals and micro-organisms, the genes they contain, the evolutionary history and potential they encompass and the Ecosystems, ecological processes and landscape of which they are integral parts.
Buffer:	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.
Catchment:	The area contributing to runoff at a particular point in a river feature.
Chroma:	The relative purity of the spectral colour which decreases with increasing greyness.
Delineation (of a wetland):	To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators.
Ecoregion:	An ecoregion is a "recurring pattern of Ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Ecotone:	An **ecotone** is a transition area between two biomes, where two communities meet and integrate. It may be narrow or wide, and it may be local (the zone between a field and forest) or regional (the transition between forest and grassland ecosystems)
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas.
Fluvial:	Resulting from water movement.
Gleying:	A soil process resulting from prolonged soil saturation which is manifested by the presence of neutral grey, bluish or greenish colours in the soil matrix.
Groundwater:	Subsurface water in the saturated zone below the water table.
Hydric soil:	Soil which is permanently or seasonally saturated by water, resulting in anaerobic conditions.
Hydromorphic soil:	A soil that in its undrained condition is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soils).
Hydrology:	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Indigenous vegetation:	Vegetation occurring naturally within a defined area.
Mottles:	Soils with variegated colour patterns are described as being mottled, with the "background colour" referred to as the matrix and the spots or blotches of colour referred to as mottles.
Obligate species:	Species almost always found in wetlands (>99% of occurences).
Perennial:	Flows all year round.
RAMSAR:	The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilisation of wetlands, i.e., to stem the progressive encroachment on and loss of wetlands now and in the future,

Definitions	
	recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971.
Riparian:	Ecosystems defined by the National Water Act (Act 36 of 1998) as: "including the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas."
Species of Conservation Concern:	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Wetland:	Ecosystems defined by the National Water Act (Act 36 of 1998) as: "land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS (AS AMENDED)

Requirements of Appendix 6 – GN R326 (7 April 2017)	**Addressed in the Specialist Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Pages 2-7 (Preliminary sections of this report)
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 8 (Preliminary sections of this report)
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2, Section 4.1, 4.2 and Appendix C
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 4, 5, 6 and 7
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 1.3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2 and Appendix C
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying alternatives;	Section 4.3 and Section 8.1 Figures 19-20
g) an identification of any areas to be avoided, including buffers;	Section 8
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 8
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Sections 5 and 6
k) any mitigation measures for inclusion in the EMPr;	Sections 6 and 9
l) any conditions for inclusion in the environmental authorisation;	Section 11.1
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 9
n) a reasoned opinion- i. whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity and activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 11 and Sections 6 and 9
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 2.3
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 5.1
q) any other information requested by the competent authority.	None requested
2. Where a government notice gazetted by the Minister provides for any protocol of minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Not Applicable

FRESHWATER ASSESSMENT FOR THE PROPOSED RIETRUG DISTRIBUTION LINE

This report presents the Freshwater Resource Assessment that was prepared by Stephen van Staden and Amanda Mileson of Scientific Aquatic Services as part of the Basic Assessment (BA) Process for the proposed construction of electrical grid infrastructure to support the proposed (split) Rietrug Wind Energy Facility (WEF), near Sutherland, in the Northern and Western Cape Provinces.

1. Introduction

1.1 Scope, Purpose and Objectives of this Specialist Report

The following proposed project components as provided by the proponent, which are associated with the electrical grid infrastructure to support the proposed Rietrug Wind Farm project, were taken into account within this Freshwater Assessment specialist study conducted as part of the BA Process:

- An on-site substation (including an operation and maintenance (O&M) building and laydown areas);
- A 132 kV distribution line from the proposed on-site substation to a third party substation (Two Alternatives);
- Connection to a third party substation (Two Alternatives); and
- A service road below the distribution line. This service road will follow the same route as the distribution line, with the exception of a small portion of the road which is located on the farm Hamel Kraal, where the service road deviates marginally from the route to follow an existing unused farm track to avoid impacts on an area of terrestrial ecological importance. This deviation is shown on the applicable maps contained within this report.

The proposed distribution line alternatives, service road and substations (i.e. proposed on-site substation and connection the third party substation) will henceforth collectively be referred to as the “study area”. In order to identify all potential freshwater resources that may potentially be impacted by the proposed development, a 500m zone of investigation around the proposed distribution line, service road and substations was used as a guide in which to assess possible sensitivities of the receiving environment; this area will henceforth be referred to as the “Investigation Area”.

The purpose of this report is to define the ecology of the study area in terms of riparian and other freshwater resources as well as mapping of the resources and defining areas of increased Ecological Importance and Sensitivity (EIS), and to define the Present Ecological State (PES) of the study area. In addition, this report aims to define the socio-cultural and ecological service provision of the freshwater resources as well as the Recommended Ecological Category (REC) for each freshwater system. It is the objective of this study to provide detailed information to guide the activities associated with the proposed electrical grid infrastructure in the vicinity of the freshwater resources to ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements and the provision of ecological services in the local area.

This report, after consideration and description of the ecological integrity of the study area, must guide the proponent and regulating authorities by means of recommendations, as to the viability of the proposed development. The specific scope and objectives in terms of this report are outlined below:

- Points of interest were selected by analysing digital satellite imagery to identify potential freshwater resources. These points of interest were then verified during the field assessment and where necessary, delineations undertaken on a desktop basis were refined;

- Freshwater resources were delineated according to (Department of Water Affairs and Forestry (DWAF[1]), 2008): "A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones". Aspects such as soil morphological characteristics, vegetation types and wetness were used to delineate the various zones of wetness (permanent and temporary) according to the guidelines. Buffer zones were allocated to the freshwater resources;
- The freshwater resource classification assessment was undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis *et al*., 2013);
- The EIS of the freshwater resources was determined according to the method described by (Rountree & Kotze, 2013);
- The services provided by the aquatic resources in the study area were assessed according to the method of (Kotze *et al.*, 2009) in which services to the ecology of the study area as well as services to the people of the area were defined;
- The WET-Health / Index of Habitat Integrity (IHI) ecostatus tools were utilised as applicable according to the resource directed measures guidelines as advocated by (Macfarlane *et al.,* 2008) and (DWAF, 2007) respectively to define the PES of the freshwater resources in the study area;
- The Riparian Vegetation Response Assessment Index (VEGRAI) ecostatus tool was applied to the riparian resources according to the method set out by (Kleynhans *et al.,* 2007) to define the integrity of the riparian vegetation of the area;
- Freshwater resources were mapped according to the ecological sensitivity of each hydrogeomorphic unit in relation to the study area. In addition to the freshwater resource boundaries, buffers were generated and the applicable zones of regulation of 32m and 500m as per (National Environmental Management Act (Act 107 of 1998, as amended) (NEMA), 1998) and Regulation Government Notice (GN) 509 of 2016 as it relates to the National Water Act (Act 36 of 1998) (NWA) respectively, were depicted where applicable;
- The PES, EIS, and ecological service provision of the freshwater resources were highlighted, and expected impacts on the systems were assessed according to the impact assessment methodology;
- To report on aspects regarding watercourse drivers and receptors as required by the Department of Water and Sanitation (DWS) Chief Directorate Instream Water Use, including the following:
  - Watercourse drivers:
    - Hydrology;
    - Water quality; and
    - Sediment balance and the geomorphological regime.
  - Watercourse receptors:
    - Habitat; and
    - Biota.
- Impact assessment and mitigation measures were presented in line with the impact assessment and mitigation hierarchy as advocated by the Department of Mineral Resources (DMR) and the Department of Environmental Affairs (DEA).

1.2 Terms of Reference

1.2.1 Description of Study Area

The study area is situated within the farms Beeren Valley, Nooitgedacht, Hartebeestfontein and Farm 219 within the Northern Cape Province, and farms Rheebokkfontein, Tygerhoek, De Molen, Hamelkraal and Farm 280 within the Western Cape Province. The study area is located approximately 34 km southeast of the town of Sutherland. The provincial road R354 is located approximately 30 km

[1] The Department of Water Affairs and Forestry (DWAF) was formerly known as the Department of Water Affairs (DWA). At present, the Department is known as the Department of Water and Sanitation (DWS). For the purposes of referencing in this report, the name under which the Department was known during the time of publication of reference material will be used.

northwest, and the R356 approximately 25 km north of the study area. The locality of the Rietrug Distribution Line Alternatives and Substations as well as the investigation area, is depicted in Figures 1 and 2 below.

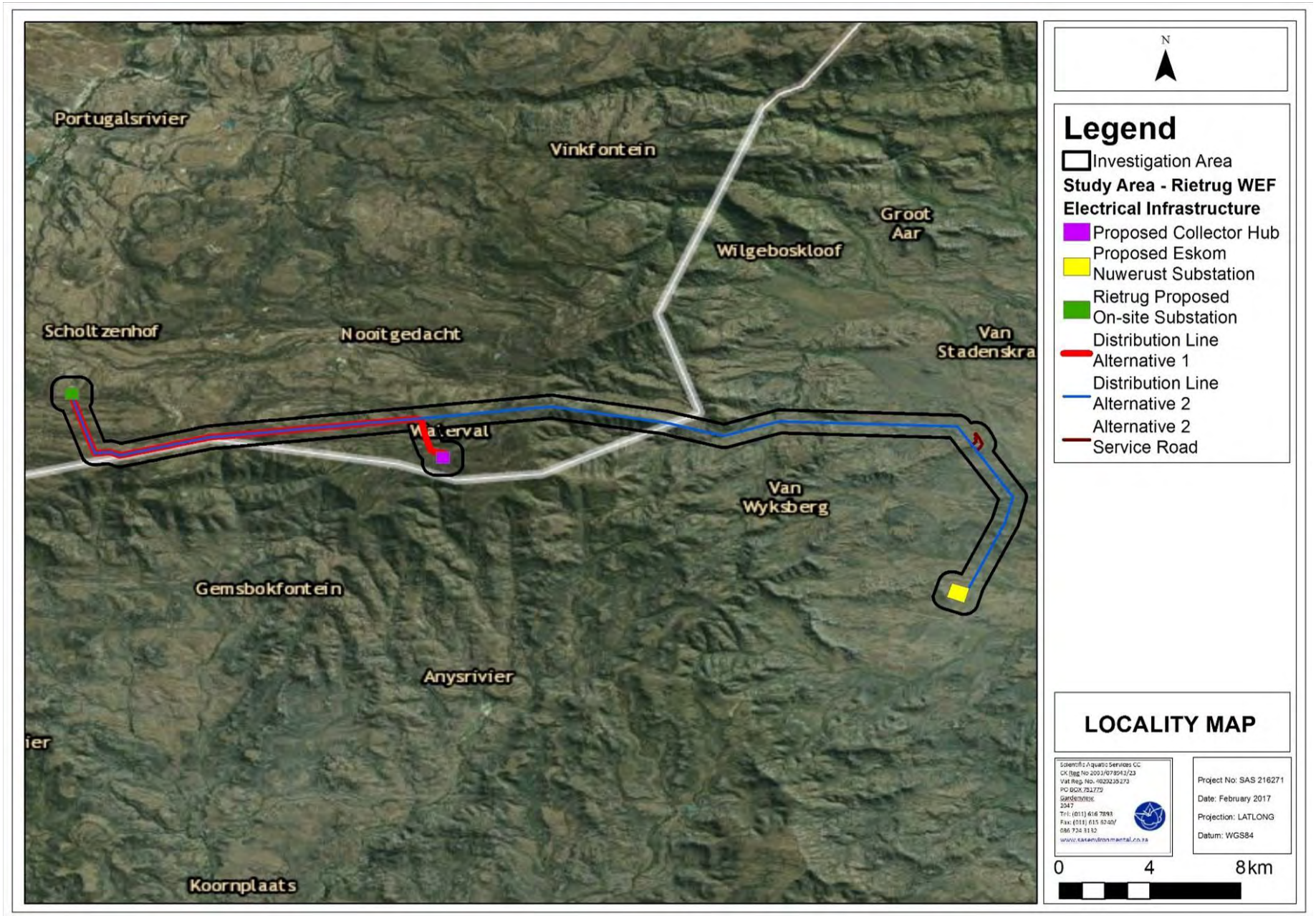

Figure 1: Digital satellite image depicting the location of the proposed 132kV Distribution Line and associated electrical infrastructure in relation to surrounding areas. The 500m investigation area is also shown on the map.

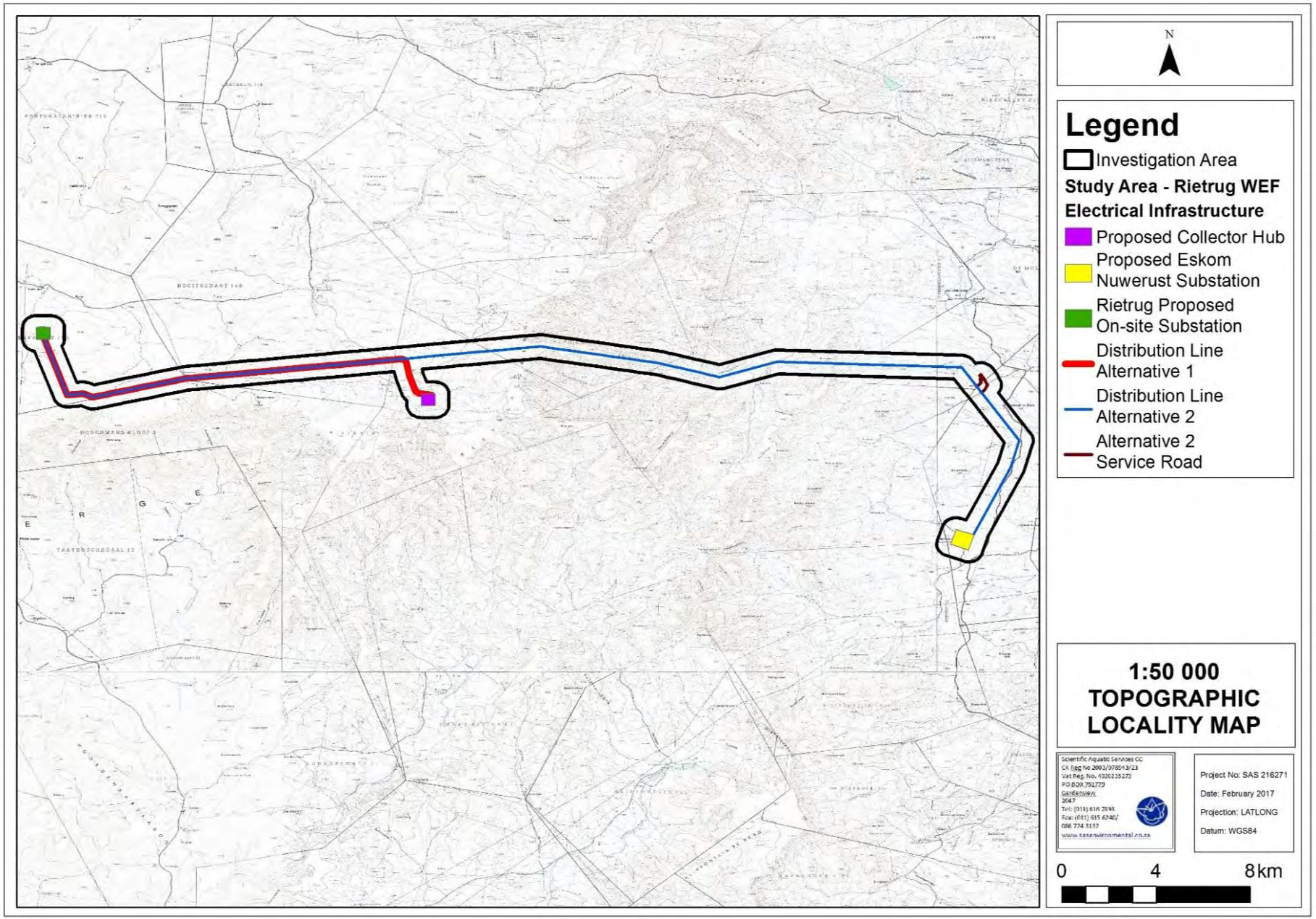

Figure 2: Study area depicted on a 1:50 000 topographical map in relation to the surrounding area. The 500m investigation area is also shown on the map.

1.2.2 Sensitivity mapping

All the freshwater features within the investigation area were considered, and sensitive areas, from a freshwater resource conservation point of view, were delineated with the use of a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto digital satellite imagery and topographic maps. The sensitivity maps, provided in Section 8.1, should guide the design and layout of the proposed development.

1.2.3 Legislation and legal requirements

The following legislative requirements were considered during the assessment:

- NEMA;
- NWA; and
- GN 509 of 2016 – requirements for Water Use Authorisation in terms of the NWA.

The details of each of the above, as they pertain to this study, are provided in Appendix B of this report.

1.2.4 Impact assessment and recommendations

Following the completion of the assessment, an impact assessment was conducted (please refer to Appendix C for the method of approach) and recommendations were developed to address and mitigate impacts associated with the proposed electrical grid infrastructure to support the proposed Rietrug WEF project. These recommendations also include general management measures which apply to the proposed Rietrug WEF project as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the project from planning, construction and operation, through to aftercare and maintenance. The detailed mitigation measures are outlined in Section 6 and 7 of this report, whilst the general management measures which are considered to be best practice mitigation applicable to a project of this nature, are outlined in Section 9 of this report. All mitigation measures provided in this report must be incorporated into the Environmental Management Programme (EMPr).

1.3 Assessment Details

Type of Specialist Investigation	Freshwater Resource
Date of Specialist Site Investigation	22 – 25 November 2016 and 1-2 February 2017
Season	Summer
Relevance of Season	Freshwater resources (specifically wetlands and rivers with established riparian zones) are characterised by the presence of specific vegetation, the presence of surface water or saturated soil for at least a period of time during the year. Thus, freshwater resource assessments should ideally be conducted during the relevant rainy and/or flowering season of the area, in order to assist in determining the boundaries and biodiversity value of freshwater resources. However, in areas which receive very little rainfall and in which sandy soils dominate, such as Sutherland, the season in which the assessment is conducted is of little relevance, since the composition of vegetation communities associated with freshwater resources mostly show little variation from the surrounding terrestrial ecosystems.

2. Approach and Methodology

During the desktop phase of this assessment, use was made of aerial photographs, digital satellite imagery, and available provincial and national wetland databases to identify points of interest prior to the field survey. Points of interest were defined taking the following into consideration:

- Ensuring a geographic spread of points to ensure that conditions in all areas were addressed; and
- Ensuring that features displaying a diversity of digital signatures were identified in order to allow for field verification. In this regard specific mention is made of the following:
  - Pattern of riparian and/or wetland vegetation: a distinct increase in density as well as tree size near drainage lines;
  - Hue: with drainage lines and outcrops displaying soils of varying chroma created by varying vegetation cover and soil conditions identified; and
  - Texture: with areas displaying various textures, created by varying vegetation cover and soil conditions being identified.

An initial site visit was undertaken during November 2016, and a follow-up site visit was undertaken in early February 2017, both during the summer season, to assess as many of the points of interest as possible which were identified during the desktop assessment phase. Where necessary due to access restrictions, verification of features was undertaken at alternative locations along systems. The presence of any wetland or riparian characteristics as defined by the (DWAF, 2008) was noted at each of these points to determine if features can be considered to contain areas displaying wetland / riparian characteristics (please refer to Figure 3 below for the location of the pre-determined and field verified points of interest). Factors influencing the habitat integrity of each feature group identified during the field survey were noted, and the functioning and the ecological and socio-cultural services provided by the various features were determined. In addition to the delineation of the resources, a detailed assessment of the systems was undertaken in order to define the following important aspects of the freshwater ecology:

- Freshwater resource characterisation and classification according to the method of Ollis *et al*; (2013);
- Freshwater resource PES definition according to the WET-Health Ecostatus tool (Kotze *et al*, 2009);
- Ecoservice provision by means of the application of the Wet-Ecoservices tool (MacFarlane, 2008); and
- Freshwater resource EIS assessment according to the method of Rountree & Kotze (Rountree & Kotze, 2013).

A detailed explanation of the method of assessment is provided in Appendix C of this report.

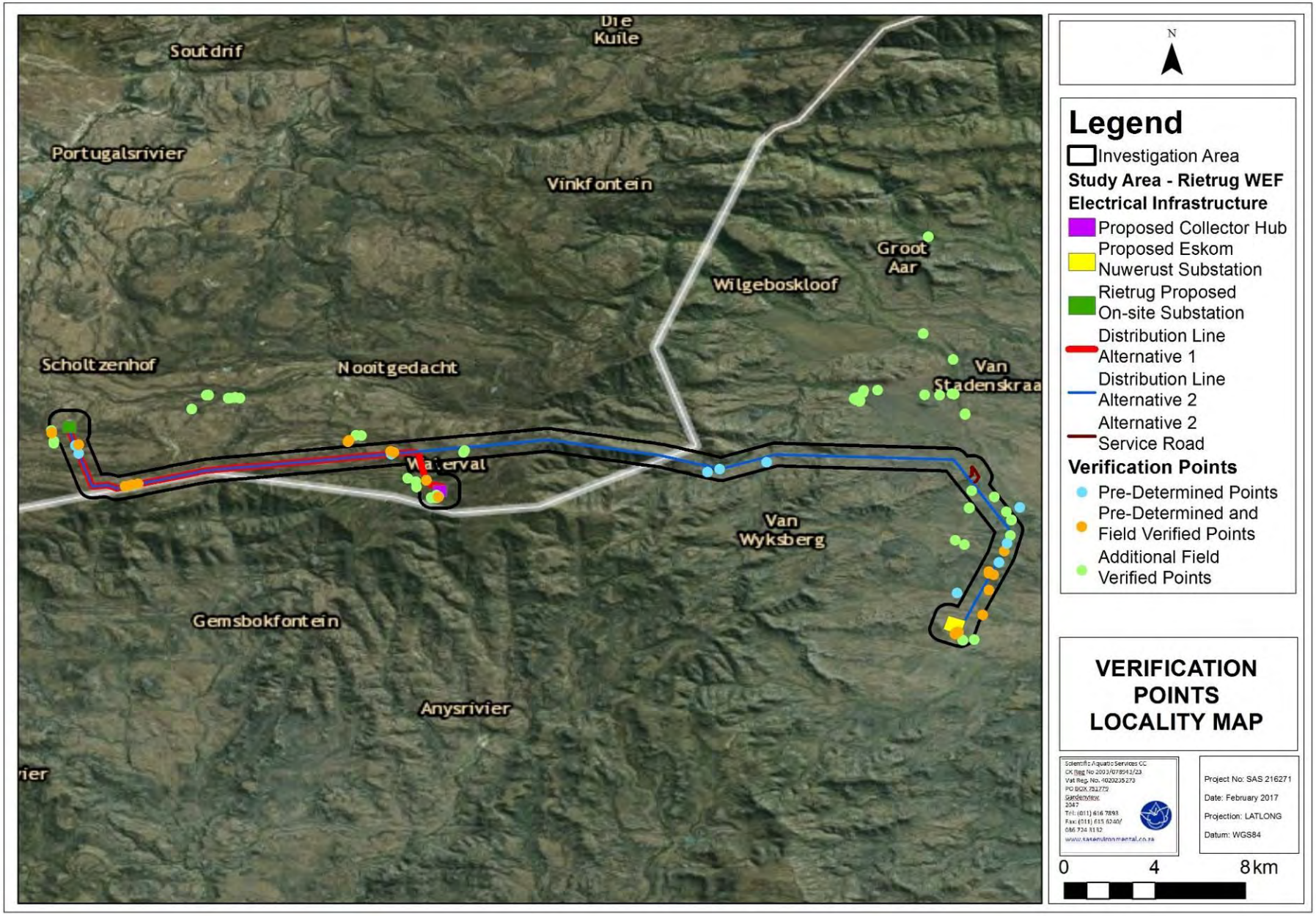

Figure 3: Locality of pre-determined points of interest and field verified points of interest in relation to the study area.

2.1 Information Sources

A desktop study was compiled with all relevant information as presented by South African National Biodiversity Institute (SANBI's) Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org).

Freshwater specific information resources taken into consideration during the assessment of the freshwater resources associated with the study area included:

- National Freshwater Ecosystem Priority Areas (NFEPA) (2011)
  - NFEPA Water Management Area (WMA);
  - NFEPA wetlands/National wetlands map;
  - Wetland and estuary FEPA;
  - FEPA (sub) WMA % area;
  - Sub water catchment area FEPAs;
  - WMA FEPAs;
  - Fish sanctuaries; and
  - Wetland ecosystem types.
- PES/EIS Database (DWS, 2014);
- Northern Cape Provincial Spatial Development Framework (NPSDF, 2012);
- Western Cape Biodiversity Framework (WCBF, 2014); and
- Municipalities Biodiversity Summaries Project (MBSP, 2010).

2.2 Assumptions, Knowledge Gaps and Limitations

The following assumptions and limitations are applicable to this report:

- The freshwater resource assessment is confined to the study area as illustrated in Figures 1 and 2, as well as areas of relevance immediately adjacent to the study area up to 500m from the study area, and does not include the neighbouring and surrounding properties outside of the 500m investigation area. The general surroundings were, however considered in the desktop assessment of the study area;
- The freshwater resource delineations as presented in this report are regarded as a best estimate of the riparian zone boundaries based on the site conditions at the time of the assessments in November 2016 and February 2017. Whilst Sutherland receives rainfall throughout the year, it is predominantly a winter rainfall area; however some rainfall was experienced during the site assessment in November 2016. Limitations in the accuracy of the delineation to disturbances created by the trampling and grazing by livestock, existing disturbances relating to agricultural activities within the study area, and anthropogenic disturbances are deemed possible;
- Freshwater resource and terrestrial areas form transitional areas where an ecotone is formed as vegetation species change from terrestrial species to facultative and obligate wetland species, or as in lower rainfall areas, where the floral community structure and composition changes subtly between terrestrial and riparian areas. Within the transition zone, some variation of opinion on the extent of the riparian zone may occur, however if the (DWAF, 2008) method for delineation is followed, all assessors should get largely similar results;
- Numerous smaller ephemeral drainage features, preferential surface flow paths and erosion gullies associated with the primary river systems associated with the study area, and their respective tributaries were identified. However, these features were not assessed as they do not have any true riparian characteristics (i.e. vegetation of terrestrial zone does not differ from that of the vegetation found within the adjacent terrestrial areas) and thus from an ecological point of view cannot be defined as watercourses as defined by the NWA. It must however be noted that, should any of these ephemeral drainage lines have a floodline applicable to them they would be defined as a watercourse and require protection as such. This should be verified by a suitably qualified hydrologist. It is recommended that a surface water baseline study should be undertaken as part of the Water Use Licence Application (WULA) process, and in

consultation with the DWS, and should be used to guide the layout of the proposed development, planned mitigation and conditions of authorization;
- It should also be noted that the numerous artificial farm dams occurring throughout the study area were not assessed since these are considered to be man-made structures which would not persist under normal circumstances, do not contribute significantly to provincial wetland conservation targets, nor to the ecological service provision of freshwater ecosystems within the study area; and
- Whilst full co-operation was received from the majority landowners in terms of granting access to the relevant farm portions, access was not granted to all areas. In particular access was not granted to the farm Rheebokkenfontein. It is anticipated that Alternative 2 will traverse the Van Wyk's River within this farm's boundaries, and therefore data was collected for this river at a point downstream of the farm. In addition, due to the extensive study area, the nature of the terrain, and a lack of vehicular entry points in some areas, it was not feasible to access some of the pre-determined points of interest. Where this was the case, efforts were made to obtain data representative of each major system in alternative locations and the observations used to extrapolate findings to the areas that will potentially be affected on the same system at a different location.

'Mitigation' is a broad term that covers all components of the 'mitigation hierarchy' defined hereunder. It involves selecting and implementing measures – amongst others – to conserve biodiversity and to protect, the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of various development activities. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level. Offsetting of impacts is considered to be the last option in the mitigation hierarchy for any project.

The mitigation hierarchy in general consists of the following in order of which impacts should be mitigated (DEA *et. al*, 2013):

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology and scale of projects to prevent impacts. In some cases if impact significance levels are expected to be too high the "no project" option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;
- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation that usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project; and
- **Offset impact:** refers to compensating for latent or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets can be considered to be a last resort to compensate for residual negative impacts on biodiversity.

Mitigation measures pertinent to a project of this nature, insofar as the reduction of potential impacts on freshwater resources, are provided in Sections 6.1, 6.2 and 6.3 of this report. Of particular importance are the following:

- Careful planning of the location of monopoles, taking into consideration the locality of riparian habitats and as much as possible, avoid placement of monopoles within riparian habitat, and powerlines are preferably to span the relevant resource. If at all possible, all monopoles should be developed above the applicable zone of regulation in terms of GN509 of the NWA;
- Where it is impossible to avoid placing monopoles within riparian habitat, flow connectivity must be retained by preventing fragmentation of the riparian habitat. Fragmentation of the riparian habitat can be avoided by (for example) ensuring that the disturbance footprint remains as small as possible, that no solid strips are excavated within the riparian habitat, that structures (such as culverts or monopoles) placed within the active channel do not cause increased turbulence, which will result in erosion, and it must be ensured that no canalization or incision of the riparian resource takes place as a result of the construction activities;
- Careful planning of the location of the substations. The applicable zone of regulation around the freshwater resources in terms of NEMA is 32m, and this must be adhered to, in order to assist in minimising impacts on the freshwater resources near the proposed substations. Please refer to the figures in Section 8 of this report for the locality of the freshwater resources, and the applicable zone of regulation;
- Clearing of vegetation at all impact sites must be kept to an absolute minimum, and strict alien vegetation controls must be implemented throughout all phases of the project. The re-growth of indigenous vegetation must be encouraged following construction; and
- Strict erosion control and soil management measures must be implemented during the construction and operational phases, particularly in areas where vegetation has been removed.

Cumulative impacts are assessed by adding expected impacts from this proposed development to existing and proposed developments with similar impacts in a 50 km radius. However, when assessing cumulative impacts, only those projects falling within the same quaternary catchment as this project were considered, since projects located outside of the catchment will not have an impact on the freshwater resources associated with this proposed development. The existing and proposed developments that were taken into consideration for cumulative impacts include:

- Suurplaat WEF (Moyeng Energy Pty Ltd, DEA/EIA/0000137/2011 and DEA Reference: 12/12/20/1583) located approximately in the centre of the study area. It should be noted that the Suurplaat WEF project has subsequently been split. The Environmental Impact Assessment (EIA) for the Moyeng Energy (PTY) Ltd Suurplaat WEF was undertaken by a separate Environmental Assessment Practitioner (EAP) and it included a separate assessment of the three phases of the WEF, the transmission lines and substations (Savannah Environmental, 2017), however a single EIA Process was followed and a single EA was received. It is understood that Moyeng Energy (PTY) Ltd is currently undertaking an Application for EA Amendment to split the approved Moyeng Energy (PTY) Ltd Suurplaat WEF EIA project into four separate EAs (DEA Reference Number: 12/12/20/1583/AM3).
- 140 MW Sutherland WEF, near Sutherland, Northern and Western Cape (South Africa Mainstream Renewable Power Developments (Pty) Ltd, NEAS No. unknown and DEA Reference: 12/12/20/1782/2);
- 140 MW Sutherland 2 WEF, near Sutherland, Northern Cape (South Africa Mainstream Renewable Power Developments (Pty) Ltd, NEAS No. unknown and DEA Reference: 12/12/20/1782/3);
- 140 MW Rietrug WEF, near Sutherland, Northern Cape (South Africa Mainstream Renewable Power Developments (Pty) Ltd, NEAS No. unknown and DEA Reference: 12/12/20/1782/1);
- Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the Sutherland 2 WEF, Northern and Western Cape Provinces (Sutherland 2 WEF – Electrical Grid Infrastructure); and
- Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the Sutherland WEF, Northern and Western Cape Provinces (Sutherland WEF – Electrical Grid Infrastructure).

2.3 Consultation Processes Undertaken

No formal consultation process was undertaken by the specialist with landowners prior to, during, or following the field assessments; however, anecdotal evidence provided by some landowners was taken into account during the assessment.

3. Description of Project Aspects Relevant to Freshwater Resource Impacts

All aspects of the proposed project, i.e. the construction, operation and maintenance of distribution lines, service roads and substations, have the potential to have either direct or indirect impacts on some freshwater resources located within the investigation area. The proposed distribution lines and associated service road are likely to traverse riparian zones associated with rivers/drainage lines, potentially impacting on flow patterns, riparian vegetation, and water quality (contaminated runoff from the access roads). Wherever possible, to minimise these potential impacts, it is highly recommended that existing access roads be utilised, and that the proposed distribution lines be routed in such a way so as to avoid traversing freshwater resources unnecessarily.

During the planning phase, the placement of the proposed substations must take into consideration the locality of freshwater resources (as depicted in Section 4.3.3 of this report) and be positioned in such a way so as to avoid these resources altogether. As discussed in Sections 4.3.3 and 4.3.4, the relevant zone of regulation in terms of NEMA, i.e. 32m, should be observed and where possible avoided, and this will assist in minimising the potential impacts of the construction and operations of the substations. Potential impacts arising from the construction and operations of the substations include (but are not limited to): possible changes to or loss of habitat, increased risk of sedimentation of resources as a result of earthworks in the vicinity of resources, increased water inputs and altered hydrological patterns as a result of increased impermeable surfaces in the vicinity thereof, loss of habitat due to vegetation clearing, increased risk of proliferation of alien floral species due to disturbances, and possible contamination of surface water runoff, leading to impaired water quality within the freshwater resources.

For a detailed discussion regarding aspects of, and potential impacts arising from the proposed project, please refer to Section 5 of this report.

4. Description of the Receiving Environment

4.1 Baseline Environmental Description

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible in order to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation is provided, and information that was of importance was emboldened.

It is important to note that although all data sources used provide useful and often verifiable, high quality data, the various databases used do not always provide an entirely accurate indication of the study area’s actual site characteristics at the scale required to inform the BA process. However, this information is useful as background information to the study and sufficient decision making can take place with regards to the development activities based on the desktop results.

Table 1: Desktop data relating to the character of freshwater resources within the study area and surrounding region.

Aquatic ecoregion and sub-regions in which the study area is located				Detail of the study area in terms of the National NFEPA (2011) database	
Ecoregion (Figure 4)	Nama Karoo (west) & Great Karoo (east)			FEPACODE	The majority of the study area and investigation area is considered to be an Upstream Management Area (FEPACODE 4), however two small sections of the western portion of the study area are located within an area considered to be a Freshwater Ecosystem Priority Area (FEPA) (FEPACODE 1). FEPACODE 1: River FEPA achieve biodiversity targets for river ecosystems and threatened fish species, and were identified in rivers that are currently in a good condition (A or B ecological category). Although the FEPA status applies to the actual river reach, shading of the whole sub-quaternary catchment reach indicates that the surrounding land and smaller stream network needs to be managed in a way that maintains the good condition of the river reach. FEPACODE 4: Upstream Management Catchment required to prevent the downstream degradation of FEPAS and Fish Support Areas.
Catchment (Figure 4)	Orange (west) & Gourits (east)				
Quaternary Catchment (Figure 4)	D56A, D56B, J11B and J24A				
WMA (Figure 5)	Lower Orange and Gouritz				
subWMA (Figure 6)	Orange Tributaries, Groot, and Gamka				
Dominant characteristics of the Nama Karoo and Great Karoo Ecoregions Level 2 (Kleynhans et al., 2007)					
Ecoregion	Nama Karoo (26.03)	Groot Karoo (21.03)	Groot Karoo (21.04)		
Dominant primary terrain morphology	Open hills, lowlands, mountains; moderate and high relief	Open hills, lowlands, mountains; moderate to high relief.	Plains; moderate relief.	NFEPA Wetlands	According to the NFEPA Database there are no wetlands associated with the study area, however an artificial channelled valley bottom wetland is indicated to be located within the 500m investigation area of the eastern portion of Distribution Line Alternative 2. A second seep wetland, considered to be predominantly artificial is also indicated within 500m of the eastern portion of Distribution Line Alternative 1 and the Proposed Collector Hub (Figure 7). Both these wetlands are considered to be in heavily to critically modified ecological condition, with less than 25% natural vegetation cover (WETCON Z3). A third natural depression is situated just outside of the investigation area, and is considered to be in a natural/ good ecological condition, with natural land cover 75% or more (WETCON AB).
Dominant primary vegetation types	Upper Nama Karoo, Bushmanland Nama Karoo, Upland Succulent Karoo, Escarpment Mountain Renosterveld	Escarpment Mountain Renosterveld, Upland Succulent Karoo, Upper Name Karoo	Lowland Succulent Karoo, Little Succulent Central Nama Karoo		
Altitude (m a.m.s.l)	1100 - 1500	500 - 1700	100 - 900	Wetland Vegetation Type	The majority of the study area is located within the Karoo Shale Renosterveld (Least Threatened) Wetland Vegetation type, while the eastern-most portion is located within the Lower Nama Karoo (Critically Endangered) wetland vegetation type.
Mean Annual Precipitation (MAP) (mm)	0 to 500	100 – 300	100 - 200		
Coefficient of Variation (% of MAP)	30 to 40	30 to 40	35 to > 40		
Rainfall concentration index	15 - 55	30 – 55	30 -55	NFEPA Rivers	The Riet River as well as an unnamed tributary of the Riet River traverse both the Distribution Line Alternatives (west), with the Riet River also located within the Proposed Collector Hub. The Vanwyks River and the Juk River traverses the Distribution Line Alternative 2 (east), while the Beerfontein se Laagte River is indicated to rise within the western portion of the Investigation Area, and as such within 500m of both Distribution Line Alternatives (Figure 8). However, analyses of digital satellite imagery indicates that the Beerfontein se Laagte River is located approximately 300m south of the Investigation Area, and as such, it was not assessed as part of this study. All of these Rivers is considered to be in an unmodified, natural or largely natural with few modification ecological condition (RIVCON AB), with the exception of the Riet River which is considered to be in a largely natural with few modification ecological condition (RIVCON B) (Figure 9).
Rainfall seasonality	Very late summer	Very late summer	Very late summer		
Mean annual temp. (°C)	14 - 18	14 – 18	16 - 18		
Winter temperature (July)	0 - 18°C	0 - 18ºC	2 -20ºC		
Summer temperature (Feb)	12 – 30°C	10 - 30ºC	12 - 32ºC		
Median annual simulated runoff (mm)	<5 to 40	<5 to 20	<5 to 10		

Ecological Status of the most proximal sub-quaternary reach (DWS, 2014)					
Sub-quaternary reach	D56B-07731 Riet River Tributary	D56B-07733 (Riet River)	J11B-07772 (Beerfontein se Laagte River)	J24A-07720 (Vanwyks River)	J24A-07778 (Juk River)
Assessed by expert?	No	Yes	Yes	Yes	Yes

Mean Ecological Importance (EI) Class	Low	Low	High	Very High	Very High
Mean Ecological Sensitivity (ES) Class	Low	Very Low	Moderate	Low	Low
Stream Order	1.0	1.0	1.0	1.0	1.0
Default Ecological Class (based on median PES and highest EI or ES mean)	Class D (Low to Very Low)	Class D (Low to Very Low)	Class B (High)	Class A (Very High)	Class A (Very High)
Northern Cape Provincial Spatial Development Framework (NPSDF, 2012)					
The study area is situated within the Hantam Roggeveld Centre of Endemism. This centre is largely congruent with Acock's Western Mountain Karoo veld type and its enclaves of Mountain Renosterveld. This vegetation type is dominated by low-growing perennial microphyllous bushes up to 0.5m tall. Common species include: *Pentzia incana, Galenia africana, Zygophyllum gilfillanii, Euphorbia mauritanica, Ruschia caroli,* and several other species of *Eriocephalus, Salsola* and *Pteronia.* This is the most significant centre of plant endemism within the Great Karoo due to the number of endemics and taxonomic isolation of some of its taxa. The vegetation of this centre is poorly conserved and there is a great need for the establishment of more conservation areas within this area (van Wyk and Smith, 2001).					
Western Cape Biodiversity Spatial Plan (WCBSP, 2017)					
Critical Biodiversity Area (CBA) 1	Both distribution line alternatives traverse several areas considered to be Terrestrial CBAs 1. These are areas in a natural condition required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure. These areas should be maintained in a natural or near natural state, with no further loss of natural habitat. Areas that are degraded should be rehabilitated, and only low-impact, biodiversity sensitive land uses are appropriate.				
Ecological Support Area (ESA) 1	The eastern section distribution line alternative 2, the service road, as well as the proposed Eskom Nuwerust substation, traverses several areas considered to be Aquatic ESAs 1. These areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning of Protected Areas or CBAs, and are often vital in delivering ecosystem services. These features should be maintained in a functional, near natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.				
ESA 2	The eastern section distribution line alternative 2, the service road, as well as the proposed Eskom Nuwerust substation further traverses several areas considered to be ESAs 2. These areas should be restored from other land uses. These areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning of Protected Areas or CBAs, and are often vital in delivering ecosystem services. Restore and/or manage to minimise impact on ecological processes and ecological infrastructure functioning, especially soil and water related services, and to allow for faunal movement.				
Other Natural Area (ONA)	The remaining areas of the study area located within the Western Cape Province is considered to be ONAs. These areas are not currently identified as a priority, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although not prioritised they are still an important part of the natural ecosystem. Minimize habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land-uses, but some authorisation may still be required for high impact land-uses				
Detail of the study area in terms of the Karoo Hoogland and Laingsburg Local Municipality Biodiversity Summary Projects (MBSP, 2010).					
The study area is located within the Karoo Hoogland Local Municipality (Northern Cape) and the Laingsburg Local Municipality (Western Cape). These datasets correspond with the NFEPA database.					

WETCON AB: Natural land cover >75%; C: Natural land cover 25-75%; Z1: Wetland overlap with 1:50 000 'artificial' inland water body from the Department of Land Affairs; Z2: Majority of wetland unit classified as artificial; Z3: natural land cover <25%.

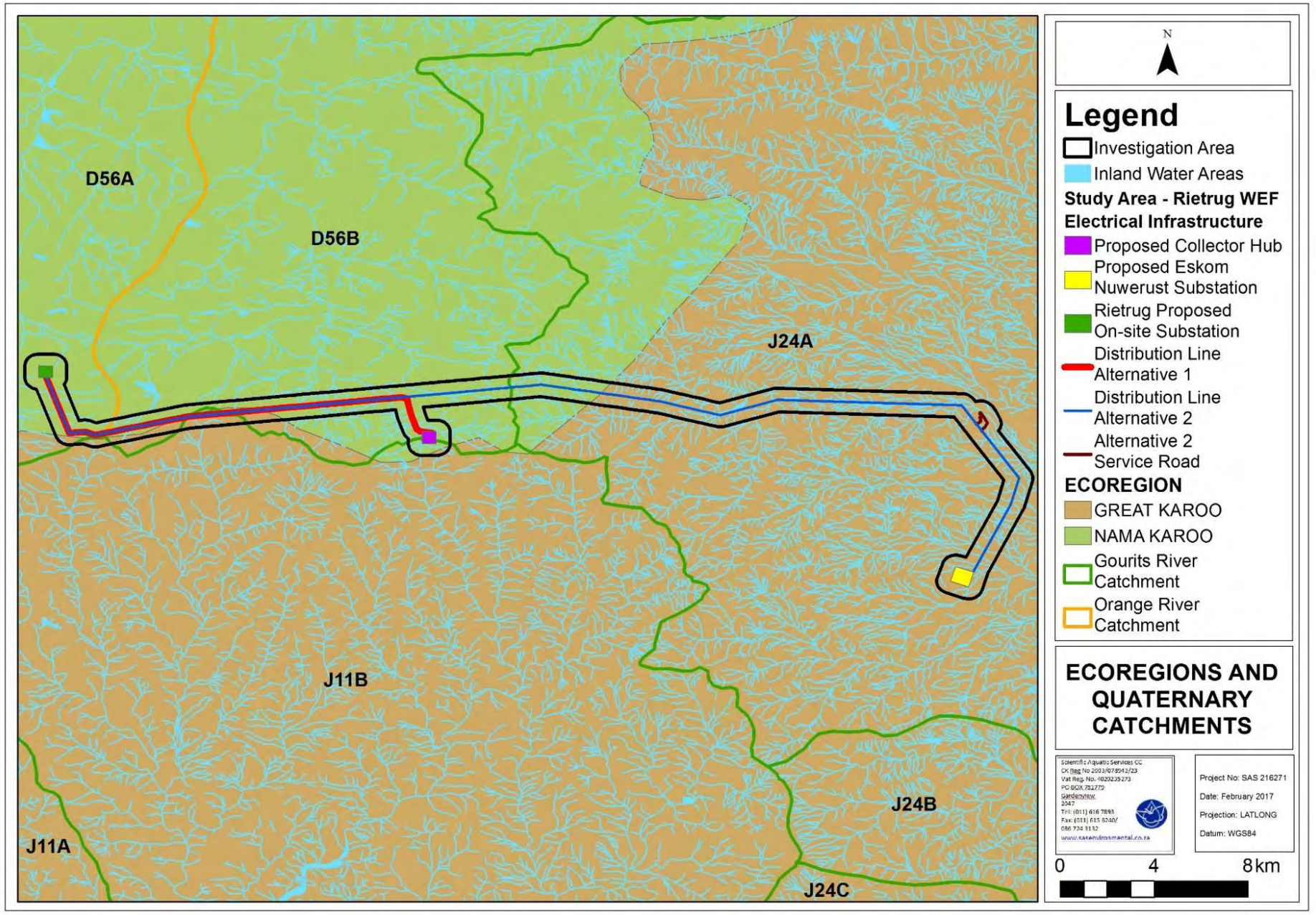

Figure 4: Aquatic Ecoregions and quaternary catchments associated with the study area.

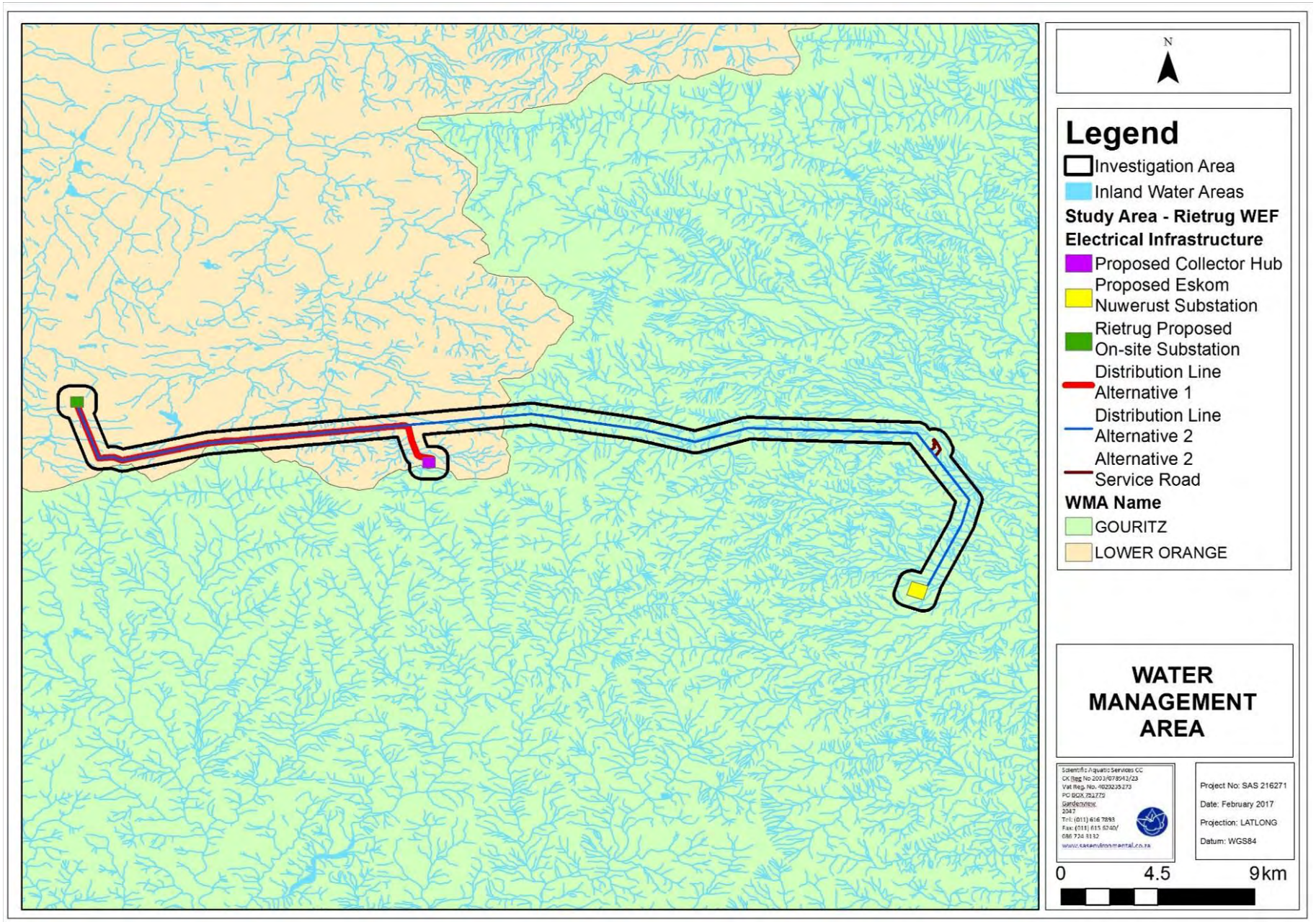

Figure 5: Lower Orange and Gouritz WMA associated with the study area according to NFEPA (2011).

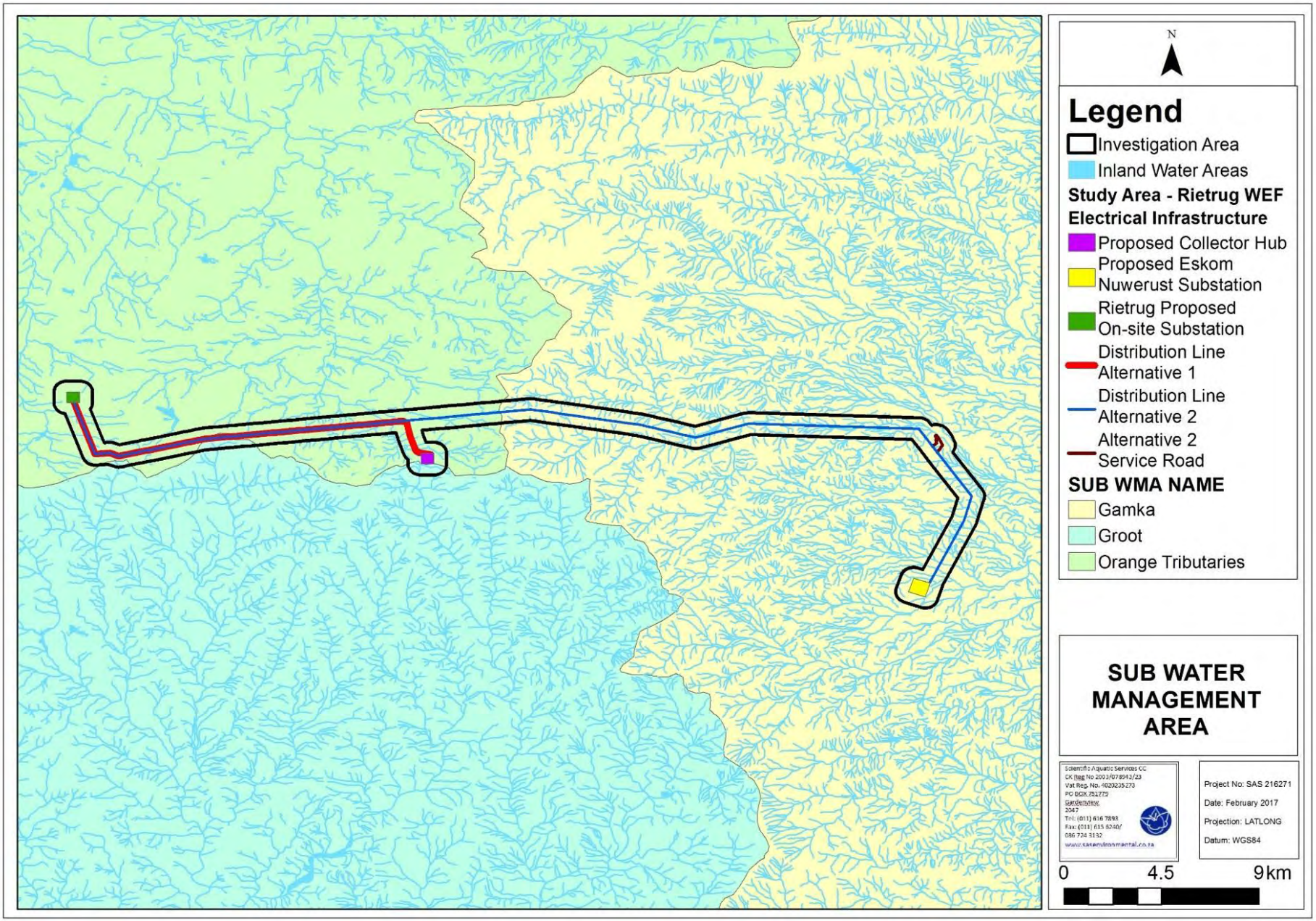

Figure 6: Gamka, Groot and Orange Tributaries sub WMAs associated with the study area according to NFEPA (2011).

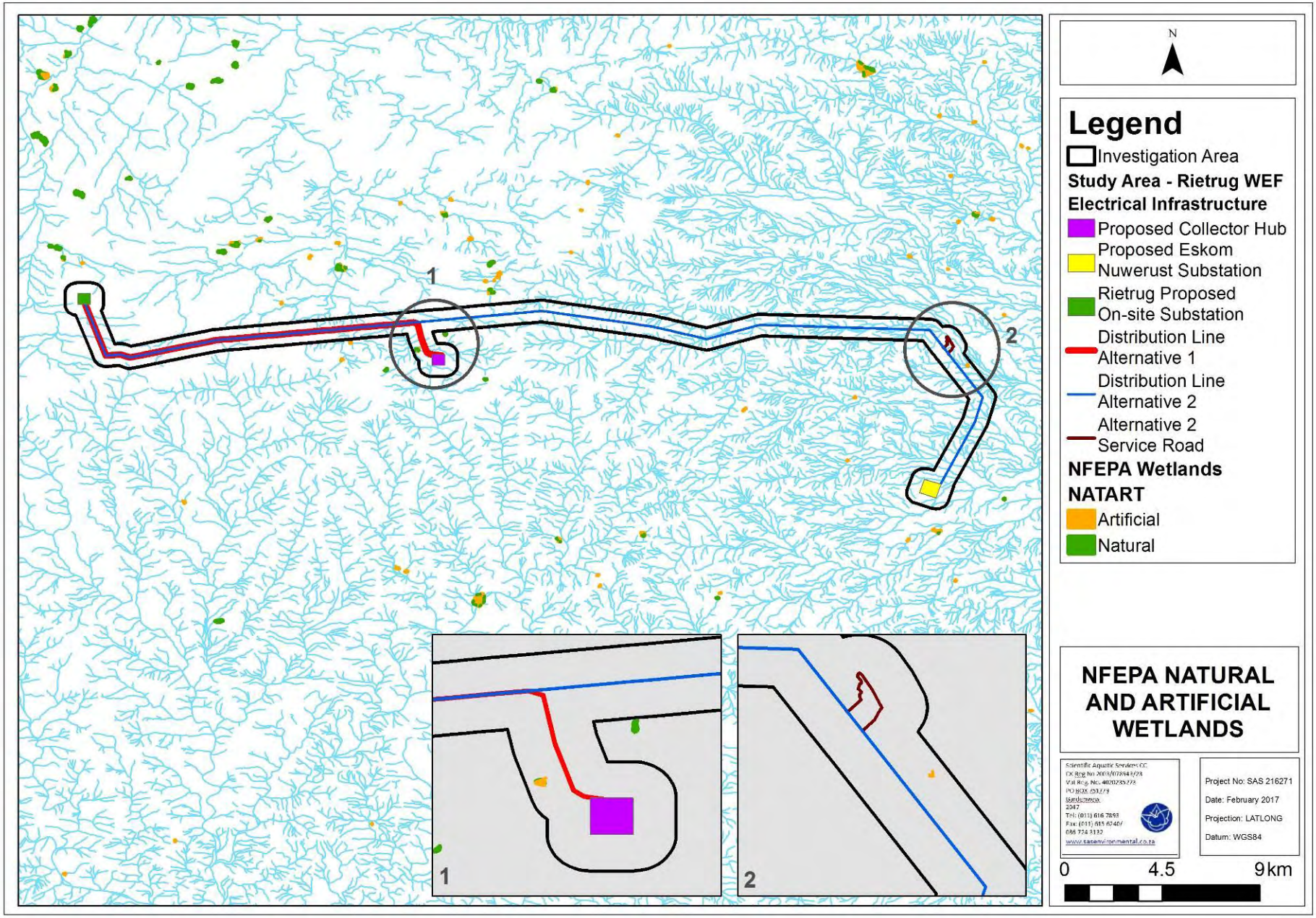

Figure 7: Natural and artificial wetlands located within the investigation area according to the NFEPA database (2011).

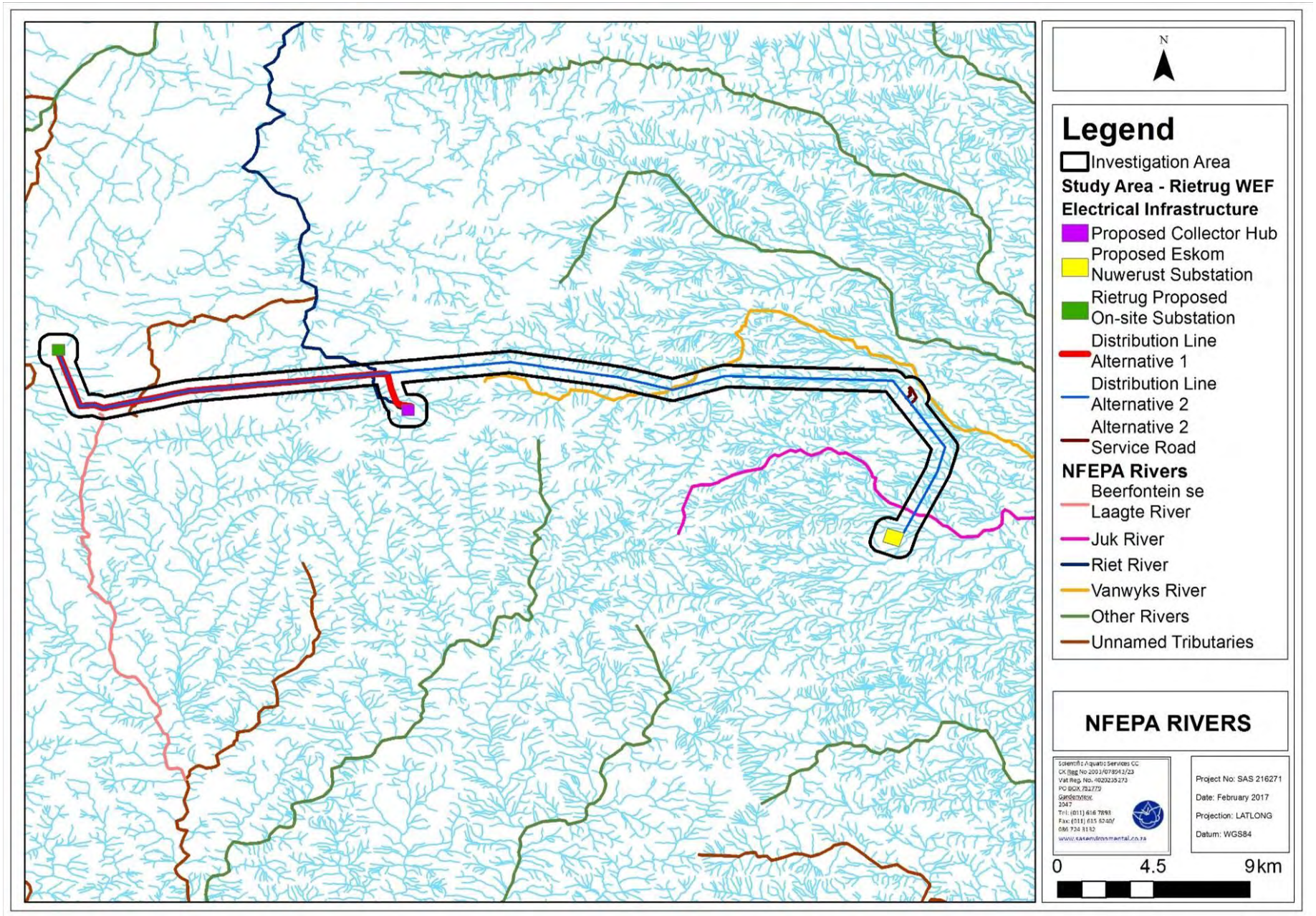

Figure 8: Rivers associated with the study area according to the NFEPA database (2011).