Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

March 2018

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BASIC ASSESSMENT PROCESS

Basic Assessment for the Proposed Development of a Transmission Line and associated electrical infrastructure to support the proposed Skeerhok Solar Energy Facilities, north-east of Kenhardt, Northern Cape Province

DRAFT BASIC ASSESSMENT REPORT

March 2018

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REPORT DETAILS

Title:	**Basic Assessment for the Proposed Development of a Transmission Line and associated electrical infrastructure to support the proposed Skeerhok Solar Energy Facilities, north-east of Kenhardt, Northern Cape Province**
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 Environmental Impact Assessment (EIA) and BA Processes for the proposed Solar Energy Facilities (SEFs) and associated electrical infrastructure (132 kV Transmission line). 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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Date:	February 2018
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CONTENTS

APPENDICES

TABLES

FIGURES

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** **Alternatives - Section A.5** **Need and Desirability – Section A.6** **Impact & Risk Assessment Process Section D**
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.2 and Appendix A**
(b) the location of the activity, including:	**Yes**	**Section A.1.1**

Appendix 1	YES / NO	SECTION IN BA REPORT
(i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;		**SG Code and Co-ordinates - Sections A.5.1**
(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.5.1 (Table 4)**
(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.3 and Section A.4**
(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**
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.6**
(g) a motivation for the preferred site, activity and technology alternative;	**Yes**	**Section A.5 (Table 5)**
(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.5 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 D of this BA Report.**

Appendix 1	YES / NO	SECTION IN 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	**Not Applicable at this stage of the BA 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.5 of the BA Report for a description of the alternatives considered.**
(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.5 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 E, which also includes relevant mitigation measures. The impact assessment methodology is also included in Section D of this BA Report. The specialists assessed all three alternatives of the proposed transmission.**
(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.5**
(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 E**
(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts;	Yes	**Section D, Appendix E**

Appendix 1	YES / NO	SECTION IN BA REPORT
(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;		
(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 E**
(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 E 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 E 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 E**
(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 E 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;	**Yes**	**Appendix A**

Appendix 1	YES / NO	SECTION IN BA REPORT
(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		
(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 for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

CONTENTS

SECTION A: INTRODUCTION, PROJECT DESCRIPTION AND LEGISLATIVE REVIEW

A.1 Introduction

A.1.1 Background and Environmental Authorisation Process

Juwi Renewable Energies (Pty) Ltd (hereinafter referred to as "juwi") is proposing to develop three 100 MWac Solar PV projects, collectively referred to as the Skeerhok Solar Energy Facilities (SEF), and associated electrical infrastructure on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120, approximately 70 km south of Upington and 43 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province. The proposed 100 MWac PV facilities will connect to the Eskom Nieuwehoop Substation located on Portion 3 of Gemsbok Bult Farm 120 via a 132 kV transmission line and associated electrical infrastructure. The proposed transmission line and electrical infrastructure will be constructed within a single electrical infrastructure corridor.

In terms of National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the amended 2014 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 40772 (GN R324, R325, R326 and R327), a full Scoping and EIA Process is required for the construction of the proposed three Solar PV facilities.

Three separate Applications for Environmental Authorisation (EA) were prepared and submitted to National Department of Environmental Affairs (DEA) for each proposed Scoping and EIA project. The Applications for EA were acknowledged by the DEA on 21 September 2017, and the following reference numbers were assigned to the Skeerhok PV projects:

- Skeerhok PV 1 - DEA Reference: 14/12/16/3/3/2/1033;
- Skeerhok PV 2 - DEA Reference: 14/12/16/3/3/2/1034; and
- Skeerhok PV 3 - DEA Reference: 14/12/16/3/3/2/1035.

Furthermore, three separate Scoping Reports were prepared and released to Interested and Affected Parties (I&APs), as well as submitted to DEA for decision-making in terms of Regulation 22 of the amended 2014 NEMA EIA Regulations. DEA acknowledged receipt and accepted the Scoping Report in a letter dated 30 November 2017. EIA Reports were then compiled for the Skeerhok PV 1, PV 2 and PV 3 projects and are currently available for a 30-day commenting period (extending from 15 February 2018 to 16 March 2018). Subsequent to the 30-day comment period, the final EIA Reports for the Skeerhok PV projects will be compiled (with the inclusion of comments raised by I&APs during the 30-day review period), and submitted to the DEA for decision-making in terms of Regulation 24 of the amended 2014 NEMA EIA Regulations.

In support of the above, juwi is also proposing the development of electrical infrastructure to connect the abovementioned Skeerhok SEF to the Eskom Nieuwehoop Substation, and to ensure that the electricity generated by the proposed SEF feeds into the national grid. The proposed transmission line and associated infrastructure will include a 132 kV transmission line, an on-site substation, and the use of existing service and access roads for maintenance purposes. In terms of the NEMA and the 2014 NEMA EIA Regulations (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 transmission line and electrical infrastructure. An Application for EA will be lodged with the DEA with the submission of the draft BA Report for the transmission line project. As part of this BA Process, three connectivity alternatives are considered, referred to as:

1. **Skeerhok Alternative 1- Transmission Line**
2. **Skeerhok Alternative 2- Transmission Line**
3. **Skeerhok Alternative 3- Transmission Line**

The location of the proposed supporting electrical infrastructure, the three connectivity options, farm portions affected and the three Skeerhok PV facilities are shown in Figure 1 below.

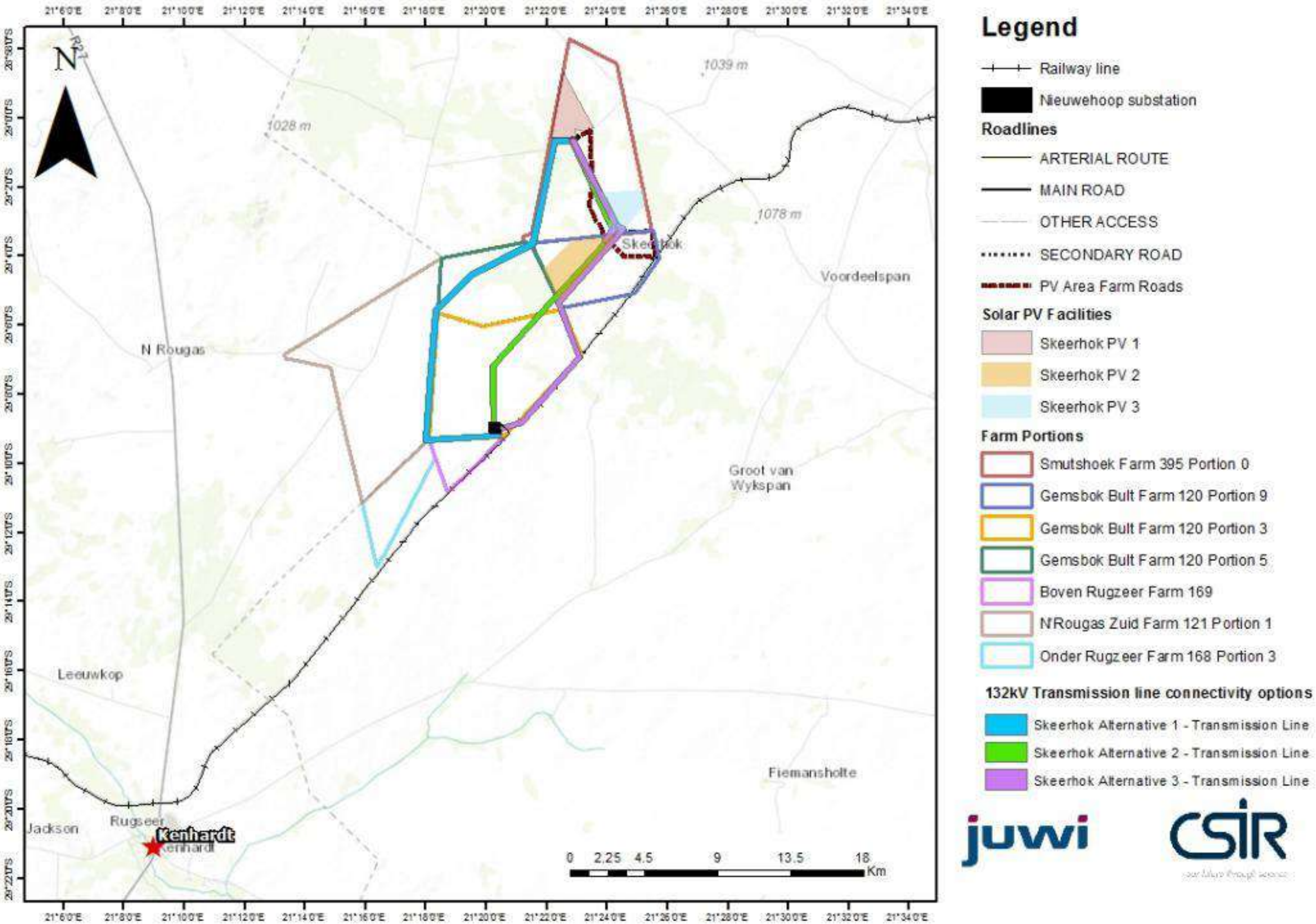

Figure 1: Locality Map of the proposed 132kV Transmission line connectivity options (showing affected farm portions)

A.2 Project team

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended, GN R326), the juwi has appointed the CSIR to undertake the separate BA Process required for the proposed project; 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, who is supported by the Project Manager, Kelly Stroebel (EAP), and the Project Officer, Babalwa Mqokeli. Paul Lochner serves as a Technical Advisor for the proposed projects.

Kelly Stroebel is a Junior EAP in the Environmental Management Services (EMS) group of the Council for Scientific and Industrial Research (CSIR) and holds an Honours degree in Environmental Science. She has been the Project Manager of several EIAs in South Africa and several Basic Assessments for the Special Needs and Skills Development Programme. She has also assisted in the SIP projects including the National Wind & Solar Strategic Environmental Assessment (SEA) and Electricity Grid Infrastructure SEA which were commissioned by the national Department of Environmental Affairs. Kelly will be supported by the EIA Project Team as outlined within **Error! Reference source not found.**. Refer to Appendix A 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 E of this BA Report. The team which is involved in this BA Process is listed in Table 1 below.

Table 1: The BA Team

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.)*
Kelly stroebel	CSIR	Project Manager (Appointed EAP*)*
Babalwa Mqokeli	CSIR	Project Officer; GIS
Specialists		
Simon Bundy	Sustainable Development Projects (SDP)	Ecological Impact Assessment (including Terrestrial and Aquatic Ecology)
Jon Smallie	Wild Skies Ecological Services	Avifauna Impact Assessment
Luanita Snyman-Van der Walt	CSIR	Visual Impact Assessment
Andrea Gibb	SiVEST	External review of the VIA
Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
Christo Bredenhann	WSP	Review of the Traffic Impact Statement complied by the CSIR using existing studies in the project area.
Rudolph du Toit	N/A	Review of the Social Impact Statement complied by the CSIR using existing studies in the project area.
Johann Lanz	N/A	Review of the Soils and Agricultural Impact Statement complied by the CSIR using existing studies in the project

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
		area.

It should be noted that the Heritage Impact Assessment specialist study (Appendix E.2 of this BA Report) is an integrated report including Palaeontology, Archaeology and Cultural Landscape.

An Impact Statement for Agriculture, Traffic and Social was also compiled by the EAP and is included in Appendices E5 of this BA Report. These statements were externally reviewed and a letter of confirmation of this is included in each statement. It must be noted that the statements serve as a general description of the existing and predicted impacts associated with the proposed project (using information from existing studies in the area) and does not classify as a specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017). Furthermore, the statements considered the full development (i.e. the development of the three Solar PV Facilities (i.e. Skeerhok PV 1, 2 and 3 which are subject to the EIA Process) and the associated electrical infrastructure (subject to this BA Process).

A.3 Project description

juwi is proposing to develop three 100 MW solar PV projects, collectively referred to as the Skeerhok SEF, within the same geographical area on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120 close to Kenhardt in the Northern Cape. The development of the transmission line and associated electrical infrastructure is proposed to connect the proposed SEF to the national grid via the Eskom Nieuwehoop Substation. Following the construction phase, the proposed transmission line and associated electrical infrastructure will either be transferred into the ownership of Eskom or remain in the ownership of the project owner. The proposed development of the transmission line and associated electrical infrastructure is subject to a separate BA process (this Report).

A.3.1 Proposed infrastructure

The proposed transmission line and associated infrastructure will include the following:

- **A 132 kV transmission line** with concrete foundations and steel tower structures (i.e. pylons). The line will consist of either self-supporting suspension structures or guyed monopoles and a maximum height of 32 m. The span lengths are estimated to range between 200 m and 300 m. The servitude for the 132 kV power line will be 40 m wide. Associated electrical infrastructure at the Eskom Nieuwehoop Substation will be constructed in order to ensure that the substation is capable of receiving the additional electricity that is generated by the proposed Skeerhok PV facilities. This infrastructure includes, but is not limited to, feeders, Busbars, transformer bays and extension to the platform at the Eskom Nieuwehoop Substation.

- **An on-site substation** (with a capacity of 22/33 kV to 132 kV). The on-site substation building is expected to extend approximately 30 m in height, with a maximum footprint of 1 hectare. It is important to note that all high voltage infrastructure leading up to the Point of Connection (i.e. Skeerhok PV facilities' section of the proposed collector/on-site substation) have been considered within the three EIA Processes (i.e. for Skeerhok PV 1. PV 2 and PV 3). High voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed collector/on-site substation) up to the line bay at the Eskom Nieuwehoop Substation may be handed over to Eskom and has been assessed separately as part of this BA Process (i.e. Skeerhok Alternative 1, 2 and 3 – Transmission Lines).

- **For powerline maintenance existing service and access roads** will be utilised as much as possible for maintenance purposes. Where no existing access is present, due to the low traffic anticipated, access will be provided in the form of jeep tracks, as opposed to formalised roads. For sections that will require use of the Transnet service road, discussions have been initiated and held with Transnet and the Project Applicant regarding the potential use of the Transnet Service Road and associated specific requirements. Transnet have informed the Project Applicant of their requirements that need to be met should the Transnet Service Road be used to gain access to the site. These requirements will be considered in the design where required, and the details of the agreement will be finalised outside of this BA Process.

A.3.2 Connectivity alternatives

As part of this BA, three connectivity alternatives are considered, namely:

1. **Skeerhok Alternative 1- Transmission Line**
2. **Skeerhok Alternative 2- Transmission Line**
3. **Skeerhok Alternative 3- Transmission Line**

A description of each alternative is summarised in Table 2 below.

Table 2: The Skeerhok Alternatives - Transmission Line descriptions

	Skeerhok Alternative 1	Skeerhok Alternative 2	Skeerhok Alternative 3
Line length	30 km	18 km	19 km
Farm portions affected	• Portion 0 of Smutshoek Farm 395 • Portion 9 of Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120 • Portion 3 of Gemsbok Bult Farm 120 • Portion 1 of N'Rougas Zuid Farm 121 • Portion 3 of Onder Rugzeer Farm 168 • Portion 0 of Boven Rugzeer Farm 169	• Portion 0 of Smutshoek Farm 395 • Portion 3 of Gemsbok Bult Farm 120 • Portion 9 Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120	• Portion 0 of Smutshoek Farm 395 • Portion 9 of Gemsbok Bult Farm 120 • Portion 3 of Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120
Foundation	Concrete	Concrete	Concrete
Pylon	Steel tower	Steel tower	Steel tower
Tower type	Self-supporting suspension structures or Guyed monopoles	Self-supporting suspension structures or Guyed monopoles	Self-supporting suspension structures or Guyed monopoles
Height	32 m	32 m	32 m
Span length	200 – 300 m	200 – 300 m	200 – 300 m
Servitude width	40 m	40 m	40 m

Each of these alternative connectivity options are proposed within a 300 m wide electrical infrastructure corridor. These corridors were considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities will be avoided in the final siting and location of the proposed transmission line. It is important to note that should the routing change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout or revisions to the layout occurring within the boundaries of the corridor 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 corridor and have identified sensitivities, which have been avoided in the siting of the proposed infrastructure. The corridor is considered to be a “box” in which the project components can be constructed at whichever location (within the boundary of the corridor) without requiring an additional assessment or change in impact significance. Any changes to the layout within the boundaries of the corridor following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

A.3.3 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 Transmission 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 Transmission Line, sewage generation is not applicable.

- **Solid Waste Generation**

The quantity of waste generated will depend on the construction phase, which is estimated to be approximately 12 months. It is estimated that approximately 90KGS 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 Environmental Management Programme (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 transmission line, waste generation is not applicable.

- **Electricity Requirements**

Any electricity required during the construction phase will be generated through the use of onsite generators. During the operational phase, the transmission line will not have any electricity requirements as the project itself will transmit and distribute electricity.

The Project Applicant has consulted the Manager: Project Management Unit at Kai !Garib Municipality for the confirmation of supply of services availability (in terms of water, waste removal, sewage and electricity) for the proposed project. Proof of correspondence and confirmation is included in Appendix G of this Report. 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).

A.3.4 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 E of this BA Report).

A.3.4.1 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 Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) (i.e. the issuing of a (Power Purchase Agreement (PPA) from the Department of Energy (DoE). The construction phase for the proposed project is expected to extend for approximately 12months.

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. The laydown area will be located within the area assessed as part of the EIA Process. 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 facility for the appointed Contractors). The laydown area is expected to cover a maximum area of 10 ha, the area will thereafter be rehabilitated (i.e. returned to its pre-construction condition) at the end of the construction phase.

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 South African National Standard (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 between 10 and 40employment 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;
- 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 transmission line and additional infrastructure.

A.3.4.2 Operational Phase

The following activities will occur during the operational phase:

- The transmission of electricity generated from the proposed Skeerhok SEF to the substation; and
- Maintenance of the transmission line servitude including the gravel service road.

During the life span of the power line (approximately 10 to 20 years), on-going maintenance will be required on a scheduled basis. This maintenance work will be undertaken by contractors employed Eskom, and in compliance with the EMPr.

A.3.4.3 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 SEF becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and any legislation or guidelines relevant at the time and the site will be rehabilitated and returned to its pre-construction state.

A.4 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 previously noted, 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.

Table 3 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 3: 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 transmission line, as well as an on-site substation. 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; ▪ (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	The proposed project will entail the construction and installation of an overhead 132 kV transmission line, as well as an on-site substation. Based on the Ecology Impact Assessment undertaken as part of the BA Process, drainage features occur on site and the infrastructure are will exceed a footprint of 100 m^2 and some will occur within 32 m of the watercourses. The proposed project will take place outside of an urban area. *Additional information regarding the presence of watercourses on site is provided in the Ecological Impact Assessment, which is attached to this report as Appendix E1.*
GN R327: Activity 19 The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of	The proposed project will entail the excavation, removal and moving of more than 5 m^3 of soil, sand, pebbles or rock from the nearby watercourses. The proposed project will also entail the infilling or depositing of more than 10 m^3 of material into the nearby watercourses. This infilling and

Listed Activity (GN R327 and R324)	Description of Project Activity that triggers Listed Activity
soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from a watercourse;	excavation of the material will occur as a result of the proposed construction of the transmission line and on-site substation. Ecology Impact Assessment undertaken as part of the BA Process identified drainage features within the investigation area.
GN R327: Activity 27 The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation	The proposed project will entail the construction of an on-site substation, which will cover an approximate area of 1 ha. As a result, 1 ha of indigenous vegetation will be removed for the construction of this structure.
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;	As noted above, the proposed project will take place outside of an urban area, on several farm portions. The land is currently used for agricultural purposes. The proposed project, which is a commercial/industrial development, will entail the construction of an on-site substation, and transmission line (including towers and pylons). This will constitute infrastructure with a physical footprint of more than 1 ha.
GN R324	
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; ▪ if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; ▪ (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.	The proposed project will entail the construction and installation of an overhead 132 kV transmission line, as well as an on-site substation. Based on the Ecology Impact Assessment undertaken as part of the BA Process, drainage features occur on site and the infrastructure will exceed a footprint of 10 m^2 and some will occur within 32 m of the watercourses. The proposed project will take place outside of an urban area. According to the SANBI Conservation Plan data there is an Ecological Support Area (ESA) present onsite *Additional information regarding the presence of watercourses on site is provided in the Ecological Impact Assessment, which is attached to this report as Appendix E1.*

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).

A.5 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.*

The main factors that determined the location of the proposed transmission line are indicated below and discussed within this section:

- Location of the Skeerhok SEF
- Location of the Nieuwehoop Substation; and
- The most cost-effective route and distance between the Skeerhok SEF and Nieuwehoop Substation.

A.5.1 Property or Location Alternatives (i.e. Site Alternatives)

It is important to note that the location of the proposed transmission line and service road, as well as the other associated infrastructure, is motivated by the location of the proposed Skeerhok SEF and its proximity to the Nieuwehoop Substation. The determination of the development footprint was determined through a desktop screening assessment of the site and consultation with the relevant landowner identifying possible areas that should not be proposed for the development. The proposed connectivity options were assessed by the specialist studies (Appendices E1 to E5) and the line routings were adjusted to avoid sensitive features identified in these studies.

As discussed previously, the overall aim of this proposed project is to provide the necessary electrical infrastructure to ensure that the proposed Skeerhok SEF is equipped and enabled to transmit the generated electricity (from the SEF) to the Nieuwehoop substation. In turn, the best routing of the proposed transmission line from the proposed SEF site to the 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 Transmission 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 Transmission 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 Transmission Line and service road. The sensitive areas identified by the specialists have been largely taken into consideration in determining the routing of the proposed Transmission Line and service road, which is indicated in Appendix B of this BA Report.

The approximate centre-point location of the proposed Skeerhok on-site substations are located at
Skeerhok PV 1: 29° 0'30.87"S, 21°22'53.98"E
Skeerhok PV 2: 29° 3'34.76"S, 21°23'57.33"E
Skeerhok PV 3: 29° 3'16.15"S, 21°24'19.81"E

Based on the above, site alternatives for this proposed BA project are not applicable, however routing options of the proposed transmission line are applicable as described above. These routing options, in relation to linear activities, are described below. The co-ordinates of the start, middle and end points of Alternatives 1, 2 and 3 of the proposed Transmission Line are indicated in Table 4 below.

Table 4: Start, Middle and End Point of Alternatives 1, 2 and 3 of the Proposed Transmission Line and Connection to the proposed Nieuwehoop Substation

	Latitude (S)	Longitude (E)
Alternative 1:		
Start Point	29° 3'34.54"S	21°23'55.03"E
Middle Point	29° 4'13.41"S	21°20'12.28"E
End Point	29° 8'54.93"S	21°20'22.22"E
Alternative 2:		
Start Point	29° 0'30.87"S	21°22'48.36"E
Middle Point	29° 4'40.18"S	21°22'48.72"E
End Point	29° 8'50.72"S	21°20'15.62"E
Alternative 3:		
Start Point	29° 0'30.87"S	21°22'53.98"E
Middle Point	29° 4'31.56"S	21°23'13.85"E
End Point	29° 9'3.29"S	21°20'18.12"E

Note: The end points above refer to the end of the transmission line itself.

For the proposed Transmission Line BA Project, three options have been assessed, however, one option is being put forward and considered for the Transmission Line routing to the proposed collector hub. This preferred routing option is referred to as Alternative 2, as described above. Please refer to Figure 1 for the locality map of the three routing options that were assessed.

Table 5 below provides a summary of the specialist assessments of the different routing alternatives that were considered for the proposed Transmission Line.

Table 5: Summary of the Specialist Assessment Feedback on findings of the different routing Alternatives

Transmission Line Routing Options	Specialist Assessment Feedback
Alternative 1	Terrestrial Ecology and Hydrology Specialist: • This corridor, located to the North-West, has been identified as falling within or proximal to an ecological support area (ESA). • This corridor traverses an area that has been evidently subjected to grazing by livestock with limited larger and occasional woody trees being evident primarily in the far northern portions of this alternative. These woody specimens comprise primarily of *Acacia karoo*, but may include an occasional specimen of *Boscia albitrunca* and *Aloe dichotoma*. *Aloe claviflora*, a protected aloe of prone habit may also be present intermittently across the corridor. • A minor portion of Alternative 1 lies to the north of a low elevated ridge which forms the boundary of the catchment between the Hartbees Rivier and the more northerly Brak Rivier and Sout Rivier. It traverses, in part, some of the dendritic drainage features of the upper catchment of N' Rougas se Loop. Heritage, Archaeology and Palaeontology Specialist: • Some older farm complexes have small graveyards located close to their farm buildings, while suspicious isolated rocks, perhaps planted upright, may mark historical graves of early mobile farmers (the so-called *trek boers*). An example has been seen some 6.5 km to the southwest of the south-western corner of the Alternative 1 corridor. • Quarry sites represented by small quartz outcrops were seen from which flakes had been removed (all along the western part of Alternative 1). • In the south-western part of Alternative 1, a small pan had a few LSA artefact scatters around it. Avifaunal Specialist • Bird collisions with power line is the most significant risk to avifauna. Species most at risk include Ludwig's and Kori Bustard, the korhaans and Secetarybird. • Martial Eagle was only recorded in an area approximately 2.5km west of the Skeerhok Alternative 1 corridor. However, this means that Alternative 1 (2.5km) is closer to that area than 2 (6.8km) and 3 (9.8km). • The shorter routes are preferred from an avifaunal perspective and Alternative 1 is 50% longer than the other two alternatives. • Placing multiple power lines adjacent to each other provides partial mitigation for bird collision since there are more overhead cables to be seen. Alternative 1 runs approximately 6.6km next to Upington Solar Park -Nieuwehoop 400kV. Visual Specialist: • In terms of roads, Alternative 1 comes within 13.5 km of the R27. • The changes to the landscape character that may be brought about by Alternative 1 can have impacts on the views of potential sensitive visual receptors. However,

<table>
<tr><th>Transmission Line Routing Options</th><th>Specialist Assessment Feedback</th></tr>
<tr><td></td><td>due to the existing approvals for solar PV developments, the construction of high-voltage electricity infrastructure in the direct surroundings of the project area, and the Saldanha-Sishen railway with overhead powerlines, the sensitivities are low from a visual, scenic, aesthetic and amenity perspective

<u>Therefore, based on the above feedback from the Terrestrial Ecology, Hydrology, Archaeology, Palaeontology and Visual Specialists, Alternative 1, although not fatally flawed, is not preferred.</u></td></tr>
<tr><td>Alternative 2
(preferred alternative)</td><td><u>Terrestrial Ecology and Hydrology Specialist:</u>

• Skeerhok Alternative 2 is positioned distally from major drainage features and other eco-morphological features of significance.
• It traverses areas of distinctly graminoid habitat form and occasional associations of Acacia karoo and Lyceum cinereum as well as Salsola aphylla are present at low points within these corridors, being primarily associated with dendritic drainage features.
• The more scrub habitat form is generally pervasive across this corridor option where the intermittent Lyceum - Acacia associations are evident in close proximity to the Nieuwehoop substation.
• The habitat form and structure that prevails across this corridor option is generally of uniform structure, offering limited species diversity.

<u>Heritage, Archaeology and Palaeontology Specialist:</u>

• One significant set of LSA archaeological sites was discovered but it was located outside of all the corridors but within about 180 m of the western edge of the Alternative 2 corridor. The complex was reported as significant after the fieldwork and the proponent <u>has revised the project layout to avoid the area</u>. It consists of an endorheic pan surrounded by artefact scatters and a low rocky hill with another site on top of it.

<u>Avifaunal Specialist</u>

• Bird collisions with power line is the most significant risk to avifauna. Species most at risk include Ludwig's and Kori Bustard, the korhaans and Secetarybird.
• Placing multiple power lines adjacent to each other provides partial mitigation for bird collision since there are more overhead cables to be seen. In addition, placing power lines adjacent to each other also normally reduces the need for new access and maintenance roads with the consequent habitat destruction. Alternative 2 runs for approximately 6.2km next to Ferrum-Nieuwehoop 400kV and 5.8km next to Upington Solar Park-Nieuwehoop 400kV. On the basis of this factor the preference is for Alternative 2.

<u>Visual Specialist:</u>

• In terms of roads, Alternative 2 (and 3) is closest to the R27 at the Nieuwehoop Substation which lies 17.2 km away.
• The changes to the landscape character that may be brought about by Alternative 2 can have impacts on the views of potential sensitive visual receptors. However, due to the existing approvals for solar PV developments, the construction of high-voltage electricity infrastructure in the direct surroundings of the project area, and</td></tr>
</table>

Transmission Line Routing Options	Specialist Assessment Feedback
	the Saldanha-Sishen railway with overhead powerlines, the sensitivities are low from a visual, scenic, aesthetic and amenity perspective Therefore, based on the above feedback from the Terrestrial Ecology, Hydrology, Archaeology, Palaeontology and Visual Specialists, Alternative 2 is preferred.
Alternative 3	Terrestrial Ecology and Hydrology Specialist: This alternative traverses areas of distinctly graminoid habitat form and occasional associations of *Acacia karoo* and *Lyceum cinereum* as well as *Salsola aphylla* are present at low points within this corridor, being primarily associated with dendritic drainage features. The more scrub habitat form is generally pervasive across this corridor where the intermittent *Lyceum* - *Acacia* associations are evident in close proximity to the Nieuwehoop substation. The habitat form and structure that prevails across this corridor option is generally of uniform structure, offering limited species diversity. It also traverses drainage features associated with the Rugseer River catchment and a semi-natural wetland feature associated with this system and this feature has been attenuated by the construction of the railway and its attending roadway creating a semi-natural pan. This pan is apparently utilized for the abstraction of water and may in turn be augmented by groundwater. It follows that the feature may act as a refugia for water fowl and serve to draw other fauna to the immediate surrounds. Heritage, Archaeology and Palaeontology Specialist: • A few rock engravings and paintings are known from the broader area (Louw Roux Bushmanland 2013). Painted art is also very rare but again, examples are known, particularly on large granite boulders like that recorded by Orton (2016g) some 2.5 km away from the south-eastern part of the Alternative 3 corridor and 7 km east of the Nieuwehoop Substation. None will be directly impacted by the line routing. Avifaunal Specialist • Bird collisions with power line is the most significant risk to avifauna. Species most at risk include Ludwig's and Kori Bustard, the korhaans and Secetarybird. • Placing multiple power lines adjacent to each other provides partial mitigation for bird collision since there are more overhead cables to be seen. In addition, placing power lines adjacent to each other also normally reduces the need for new access and maintenance roads with the consequent habitat destruction. Alternative 3 runs approximately 6.2km next to Ferrum-Nieuwehoop 400kV and approximately 4.4km next to another 400kv line close to Nieuwehoop Substation. Visual Specialist: • In terms of roads, Alternative 3 (and 2) is closest to the R27 at the Nieuwehoop Substation which lies 17.2 km away. • The changes to the landscape character that may be brought about by Alternative 3 can have impacts on the views of potential sensitive visual receptors. However, due to the existing approvals for solar PV developments, the construction of high-voltage electricity infrastructure in the direct surroundings of the project area, and

Transmission Line Routing Options	Specialist Assessment Feedback
	the Saldanha-Sishen railway with overhead powerlines, the sensitivities are low from a visual, scenic, aesthetic and amenity perspective Therefore, based on the above feedback from the Terrestrial Ecology, Hydrology, Archaeology, Palaeontology and Visual Specialists, Alternative 3, although not fatally flawed, is not preferred.

Refer to Section D of this BA Report for an assessment of all Alternatives 1, 2 and 3 of the proposed Transmission Line routing, as well as feedback based on the specialist studies regarding the preference for each alternative.

A.5.2 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 Skeerhok SEF (where the activity associated with the SEF is generation of electricity). Essentially, the Skeerhok SEF 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 Skeerhok SEF. 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 SEF to the Eskom Nieuwehoop substation is via an overhead Transmission 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 SEF 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.

A.5.3 Design or Layout of the Activity Alternatives

As discussed above, as part of the BA, a 300m corridor area 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 transmission line. Based on the findings of the specialist studies, an environmental sensitivity map has been produced (and included in Appendix B of this Draft BA Report, as well as the EMPr). This map shows the sensitivities on site (terrestrial, aquatic and heritage features) within the corridor that was assessed. Based on this map, the preferred location and routing for the Skeerhok transmission line avoids the sensitive features that were identified by the specialists within the corridor. Based on the boundaries of the corridor and the constraints of the environmental sensitivities, a routing has been preliminarily determined for this project, which is included in Appendices B and C of this Draft BA Report, as well as the EMPr. It is important to note that should the routing change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout/routing or revisions to the layout/routing occurring within the boundaries of the corridor 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 have been avoided in the siting of the proposed infrastructure. The corridor 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 corridor 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/routing occur outside of the boundaries of the corridor following the issuing of the EA (should it be granted) will need to be undertaken as part of a separate EA Amendment process and will be considered as substantive.

A.5.4 Technology Alternatives

The technology that is proposed for the construction and operation of the proposed Transmission 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. 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.

A.5.5 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.

A.5.6 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 Skeerhok – Transmission Line 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 Project is not constructed):

- There will be negative implications for the proposed Skeerhok SEF, as there will be no dedicated and fundamental electrical infrastructure to allow the proposed SEF to connect to the Nieuwehoop 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 Skeerhok SEF. This could also result in additional costs and expenditure, as well as additional timeframes required, due to the potential re-design of the proposed Skeerhok SEF to align with an alternative substation within the region. Using an alternative 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 Skeerhok SEF will not be able to be constructed as it will not have fundamental infrastructure to link it to the national grid. If the proposed Skeerhok SEF cannot be constructed as a result of the no-go of the proposed Skeerhok – Transmission Line 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 SEFs 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.

The purpose of the proposed Skeerhok – Transmission Line 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 SEF would not be realised.

A.5.7 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 6: 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 (5) i.e. this section of the BA Report for a description of the alternatives considered, and a justification for the preferred alternative. Three alternative connectivity options were considered and assessed by the specialist in order to ensure that any development constraints or environmental sensitivities will be avoided in the final siting and location of the proposed transmission line. Based on sensitivities identified with each option of the transmission line routing and the possible impacts, as well as technical and financial feasibility, and alignment to existing development as much as possible of the three alternatives, the preferred routing option identified for this project is **Skeerhok Alternative 2.**
▪ (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 with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Refer to Section A (5) i.e. this section of the BA Report for a description of the alternatives considered and their corresponding environmental attributes.
▪ (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 (5) i.e. this section of the BA Report for a description of the alternatives and routing options considered, and a justification for the preferred alternative. Note that a complete impact assessment is included in Section D of this BA Report for Alternatives 1, 2 and 3 of the considered transmission line connectivity options. Section D of this BA Report details the impacts and risks identified, and is also included in the respective specialist studies in Appendix E of this BA Report (which includes the nature, significance, consequence, extent, duration, probability, reversibility, and irreplaceability of the impacts, as well as the suggested mitigation measures). The methodology used in the impact assessment is also noted in Section D of this report. All three connectivity options have been assessed as part of this BA Process, based on the precautionary principle to allow for the proposed SEF to connect to either Alternative 1, 2 or 3 of the transmission lines.
▪ (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 alternative that has been considered in the BA Phase:

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
	Development of **Alternative 2** for the Skeerhok – Transmission Line Project is mainly dependent on it being the most cost-effective route and shortest distance to the Nieuwehoop Substation. Planning and design allows for the avoidance of sensitive features identified within the corridor. The layout of the transmission line and electrical infrastructure 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. Thus, considering various technological alternatives relating to the design and construction of the pylon structures on the preferred site, as well as layout options to avoid sensitivities, **Skeerhok Alternative 2** is preferred.

A.6 Needs and Desirability

It is an important requirement in the BA Process to review the need and desirability of the proposed project. Guidelines on Need and Desirability were published in the Government Gazette 38108 of 20 October 2014. These 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. Need and desirability answer the question of whether the activity is being proposed at the right time and in the right place. Table 7 below includes a list of questions based on the DEA's Guideline to determine the need and desirability of the proposed project. It should be noted this table was informed by the outcomes of the Scoping and EIA Process, as well as the BA Process.

Table 7: The Guideline on the Need and Desirability's list of 14 questions to determine the "Need and Desirability" of a proposed project

NEED	
Question	**Response**
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area)?	
1.1. How were the following ecological integrity considerations taken into account?: 1.1.1. Threatened Ecosystems, 1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"), 1.1.4. Conservation targets,	**The environmental sensitivities present on site were determined and assessed within the ecological impact assessment undertaken for this project.** **The specialist identified all ecological sensitive areas on site that have to be avoided by the proposed development as well as how to suitably develop within these areas so that the ecological integrity of the areas is maintained.** **The sensitivity map is included in Appendix B of this Report.**

NEED	
Question	**Response**
1.1.5. Ecological drivers of the ecosystem, 1.1.6. Environmental Management Framework, 1.1.7. Spatial Development Framework, and 1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	
1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**The environmental sensitivities present on site were determined and assessed within the ecological impact assessment undertaken for this project.** **The specialist identified all ecological sensitive areas on site that have to be avoided by the proposed development as well as how to suitably develop within these areas so that the ecological integrity of the areas is maintained.** **The sensitivity map is included in Appendix B of this Report.** **Measures to avoid, remedy, mitigate and manage impacts are included within the compiled Environmental Management Programme (EMPr), included as Appendix G of the Report, which forms part of this BA Report.**
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**Measures to avoid, remedy, mitigate and manage impacts are included within the compiled EMPr, which forms part of this Report.**
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether; what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	**Potential impacts associated with the proposed project, including waste generation are included in Section D of this Report, as well as in the EMPr included as Appendix G of this Report. Measures to avoid, remedy, mitigate and manage impacts are included within the compiled EMPr), which forms part of this Report.**
1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**A Heritage Impact Assessment was undertaken as part of the assessment for this project. A Heritage profile is included in Section B of this Report, as well as in Appendix E2. The applicable measures to avoid, remedy, mitigate and manage impacts are included in Appendix E2, as well as in the EMPr included as Appendix G of this Report.**
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**An Ecological Assessment has been undertaken with regards to the proposed project; the assessment includes a detailed profile of the natural environment and anticipated impacts. Measures to avoid, remedy, mitigate and manage impacts are included in the EMPr (Appendix G of this Report).**

NEED	
Question	**Response**
1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? 1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life) 1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources of the proposed development alternative?) 1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	**The proposed project aims to construct electrical infrastructure to connect the proposed Skeerhok SEF to the Eskom Nieuwehoop Substation, and to ensure that the electricity generated by the proposed SEF feeds into the national grid. The overall project is seen as a source of 'clean energy' and reduces the dependence on non-renewable sources, such as coal fired power plants.** **The overall proposed project is a sustainable option for the area and the proposed footprint will be placed to ensure avoidance and/or mitigation of any potential impacts to the receiving environment.**
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?: 1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 1.8.2. What is the level of risk associated with the limits of current knowledge? 1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	**The precautionary approach has been adopted for this assessment, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts.** **Current gaps in knowledge include the number of other electrical grid infrastructure that will be constructed in the area. Ways in which this gap is addressed is to consider the cumulative impact of all solar facilities and associated electrical infrastructure being developed within the area.**

<table>
<tr><th colspan="2">NEED</th></tr>
<tr><th>Question</th><th>Response</th></tr>
<tr><td>1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following:

1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?
1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</td><td>This is considered and addressed as part of the desktop review of previous social assessments undertaken in the area for similar types of projects (included in Appendix E5).

An EMPr (Appendix G) 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. The impact on the sense of place is difficult to predict and would potentially be ambiguous. This is due to the subjective nature of perceptions regarding the relative attraction or disturbance of transmission lines in a rural landscape. The visual impact has been assessed as part of the Visual Impact Assessment (Appendix E4 of this Report).</td></tr>
<tr><td>1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?</td><td>This is considered and addressed as part of the desktop review of previous social assessments undertaken in the area for similar types of projects (included in Appendix E5).</td></tr>
<tr><td>1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?</td><td>The proposed activity does not compromise any of the objectives set within the !Kheis Municipality Draft IDP (2012 – 2017 and 2015 – 2019). The proposed overall project will also be supportive of the IDP's objective of creating more job opportunities. The proposed solar energy facility and associated electrical infrastructure will assist in local job creation during the construction and operation phases of the project (if an EA is granted by the DEA). However, it should be noted that although employment will be temporary during the construction phase of the transmission line and solar facility, these opportunities are long-term during the operational phase of the overall project as the plant is expected to be operational for 20 years.</td></tr>
<tr><td>1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?</td><td>Please refer to Section A 5 of this Report.</td></tr>
<tr><td>1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?</td><td>Please refer to Section D of this Report.</td></tr>
<tr><td colspan="2">2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:</td></tr>
<tr><td>2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,</td><td>The !Kheis Municipality Draft Integrated Development Plan (IDP) (2012 – 2017 and 2015 – 2019) states that an opportunity exists to utilise solar energy more widely and lessen the dependence on wood and fire. This</td></tr>
</table>

NEED	
Question	**Response**
	opportunity has been identified because not all people within the municipal area have access to electricity. Even though the overall solar facility will not provide the municipality directly with electricity, the energy produced by the facility will feed into the national grid. Furthermore, the DEA have commissioned a Strategic Environmental Assessment (SEA) to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The SEA 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). The overall proposed solar facility and associated electrical infrastructure falls within one of the potential eight REDZ areas. 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 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. **One of the priority issues identified within the !Kheis Municipality IDP (2012 – 2017 and 2015 – 2019) is the low levels of skilled people, as well as high levels of poverty and unemployment. The IDP (2012 – 2017 and 2015 – 2019) states that the objective to resolve this issue is to create an environment whereby the local community is empowered through capacity building and skills development (particularly for the youth). The proposed overall project will create job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the DEA). It should however be noted that although employment will be temporary during the construction phase of the transmission line and solar facility, these opportunities are long-term during the operational phase of the overall project as the plant is expected to be operational for 20 years.** **Therefore, the proposed SEF and transmission line would help to address the need for increased electricity supply while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area.** **The proposed activity does not compromise any of the objectives set within the !Kheis Municipality Draft IDP (2012 – 2017 and 2015 – 2019). The proposed project will also be supportive of the IDP's objective of creating more job opportunities. The proposed Solar Energy Facility and associated transmission line will assist in local job creation during the construction and operation phases of the project (if an EA is granted by the DEA).**
2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integration of segregated communities, need to upgrade informal settlements, need for densification, etc.),	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**

NEED	
Question	**Response**
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	**The impact on sensitive natural areas would be limited. Each of the three alternative transmission line connectivity options are proposed within a 300 m wide electrical infrastructure corridor. These corridors were considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities will be avoided in the final siting and location of the proposed transmission line. The impact of the proposed project on cultural/heritage areas (archaeology and palaeontology) have been assessed in the form of a Heritage Impact Assessment attached as Appendix E2. Due to sensitive heritage features present on site, the site layout has been amended to avoid these features. Please see Appendix B for an amended site layout map including the avoided sensitive features.** **The project site is currently being used for agricultural purposes, predominantly grazing. The site is deemed to be of low agricultural potential and no agricultural sensitive areas occur within the wider project area. A Soils and Agricultural Potential Impact Statement (Appendix E5) was compiled using the extensive existing information available and is included within the BA Report to reflect the impact of the proposed project in terms of the land use and agricultural potential.** **As noted, an EMPr was compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced. The impact on the sense of place is difficult to predict and would potentially be ambiguous. This is due to the subjective nature of perceptions regarding the relative attraction or disturbance of the solar facility in a rural landscape. The visual impact and considerations have been assessed in the Visual Impact Assessment which is attached as Appendix E4. An environmental sensitivity map is included in Appendix B, based on the input obtained from the various specialist studies. Where possible sensitive features have been avoided by layout revisions.**
2.1.4. Municipal Economic Development Strategy ("LED Strategy").	**The 2012 !Kheis LED Strategy states that a great opportunity exists for the generation of green energy in the area, particularly solar energy, due to the area experiencing longer daylight hours, that is longer sunshine hours.**
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? 2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	**This is addressed and included within the Social Impact Statement (Appendix E5).**
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	**This is addressed and included within the Social Impact Statement (Appendix E5).**

NEED		
Question		Response
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?		**This is addressed and included within the Social Impact Statement (Appendix E5).**
2.5. In terms of location, describe how the placement of the proposed development will:		
2.5.1.	result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.5.2.	reduce the need for transport of people and goods,	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.5.3.	result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use. This project is a renewable energy project and not a transportation project.**
2.5.4.	compliment other uses in the area,	**The preferred project site is currently being used for agricultural purposes, predominantly grazing. The site is deemed to be of low agricultural potential and no agricultural sensitive areas occur within the wider project area. A Soils and Agricultural Potential Impact Statement is included within the Report (Appendix E5) to reflect the impact of the proposed project in terms of the land use and agricultural potential.**
2.5.5.	be in line with the planning for the area,	
2.5.6.	for urban related development, make use of underutilised land available with the urban edge,	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.5.7.	optimise the use of existing resources and infrastructure,	**The proposed project will connect the proposed Skeerhok SEF to the existing Eskom Nieuwehoop Substation and will make use of the Transnet Service Road as an access road as much as possible for maintenance purposes. Where no existing access is present, due to the low traffic anticipated it will be provided in the form of jeep tracks, as opposed to formalised roads.**
2.5.8.	opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	**This project is a renewable energy project and not related to bulk infrastructure expansion.**
2.5.9.	discourage "urban sprawl" and contribute to compaction/densification,	**Not applicable as the project is not proposed in an urban area where social impacts are expected to manifest.**
2.5.10.	contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	**N/A the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.5.11.	encourage environmentally sustainable land development practices and processes,	**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. No impacts of high significance (with the implementation of mitigation measures) were identified in the BA. As noted in Appendix E5 of this Report (Soils and Agricultural Potential Impact Statement), due to the climate and soil limitations, the site is not suitable for any agricultural land use other than low intensity grazing. Currently, the site is used for grazing, which could continue in the**

NEED	
Question	**Response**
	surrounding regions, together with the generation of additional income via the leasing of the land to the Applicant. **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.**
2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	**Please refer to Section A5 for a description of the process undertaken to identify the site is a preferred site for the proposed transmission line.**
2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	**This is addressed and included within the Social Impact Statement (Appendix E5).**
2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	**The impact of the proposed project on cultural/heritage areas (archaeology and palaeontology) was assessed and forms Appendix E2 of this Report.**
2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	**Several solar PV projects and associated electrical infrastructure are proposed in the area, which lends itself potentially to a renewable energy development area.** **The proposed solar facility and associated electrical infrastructure falls within one of the eight REDZ areas now gazetted. Therefore, when renewable projects operate within these areas, Eskom may be able to unlock funding to proactively construct grid infrastructure 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.**
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	
2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	**This is addressed and included within the Social Impact Statement (Appendix E5).**
2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise,	**This is addressed and included within the Social Impact Statement (Appendix E5).**

NEED	
Question	**Response**
manage and remedy negative impacts?	
2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	
2.13. What measures were taken to:	
2.13.1. ensure the participation of all interested and affected parties,	**The PPP undertaken to date as part of the BA process is included in Section C and Appendix D of this Report. Various methods have been employed to notify potential (I&APs) of the proposed project, namely, through adverts, site notices on site and in Kenhardt and notification letters.**
2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	
2.13.3. ensure participation by vulnerable and disadvantaged persons,	
2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	**The BA process has taken cognisance of all interests, needs and values espoused by all interested and affected parties. Opportunity for public participation will be provided to all I&APs throughout the BA process in terms of the 2014 EIA Regulations, as amended.**
2.13.5. ensure openness and transparency, and access to information in terms of the process,	**The PPP undertaken to date as part of the BA process is included in Section C and Appendix D of this Report. This will be updated with the PPP undertaken during the distribution of the Draft BA Report. Various methods have been employed to notify potential (I&APs) of the proposed project, namely, through adverts, site notices on site and in Kenhardt and notification letters.**
2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition	**The BA process has taken cognisance of all interests, needs and values adopted by all interested and affected parties.**

NEED	
Question	**Response**
were given to all forms of knowledge, including traditional and ordinary knowledge,	
2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was promoted.	**Public participation of all I&APs has been promoted and opportunities for engagement will be provided throughout the BA process.**
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	**The proposed project presents viable long term benefits for the community and society in the Kenhardt area. Recommendations made within the Social Impact Statement (included in Appendix E5 of this Report) and those included in the EMPr section of this Report (Appendix G) have the potential to facilitate more options to local community members in terms of socio-economic benefits.**
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	**An EMPr has been developed to address health and safety concerns. An Environmental Control Officer will be appointed to monitor compliance.**
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1. the number of temporary versus permanent jobs that will be created,	**This is addressed and included within the Social Impact Statement (Appendix E5).**
2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	
2.16.3. the distance from where labourers will have to travel,	
2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits),	
2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17. What measures were taken to ensure:	
2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment,	**Legislation, policies and guidelines, which could apply to impacts of the proposed project on the environment, have been considered. The scope and content of this BA Report has been informed by applicable integrated environmental management legislation and policies. Section A7 of this Report and the specialist studies included in this Report also provide a description of the relevant applicable legislation that the proposed development complies with.**
2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	**Public Participation has been undertaken as part of the BA process, and to this date the CSIR has not received information on potential conflicts of interest.**
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the	**Public participation forms an integral part of the Environmental Assessment Process and assists in identifying issues and possible alternatives to be**

NEED	
Question	**Response**
public interest, and that the environment will be protected as the people's common heritage?	**considered during the BA Process.**
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	**The proposed mitigation measures included in the EMPr (Appendix G) of this Report have been informed by the Specialist studies undertaken and this includes a detailed assessment of the environment as well as the impacts associated with the proposed development. Solar energy facilities and associated electrical infrastructure can be dismantled and completely removed from the site utilised for the development and do not permanently prevent alternative land-uses on the same land parcel. Based on material and socio-economic terms, and measured to the value of the best alternative that is not chosen, the proposed project will result in positive opportunity costs.**
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	**The EMPr (Appendix G) of this proposed project must form part of the contractual agreement and be adhered to by both the contractors/workers and the applicant.**
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	**Due to both the climate and soil limitations, the site is not suitable for any agricultural land use other than low intensity grazing. The site is within one of South Africa's eight proposed REDZs, and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impact, economic and infrastructural factors. These factors include an assessment of the significance of the loss of agricultural land. Renewable energy development is therefore a very suitable land use option for the site. The proposed overall project would however be more robust in terms of economic viability and profitability while also being largely uninfluenced by climate change variables. The proposed project contribute to local socio-economic upliftment through job creation.**
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	**In assessing the cumulative impacts of the proposed development, all the projects that fall within a 30 km radius of the proposed Skeerhok projects and supporting electrical infrastructure were considered. The incidence and severity of the in-migration of job seekers and increases in social deviance are likely to increase with the development of more solar PV projects and associated electrical infrastructure in the area. The cumulative socio-economic benefit offered by industrial scale development in the area outweighs the negative impacts associated with economic growth. The cumulative impact of the proposed development is therefore considered to be of moderate significance.**

A.7 Applicable legislation

The scope and content of this BA Report has been informed by the following legislation, guidelines and information series documents (**Table 8**). It is important to note that the specialist studies included in Appendix E of this BA Report also include a description of the relevant applicable legislation.

Table 8: 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 (4) 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 E1 of this BA Report (Ecology Impact Assessment), the National Forest Act (Act 84 of 1998) governs the removal, disturbance, cutting or damage	DAFF	1998

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
	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. Listed species that may be encountered in the area include *Boscia albitrunca* and possibly *Acacia erioloba*. Neither of these species were identified as falling within the proposed Skeerhok Alternative 2 corridor. It is unlikely that an application for the "clearing of a natural forest", as defined within the Act, will be required on the route in question.		
National Water Act (NWA) (Act 36 of 1998)	The need for a WUL will be confirmed 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 Ecology Impact Assessment (Appendix E1 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.	Department of Water Affairs	1998
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 E2).	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.	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 Ecology Impact Assessment (included in Appendix E1 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. 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
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 transmission line development, taking place in the identified Bushmanland Arid Grassland	National DEA	September 2004

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
	environment, 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 the Ecological Impact Assessment Report (Appendix E1), as well as possible other 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.		
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 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).	Department of Science and Technology	2007

SECTION B: DESCRIPTION OF THE AFFECTED ENVIRONMENT

This Section of the BA Report provides an overview of the affected environment and surrounding region of the proposed development of electrical infrastructure to support the Skeerhok SEF. The receiving environment is understood to include biophysical, socio-economic and heritage aspects which could be affected by the proposed development or which in turn might impact on the proposed development. The information presented in this section has also been derived from the specialist studies that are included in Appendix E of this BA Report.

It is important to note that this chapter intends to provide an overview of the receiving environment based on the specialist studies. Detailed descriptions of the proposed project site focused on specific environmental aspects are provided in the relevant specialist studies (which are included in Appendix E of this BA Report).

B.1 Property details

Table 9 below provides the details of the affected properties for the Skeerhok Alternative 1, 2 and 3 transmission lines.

Table 9: Details of the Affected Properties

	Skeerhok Alternative 1	Skeerhok Alternative 2	Skeerhok Alternative 3
Farm name and number	1. Portion 0 of Smutshoek Farm 395 2. Portion 9 of Gemsbok Bult Farm 120 3. Portion 5 of Gemsbok Bult Farm 120 4. Portion 3 of Gemsbok Bult Farm 120 5. Portion 1 of N'Rougas Zuid Farm 121 6. Portion 3 of Onder Rugzeer Farm 168 7. Portion 0 of Boven Rugzeer Farm 169	1. Portion 0 of Smutshoek Farm 395 2. Portion 3 of Gemsbok Bult Farm 120 3. Portion 9 Gemsbok Bult Farm 120 4. Portion 5 of Gemsbok Bult Farm 120	1. Portion 0 of Smutshoek Farm 395 2. Portion 9 of Gemsbok Bult Farm 120 3. Portion 3 of Gemsbok Bult Farm 120 4. Portion 5 of Gemsbok Bult Farm 120
SG Code	1. C03600000000039500000 2. C03600000000012000009 3. C03600000000012000005 4. C03600000000012000003 5. C03600000000012100001 6. C03600000000016800003 7. C03600000000016900000	1. C03600000000039500000 2. C03600000000012000003 3. C03600000000012000009 4. C03600000000012000005	1. C03600000000039500000 2. C03600000000012000009 3. C03600000000012000003 4. C03600000000012000005
Current land-use zoning	Agricultural land-use - mainly livestock grazing. A servitude for the proposed transmission line will need to be registered on the affected farm portions. Servitude requirements also need to be discussed between the Applicant and Eskom.		

B.2 Topography and landscape OF THE SITE

Based on the elevation profiles derived from Google Earth, as well as the findings of the specialists during site work and the topographical profiles included in the Visual Impact Assessment (Appendix E4 of this BA Report), the elevation characteristics of the project area are very slight (ranging from ~ 900 m – 1050 m) with an average of slope of 0.5 %. The broader landscape of the study area is generally flat, with a few rocky hills occurring sporadically. The Terrestrial Ecology Impact Assessment (Appendix E1 of this BA Report) notes that few elevated features are evident across the corridors.

B.3 Groundwater, Soil and Geological stability of the site

According to the 1:500 000 scale groundwater map of Prieska (2920) the entire study area hosts an intergranular and fractured aquifer (i.e. the wind-blown sands and river alluvium as well as fractures within the bedrock constitutes an aquifer) with an average borehole yield of 0.1 ℓ/s to 0.5 ℓ/s (GEOSS, 2014). With such low rainfall in the area, and thus associated low groundwater recharge conditions, it is anticipated that the groundwater quality will be poor. The area is characterised as having low borehole yields, determined from the boreholes that are in close proximity to the proposed site.

The proposed project is located across two very similar land types, Ag6 and Ag5. These land types comprise predominantly shallow, red, sands to loamy sands on underlying rock, hard-pan carbonate, or hard-pan dorbank. The soils fall into the arid Silicic, Calcic, and Lithic soil groups according to the classification of Fey (2010).

The underlying geology of the sites belongs to the Vyfbeker Metamorphic Suite and represents supracrustal rocks (sediments which have undergone several episodes of metamorphism and deformation) of the Kakamas Terrane (Johnson, Anhaeusser, and Thomas 2006). Erosion resistant rocks of this suite form distinctive low rocky hills that are often visible in the distance, although none occur in the study area. Vegetation consists of low shrubs and grassland with occasional quiver trees (kokerboom), and produces a mottled background to most views which is effective at making some development types such as power lines and pylons blend in with the background.

B.4 Terrestrial Environment

Groundcover:
The proposed site is located within the Nama-Karoo biome of South Africa and as noted previously, falls within the Bushmanland Arid Grassland (Nkb3) () vegetation type (Mucina and Rutherford 2006) is classed as Least Threatened in terms of Ecosystem Threat Status as per the National Environmental Management: Biodiversity Act (Act 10 of 2004). This vegetation unit is the second most extensive vegetation type in South Africa extending from around Aggeneys in the east to Prieska in the west. It is associated with freely draining alkaline soils common to this area. This veld type is an arid grassland form comprising of extensive plains dominated by sparse, intermittent pockets of *Aristida* spp and *Stipagrotis* spp.

Although a graminoid dominated region, the corridors traverse an area that has been subject to extensive grazing, with limited woody specimens comprising primarily of *Acacia karoo*. The habitat form and structure that prevails across the proposed site is generally of uniform structure, offering limited species diversity.

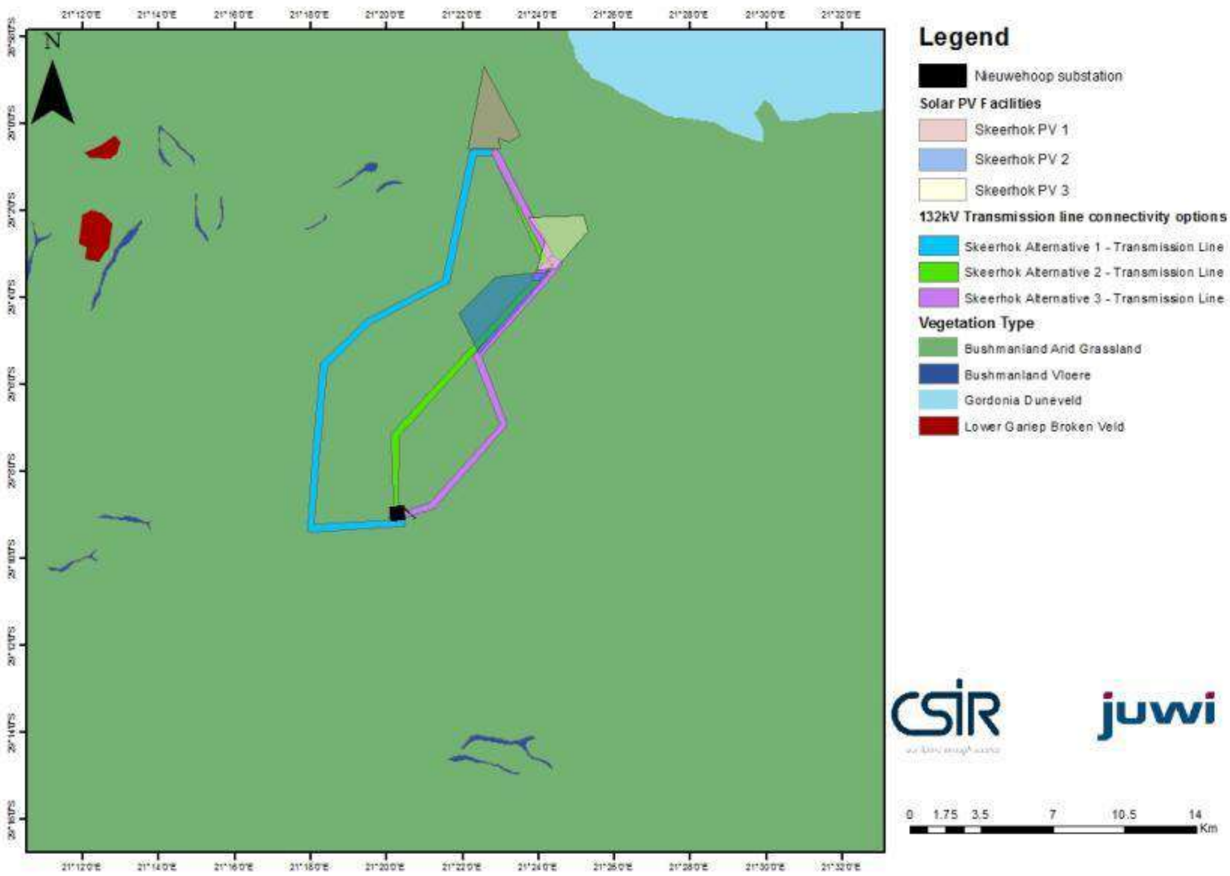

Figure 2: Vegetation Types associated with the proposed Skeerhok transmission line connectivity options.

Fauna:

Fauna that are endemic to the region are considered to be typical of a xeric environment, with limited habitat variation across the study area giving rise to a primarily uniform distribution of such species.

As is typical of the region, a large number of fossorial and burrowing species, including mammals and invertebrates, were identified across the subject area. Such species included ground squirrel (*Xerus inauris)* and suricates (meerkat) (*Suricata suricata*). Also sporadically present within the site are aardvark (*Orycteropus afer*), as well as the porcupine (*Hystrix africaeaustralis*).

Identified during the site reconnaissance was the Bushmanland tent tortoise (*Psammobates tentorius verroxii*), , one of three sub species of tent tortoise within South Africa. This relatively small tortoise is not typical of the “tent tortoise family”, in terms of its carapace shape and form. Although listed in the IUCN Red List of Threatened Species as ‘least concern”, the tortoise is generally sparsely distributed across the desert regions of South Africa. Other tortoise species that are likely to occur within the subject area include the serrated tortoise (*Psammobates oculiferus*) and possible species of padloper (*Homopus spp*).

Reptiles, smaller vertebrates and other invertebrates are also likely to show varying trends in populations across the study site. As indicated above, habitat and climatic state are the major drivers of faunal presence within the region, with most species being transitory in any given area and their presence being subject to the availability of vegetation cover, water and other resources.

<u>Avifauna:</u>
This arid area is home to several large terrestrial bird and raptor species, the most important of which are Ludwig's Bustard *Neotis ludwigii*, Kori Bustard *Ardeotis kori*, Secretarybird *Sagittarius serpentarius*, Karoo Korhaan *Eupodotis vigorsii,* Verreaux's Eagle *Aquila verreauxii* and Martial Eagle *Polemaetus bellicosus*. In addition to being classified as threatened regionally and in some cases globally, most of these species are facing significant threats to their survival from existing impacts in the arid parts of South Africa. In addition, this area is home to an assemblage of arid zone adapted smaller bird species including larks, sparrow-larks, chats and others. Most important of these from a conservation perspective are Red Lark *Calendulauda burra* and Sclater's Lark *Spizocorys sclateri*, both of which are listed as regionally threatened species (Vulnerable and Near-threatened respectively), have very restricted ranges and have been recorded in the broader area within which the study area is situated. Stark's Lark *Spizocorys starki* is also an important endemic present in the area, and Burchell's Courser *Cursorius rufus* (Vulnerable) is a nomadic species which occurs in the broader area.

B.5 Hydrological features

The proposed project lies within a xeric to semi xeric environment with rainfall confined to a short period during the summer/autumn months. The prevailing climate regime indicates that rainfall is generally sparse, and together with the sandy percolative soils that prevail across the region there is limited potential for extensive wetland and riparian features.

Surface flow within the study area is primarily by means of shallow channels that may vary on a temporal basis according to factors such as changes in the prevailing wind regime, vegetation growth or the movement of livestock. As such, these dendritic channels are often ephemeral in nature and do not show specific hygrophilous vegetation characteristics as may be defined, nor do they show the presence of geohydromorphic soils. The absence of these indicators is due primarily to the fluctuating levels of inundation in these drainage features, over extended periods of time which is also driven by the intensity and erratic nature of rainfall experienced in this region. Farmers in the region note that these features show short term inundation during high rainfall periods, in events that arise "every 4 to 5 years" (S Strauss *pers. comm.*). These features are often termed "whaadies", a term derived from the Arabic name for these intermittently flowing streams. Flow is generally sluggish under these conditions, and following the cessation of rains, the water rapidly drains from site on account of the percolative, sandy conditions, or is lost to evaporation.

Although short lived, in terms of the presence of water within these features, these drainage lines do bestow intermittent hydrological benefit to the landscape and can be considered groundwater "recharge zones" in respect of the local subsurface hydrology.

Surface drainage in the study area is generally through a number of minor dendritic drainage features which feed two larger drainage systems, namely the N'Rougas se Loop and the Wolfkop se Loop, located to the south. Some drainage may also serve the more southerly Rugseers Rivier. The three corridor options fall within one or more of the three primary catchments in the region, these being the N'Rougas se loop, Wolfkopse loop and Rugseers River, which in turn all drain into the Hartbees River (Figure 3).

It is important to note that although Alternative 1 and 2 traverse the minor drainage feature associated with the Wolfkop se Loop drainage system and identified as an ESA, the hydrological specialist who undertook a site visit and assessment of the area, does not deem this feature to have any sensitivity.

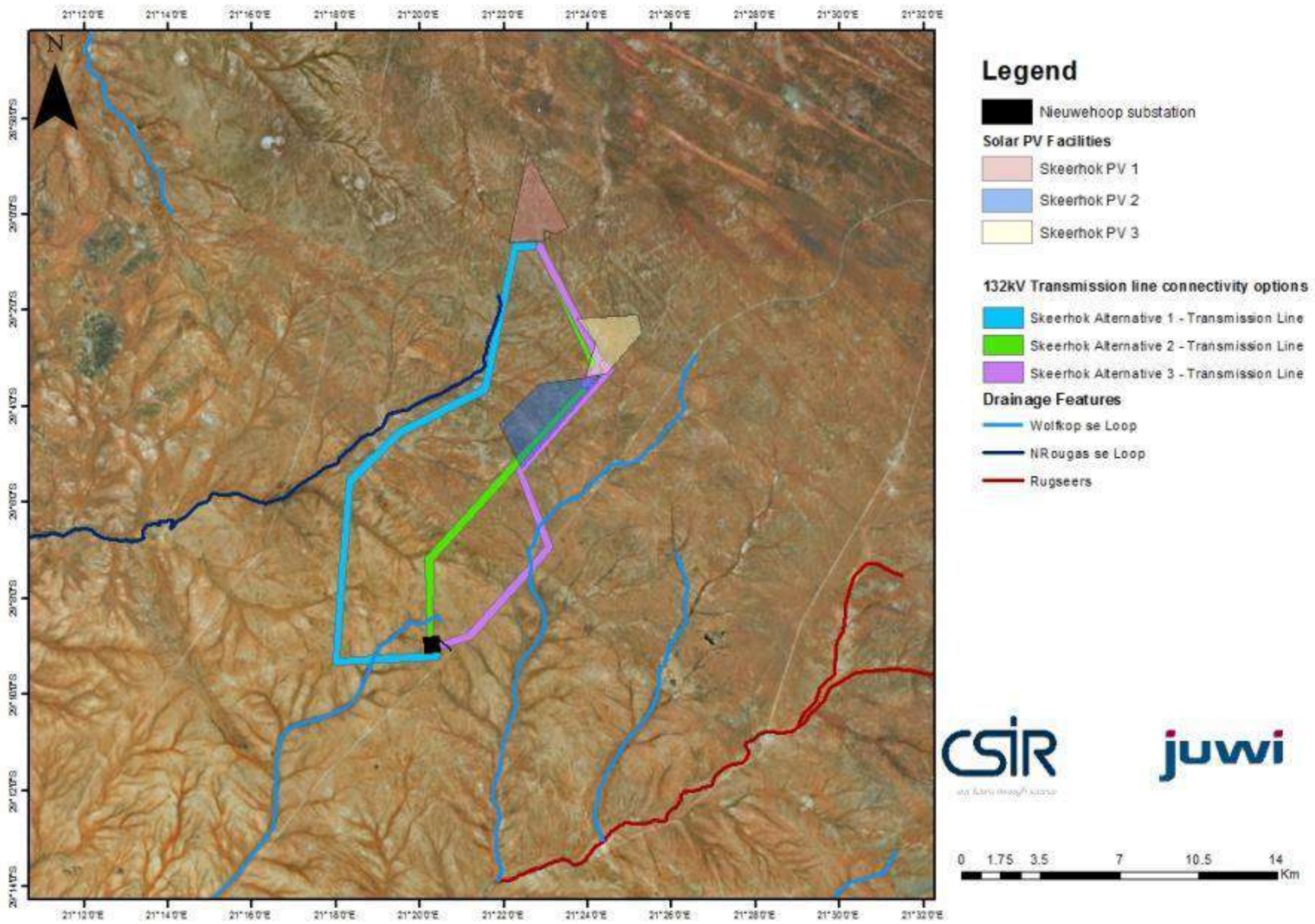

Figure 3: Proposed project area in relation to the drainage features in the region

B.6 Biodiversity planning

Based on the sensitivity screening undertaken for the site, the proposed project area does not fall within any threatened ecosystem, National Protected Areas or National Protected Area Expansion Strategy (NPAES) Focus Areas. As noted previously, the proposed project falls within the Bushmanland Arid Grassland veld type (NKb3), which is an extensive habitat form, located primarily to the south of the Orange River, but may include a number of smaller habitat forms within its broader extent. This type of vegetation is classified as least threatened (i.e. this vegetation type is not listed as Threatened Ecosystems under the National Environmental Biodiversity Act (NEMBA)).

In terms of the National Biodiversity Assessment (NBA) (2011), rivers are classified into critically endangered, endangered, vulnerable and least threatened. The proposed project traverses and/or is in close proximity to the minor drainage features occuring in the region. These features are classified as Class B (Largely Natural) National Freshwater Ecosystems Protected Areas (NFEPA). These features have also been identified as Ecological Support Areas in terms of the SANBI Conservation Plan for the Northern Cape (Figure 4).

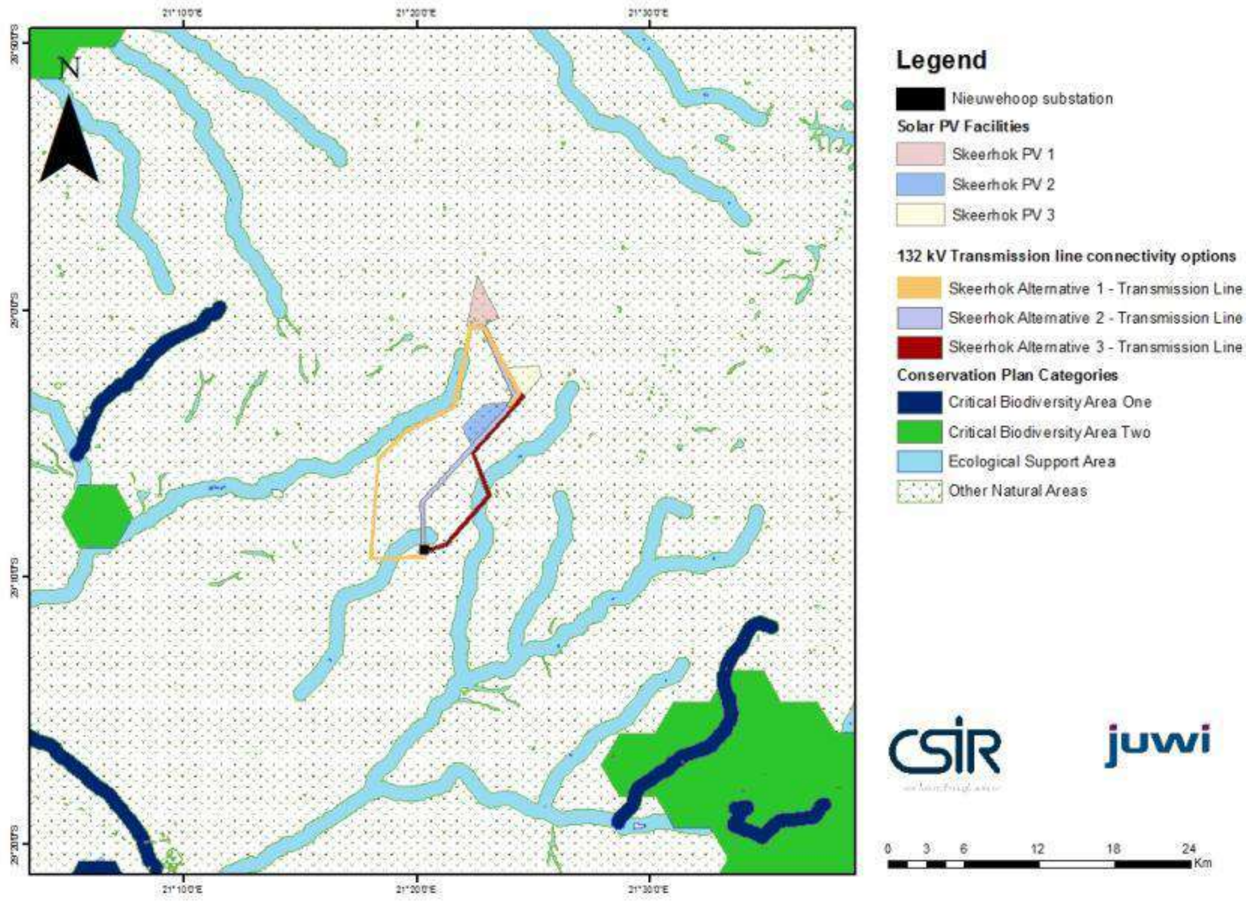

Figure 4: Northern Cape Biodiversity Planning Categories in relation to the proposed project area.

B.7 Heritage profile

Bushmanland is well known for the vast expanses of gravel that occur in places and which frequently contain stone artefacts in varying densities (Beaumont *et. al* 1995). Such material is often referred to as 'background scatter' and is generally of limited significance (Orton 2016i). At times, however, the scatter can become very dense and mitigation work is occasionally called for. The artefacts located in these contexts are largely Early Stone Age (ESA) and Middle Stone Age (MSA) and date to the middle to late Pleistocene. They are not associated with any other archaeological materials, since these would have long since decomposed and disappeared. The Heritage Impact Assessment study (Appendix E2) undertaken as part of this BA Process noted that previous experience in the general vicinity suggests that such dense accumulations of background scatter artefacts are unlikely to occur in this part of Bushmanland.

Of potentially more significance, however, are Later Stone Age (LSA) sites which are commonly located along the margins of water features in Bushmanland. These features include both pans and ephemeral drainage lines. Such sites have been identified in the broader vicinity in association with pans but artefact scatters associated with drainage lines are rare (Orton 2014a, 2014b, 2014c, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g, 2016h, 2016j, 2016k, 2016l). These sites would typically contain mostly stone artefacts, but fragments of ostrich eggshell (from eggs used as water containers and also as a food source) and pottery are also found at times, while bone is rare and likely confined to sites that are very recent. While no sites have ever been sampled in the vicinity of the present study area, excavations to the northeast of Pofadder at sites adjacent to small water holes demonstrate this pattern well (Orton 2016a). Similar LSA sites can also be found in association with rocky outcrops. Because of their positions along water courses and adjacent to rocky areas, many of these sites get avoided by development proposals because of the need to avoid the relevant natural features. Despite the increased likelihood of locating archaeology along streams, Morris (2009) noted that a search along the banks of the Hartebeest River close to Kenhardt, where he expected elevated frequencies of archaeological material, revealed virtually nothing. This is in contrast to a section of river bank some 11.5 km south of the Nieuwehoop Substation along which a dense concentration of LSA and historical sites (including contact sites) was found (Orton 2016d).

Another kind of archaeological site fairly commonly encountered in Bushmanland is small rock outcrops that have been quarried as a source of stone material for making stone tools. Several such occurrences – usually of quartz – have been seen in the general area but these are not significant sites.

A few rock engravings and paintings are known from the broader area (Louw Roux Bushmanland 2013). From the limited information available and from observations made along the Hartebees River by the present author, the engravings tend to be naturalistic images produced by the Bushmen, while the paintings are geometric images, produced by the Khoekhoen. The latter are not well known from the area (Orton 2013), although examples have been seen in the region (David Morris, pers. comm. 2015; Orton 2016g). Painted art is also very rare but again, examples are known, particularly on large granite boulders like that recorded by Orton (2016g) some 2.5 km away from the south-eastern part of the Alternative 3 corridor and 7 km east of the Nieuwehoop Substation (Figure 5).

Figure 5: View of the context of the one painted site known from within the vicinity of the study area (ASHA, 2018).

The Anglo-Boer War was fought across much of the Northern Cape interior, but information on the role of Kenhardt appears difficult to locate. The town was occupied by the Boers in late February 1900 after they convinced the magistrate that they had a large gun and would fire on the town if it did not surrender. They later surrendered to the British who occupied the town on 31st March 1900. By mid-1900 there were perhaps 100 Cape Rebels detained in a camp outside of Kenhardt (Grobler 2004). The British raised a local force known as the Border Scouts in Upington in May 1900. Many were mixed-race individuals, some local farmers, others Kalahari hunters, but all disliked the Boers. The scouts were responsible for a large area of the north-western Cape Colony centred on Upington and Kenhardt. They eventually numbered 786 by January 1901 and were under the command of Major John Birbeck (AngloBoerWar.com 2015; Rodgers 2011). At the beginning of 1902 there were 150 Border Scouts stationed at Kenhardt. Two boers, H.L. Jacobs and A.C. Jooste, were accused of treason and executed in the town on 24 July 1901 (Grobler 2004). A memorial stands there to their honour (Green Kalahari n.d.). Events around Kenhardt were likely not that important and this execution does not even feature in the Boer War timeline provided by Packenham (1993: 291-294). No major action appears to have taken place around Kenhardt, although the Boers are known to have attacked a patrol on 17th May 1901, while the British attacked a Boer position on 25th June 1901 (AngloBoerWar.com 2015).

From an archaeological point of view the only material remains possibly related to occupation around the time of the Boer War are the series of contact period river bank scatters mentioned above. On one of these was a rusted pen knife handle with the portrait and name of Paul Kruger on it. This may indicate that a Boer commando had camped there (Orton 2016d).

The built environment is sparsely represented in rural Bushmanland because the farms tend to be so large. The vast majority of structures appear to be quite recent in age (20th century) and are of very limited heritage significance. In any case, the development will not directly affect any buildings.

Graves are also very rare. Some older farm complexes have small graveyards located close to their farm buildings, while suspicious isolated rocks, perhaps planted upright, may mark historical graves of early mobile farmers (the so-called trek boers). An example has been seen some 6.5 km to the southwest of the south-western corner of the Alternative 1 corridor (Orton 2016j), while another was seen in the footprint of the proposed Skeerhok PV3 (DEA ref 14/12/16/3/3/2/1035) (ASHA, 2018). Unmarked pre-colonial graves can, in theory, be located anywhere, although they are generally more common in sandy areas where excavation of graves was easier and in more productive areas where population densities would have been higher.

Although the SAHRIS Palaeosensitivity Map shows the study area to be largely of moderate sensitivity, the nature of the area in terms of palaeontology is such that a full palaeontological study was not deemed necessary by the appointed specialist. However, a desktop palaeontogical evaluation of was compiled for the greater project. The broader area is underlain by metamorphic rocks that are entirely unfossiliferous. The overlying Late Cenozoic superficial sediments are generally of low palaeontological sensitivity, although small, isolated pockets of high sensitivity can be found when fossils are trapped within aluvium related to pans and river terraces along larger water courses.
The Heritage Impact Assessment Report (Appendix E2) lists possible fossils that might be found in the area. It is however noted that none have been found there to date. Isolated bones and teeth (e.g. of mammals, fish, amphibians), ostrich eggshell fragments, freshwater molluscs, crabs, trace fossils (e.g. burrows), petrified wood, stromatolites, diatoms and pollen are all possible finds but deemed highly unlikely.

B.8 Socio-economic Character

It must be noted that documented data on the study area, particularly in terms of area specific (i.e. Kenhardt and surrounds) socio-economic data, is very limited. Accordingly, the available data is interpreted in terms of professional opinion and generally accepted trends within the study area and South Africa.

Demographic Profile:

The ZF Mgcawu District Municipality (DM) comprises six Local Municipalities namely: Mier; Kai! Garib; Khara Hais; Tsantsabane, !Kheis and Kgatelopele and is classified as a Category C municipality (Figure 3.13). The ZF Mgcawu DM covers an area of approximately 100 000 km2 (almost 30 % of the Province) (ZF Mgcawu DM IDP, 2014) and according to the 2011 Census has approximately 236 783 inhabitants.

The actual development footprint is located within the !Kheis Local Municipality. However, the closest urban center, Kenhardt, is located in the Kai !Garib Local Municipality.

A total of 16 703 households resides in the Kai !Garib Local Municipality, with 35 % of households being female headed. The total female population dominates the total male population by 8.5 % (Kai !Garib Draft IDP, 2014). Population of the working age demographic (i.e. 15 to 65 years) makes-up 70.5 % of the population, whereas those below 15 years of age comprise 24.4 % of the population, and the above 65 years age group makes-up 5.1 % of the population of the Kai !Garib Local Municipality. Accordingly, the dependency ratio (i.e. the economically active population vs. the non-economically active population: 24.4 % + 5.1 %) is 29.5 % (du Toit, 2015).

The !Kheis Local Municipality consists of a total of 4146 households, with 34.6 % of households being female headed. Population of the working age demographic (i.e. 15 to 65 years) makes-up 70.5 % of the population, whereas those below 15 years of age comprises 35 % of the population, and the above 65 years age group makes-up 5.1 % of the population (Statistics SA, 2015).

This data is suggestive of an area with a relatively high level of vulnerable people groups (i.e. woman and children) and, potentially, a corresponding high level of vulnerable households.

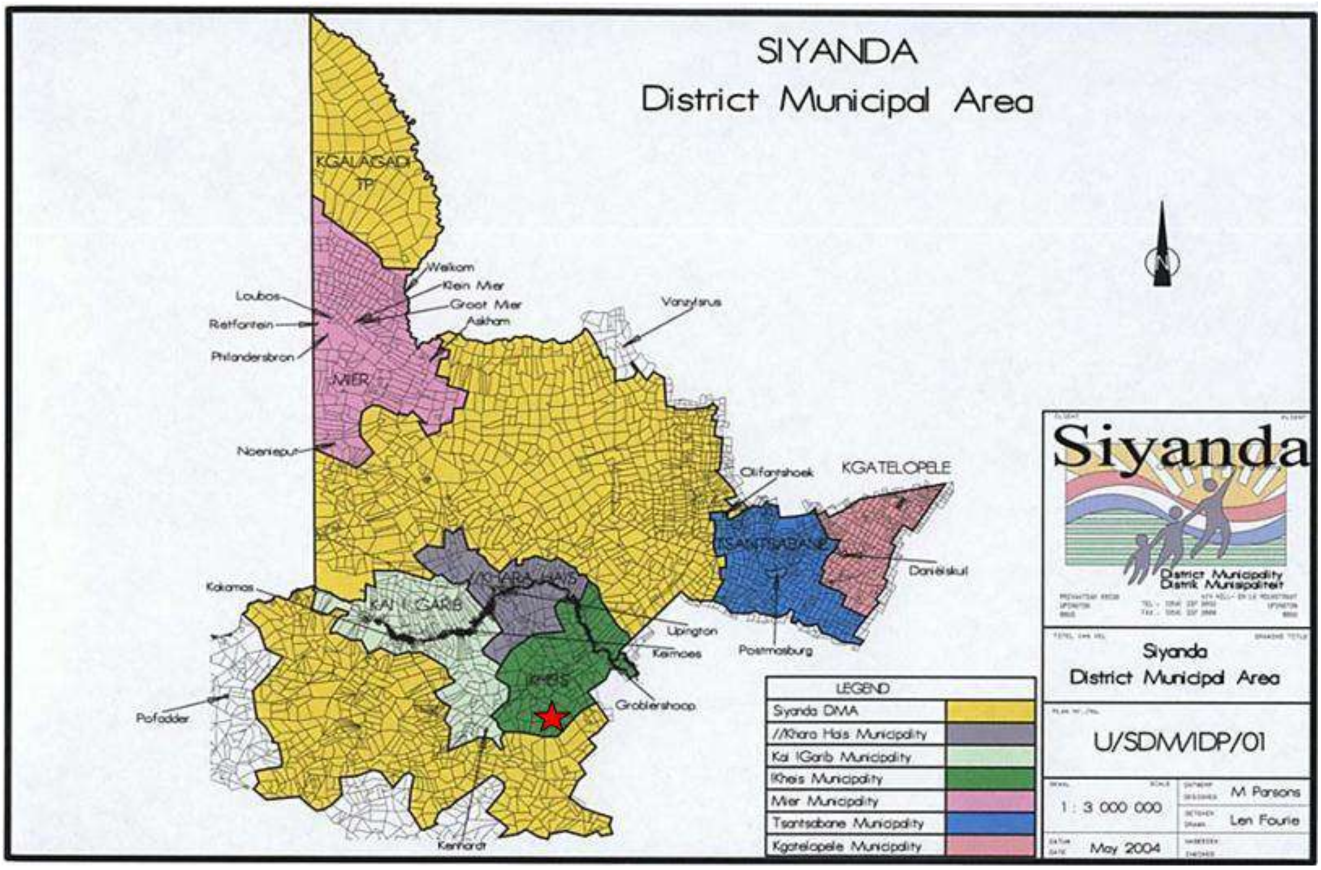

Figure 6: Siyanda DM (now known as ZF Mgcawu DM) boundary and boundaries of local municipalities (Siyanda DM IDP, 2013)

The !Kheis Local Municipality, in which the proposed project is located, has a population of 16 637, according to the 2011 Census (Statistics SA, 2015). As shown in Table 10 the !Kheis Local Municipality constitutes 8 % of the total population of the ZF Mgcawu DM.

Table 10: Population of the Local Municipalities within the ZF Mgcawu DM (Statistics SA, 2011)

Municipality	Census 2001	Census 2011	% of the total population	Difference	Area (Km^2)	Person/Km^2
Mier	7207	7003	3%	493	22468	0.3
Kai Garib	58 617	65 869	24%	799	26357	2.1
//Khara Hais	77 919	93 494	42%	25249	21780	4.6
!Kheis	16 538	16 637	8%	2797	11107	1.7
Tsatsabane	27 082	35 093	12%	4018	18330	1.5
Kgatelopele	14 743	18 687	9%	6755	2478	8.7
Total	**202 106**	**236 783**	**100%**	**35903**	**102520**	**2.3**

Afrikaans is the dominant language (76.4 %) and Setswana the second largest language (15.8 %) spoken in the ZF Mgcawu DM. Within the !Kheis Local Municipality 94 % of the population speaks Afrikaans and 1.9 % Setswana. The population of the ZF Mgcawu DM is predominantly Coloured (61.2 %), followed by Black Africans (29.8 %) and Whites (8.3 %), with the !Kheis Local Municipality containing a similar racial population group composition (as shown in Figure 7).

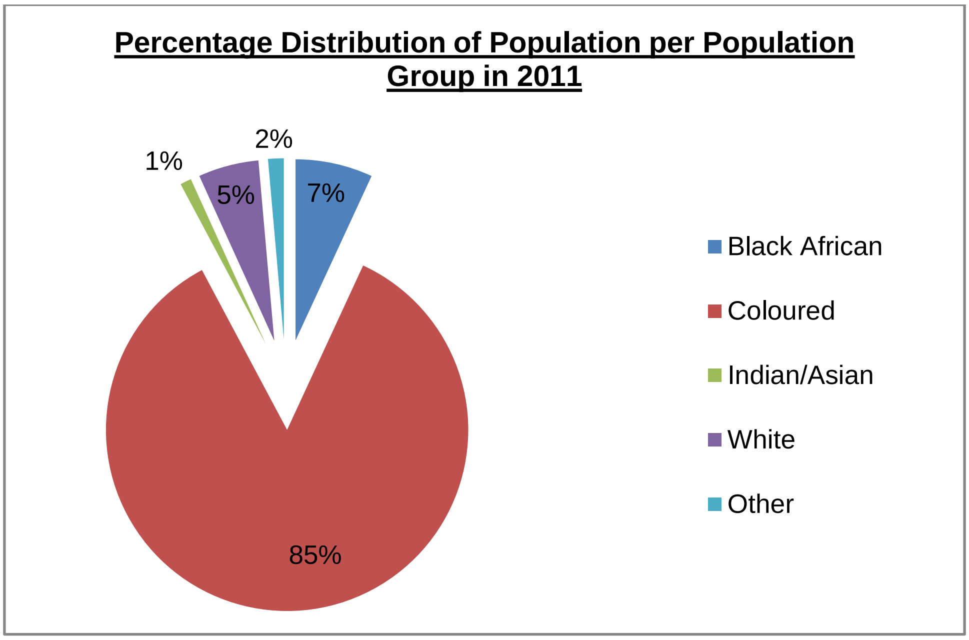

Figure 7: Percentage Distribution of Population per Population Group for the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

The age distribution of the ZF Mgcawu DM (shown in Figure 8 below) is represented by a majority of young people, i.e. persons younger than 40 years old (Statistics SA, 2011).

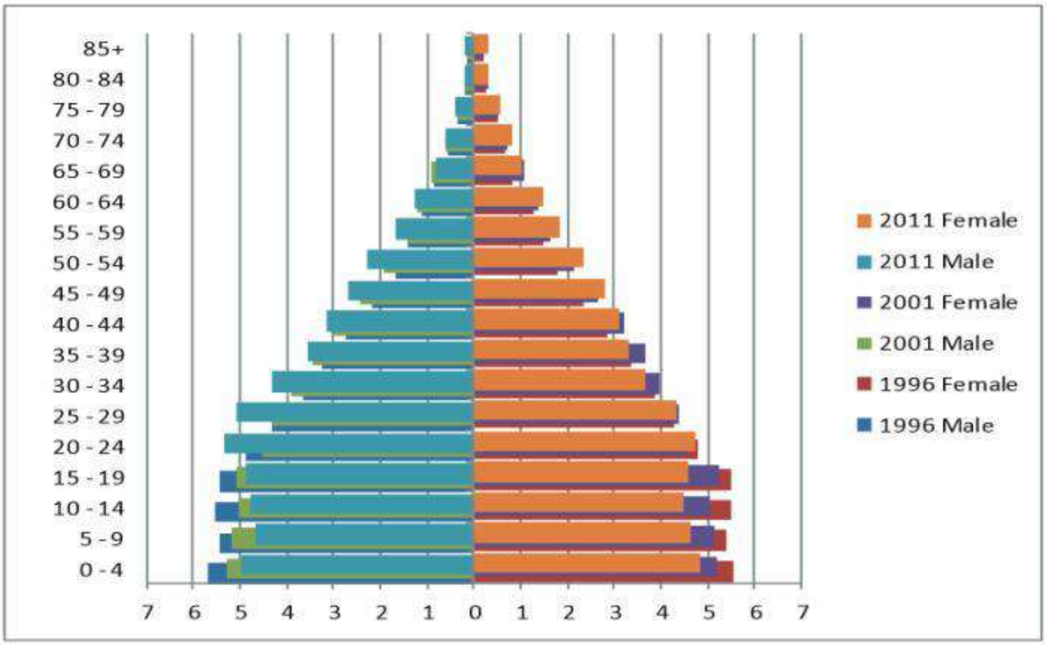

Figure 8: Age Distribution of the ZF Mgcawu DM (Statistics South Africa, 2011).

Economic Profile

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. Approximately 60 % of ZF Mgcawu DM's population has an income of between R 0 to R 800 per month. The majority of the population (i.e. 28.30%) within the !Kheis Local Municipality earns between the R 19 601 – R 38 200 income bracket, as shown in Figure 9 below, and approximately 7.7 % of the population has no income.

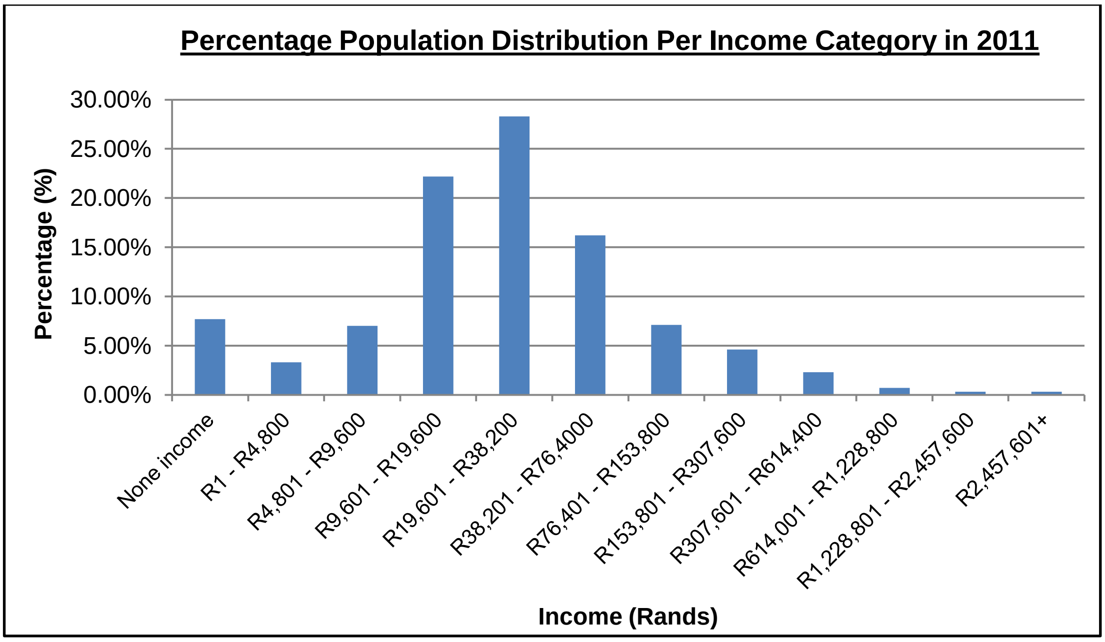

Figure 9: Income Distribution of the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

The 2011 census indicates that 22 % and 34 % of the economically active population (between the ages of 15-34) in the ZF Mgcawu DM and the !Kheis Local Municipality, respectively, are unemployed. The !Kheis Local Municipality has the highest unemployment percentage of all the local municipalities falling within the ZF Mgcawu DM. Also, nearly a third of the population is economically inactive which suggests that individual and household incomes generated in the study area are being used to support a substantial amount of dependents. This in turn exacerbates the level of household vulnerability in the area.

The unemployment rate for the Kheis Local Municipality in 2001 was 20 % and in 2011 was 28 % (Statistics SA, 2015). The official unemployment rate of 10 % (based on the 2011 Census) has decreased by 6.1 % since the 2001 Census measurement of 16.1 % for the Kai !Garib Local Municipality. The economic sector is dominated by agriculture which provides 51.8 % of jobs, followed by the Community and Government Services sector with 15.9 %. The number of jobs generated by the agricultural sector needs to be interpreted within the context of the Kai !Garib Municipality. The vast majority of the land area occupied by the Kai !Garib Municipality consists of agricultural land, accordingly, it is unsurprising that agriculture would register as the major employer at municipal (i.e. regional) level.

However, the distribution of jobs within urban centers, like Kenhardt, does not necessarily follow this agriculturally dominated pattern. If the prevailing practice of predominantly male-oriented employment within the agricultural sector (specifically in terms of sheep farming) is assumed, the 51.8 % of jobs generated by the agricultural sector could in fact be heavily skewed towards men. This in turn is suggestive of a female dominated population which is heavily dependent on other economic sectors (i.e. non-agricultural sectors) for their income, and could very well imply that socio-economic impacts on urban centers, like Kenhardt, could be of more significance than farm-based impacts.

In terms of education, only 9.5 % of the total population of ZF Mgcawu DM has no formal schooling, while 13.5 % of the !Kheis Local Municipality's population is unschooled. Based on the 2011 Census, 3.1 % of the population of the !Kheis Local Municipality has no form of education, 55 % has some primary schooling, 7.5 % completed primary school, 5.7 % completed secondary school and 0.5 % has higher education, as shown in Figure 10 below.

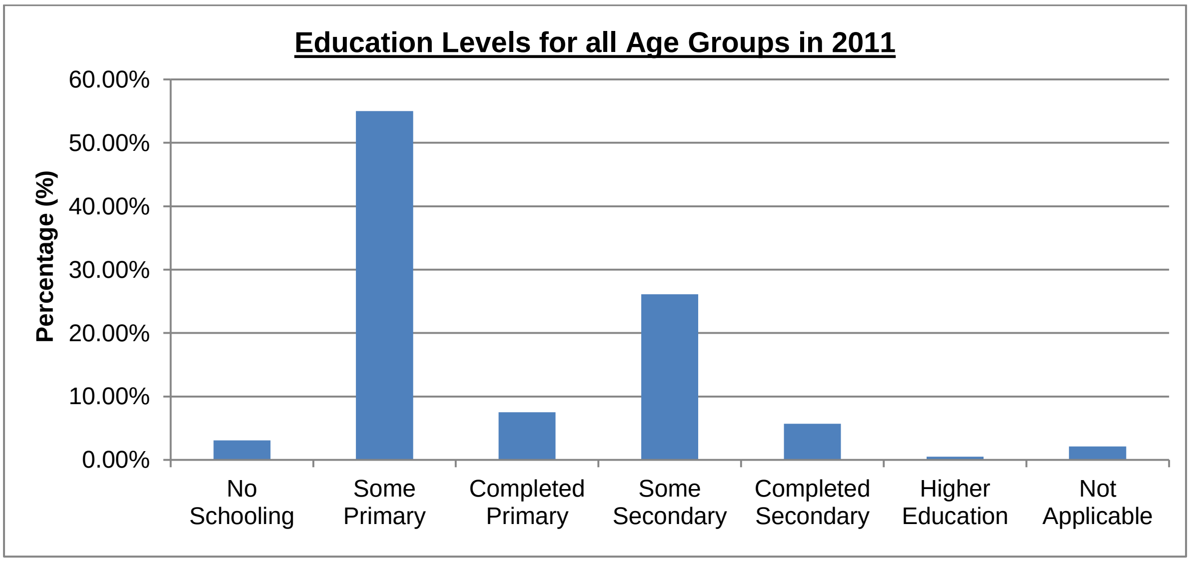

Figure 10: Education Levels of the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

The economy of the ZF Mgcawu DM is dominated by mining and agriculture and accounts for up to 30 % of the Northern Cape's economy. Agriculture is the major industry in the district, contributing to job creation and economic growth. The region is characterised by livestock farming which occurs mainly on large farms that are managed for extensive production. The majority of these farms are privately owned. According to the !Kheis Local Municipality's IDP, the area is ideal for stock-farming, with the main focus being on sheep farming. The stock-farming industry also provides work to local people.

The ZF Mgcawu DM has a unique landscape that has the potential to contribute to and provide for a range of local and international tourist activities and destinations. The main attractions and destinations in the area are the Augrabies Falls National Park and the Kgalagadi Transfrontier Park. The presence of the Orange River is also a tourism asset providing several tourism opportunities. The natural appearance of the area also supports agricultural tourism. The ZF Mgcawu DM IDP indicates that tourism is one of the most important economic sectors in the Northern Cape as well as within the ZF Mgcawu DM boundaries. Tourism is a growing component of the economy of the Northern Cape and the IDP indicates that, after the agricultural sector, the local tourism industry should become the most important economic activity in the area within the next ten years. This is based on the current growth rate in both development and employment.

B.8.1 Socio-Economic Value of the Proposed Project

Expected capital value of the proposed project on completion	**R25 000 000**
Estimated number of new employment opportunities that will be created in the construction phase of the proposed project	**10-40**
Expected value of the employment opportunities during the construction phase of the proposed project	**R100 000 – R250 000**
Percentage of the value of employment opportunities that will accrue to previously disadvantaged individuals during the construction phase of the proposed project	**80%**
Estimated number of permanent new employment opportunities that will be created during the operational phase of the proposed project	**Unsure (Eskom ownership)**
Expected current value of the employment opportunities during the first 10 years during the operational phase of the proposed project	**Unsure (Eskom ownership)**
Percentage of the value of employment opportunities that will accrue to previously disadvantaged individuals during the operational phase of the proposed project	**Unsure (Eskom ownership)**

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. The BA Process commenced in September 2017, during which the proposed project was announced in the public domain via an integrated notification process. The integrated PPP included notifying the public of the BA Process (i.e. Skeerhok – Transmission Line (i.e. this project)) and the Skeerhok PV 1, 2 and 3 projects (Draft EIA Reports submitted 15 February 2018). However, this Draft BA Report will have a different 30 day public comment period to the Draft EIA reports for the SEF, as this report is being released after the Draft EIA Reports. I&APs will be notified of this difference in comment period when this Draft BA report is released.

The BA Report is currently being released to I&APs, Stakeholders and Organs of State (including the National DEA) for a 30-day comment period. The Application for EA has been submitted to the National DEA at the same time as the BA Reports.

All comments submitted during the 30-day review of the Draft BA Report (which is being circulated during the consultation process) will be incorporated into the finalised BA Report, as applicable and where necessary. The finalised BA Report 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).

C.1 Advertisement and notice

Appendix D of this BA Report includes proof of the placement of the newspaper advertisement and site notice boards.

Newspaper Advertisement:

In order to notify and inform the public of the proposed project and invite I&APs to register on the project database, the BA Process (combined with the EIA Processes) were advertised in a local newspaper. Specifically, the advertisement was placed in Die Gemsbok newspaper on 6 October 2017 (Proof can be seen in **Appendix D** to this Draft BA Report). The newspaper advertisement 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.

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 **Appendix D** on 19 September 2017. Overall, 10 notice boards were placed for the proposed project.

C.2 Determination of appropriate measures

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 letter to I&APs, Stakeholders and Organs of State). 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 EIA Process in the local print media), an initial database of I&APs (including key stakeholders and Organs of State) was developed for the BA Process. Appendix D 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 following the project announcement.

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).

At the time of compiling the BA Report for release to I&APs, Organs of State and stakeholders in February 2018, the database included 74 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.

As noted in the sections above, the Skeerhok Transmission Line Alternative 1 will traverse 7 farm portions in the Northern Cape and Alternative 2 and 3 will each traverse 4 farm portions in the Northern 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. September 2017), and they were informed of the proposed project and included on the database of I&APs (as included in Appendix D). Therefore, written notice has been provided to the occupiers of the site (in accordance with Regulation 41 (2) (b) (i) of the 2014 NEMA EIA Regulations (as amended)).

C.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 or undertaken.

C.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 advertisement (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, **74 I&APs** were registered on the project database. A copy of the updated I&AP database is included in Appendix D of this BA Report.
- **Letter 1 to I&APs**: As noted above, I&APs were notified via a Letter (dated 1 September 2017) of the Project Initiation Phase. Letter 1 to I&APs was emailed to I&APs and organs of state on the database (where email addresses were available) on 19 September 2017, as well as hand delivered to the Kai !Garib Municipality Offices in Kenhardt.
- **Advertisement to Register Interest:** An advertisement was placed die Gemsbok newspaper on 8 October 2017, advertising the BA (and EIA) commencement and opportunity to comment. A copy of this advertisement is included in Appendix D of this BA Report.
- **Site Notice Board**: As noted in Section C (1) above, 10 notice boards were placed for the proposed projects on 19 September 2017. A copy of the notice boards and proof of placement thereof are included in Appendix D 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 19 September 2017 to 23 October 2017.
- **Comments Received:** To date no comments have been received pertaining to the BA process, however, following the 30 day public comment period, all comments received on this project will be captured in a comments and responses trail and included in the Final BA Report for submission to the Competent Authority.
- **Access to Information**: All project information has been made available on an easily accessible website: https://www.csir.co.za/environmental-impact-assessment

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

As noted above, the BA Report (this report) is 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, 74 I&APs were registered on the project database. The current database is included in Appendix D of this BA Report.
- **Letter 2 to I&APs**: Written notification of the availability of the Draft BA Report 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 post (where addresses available). The letter will include notification of the 30-day comment period for the BA Reports. Proof of delivery and a copy of the emails sent will be included in Appendix D 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 Report.

- **Availability of Information:** The BA Report will be made available and distributed to ensure access to information on the project and to communicate the outcome of specialist studies. A copy of the report will be placed at the Kenhardt library 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 Report via courier. The BA Report 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 have possibly been held during the review of the BA Report, 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 D of the finalised BA Report and in the Comments and Response Report (Appendix D 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.

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

- Following the 30-day commenting period of the BA Report and incorporation of the comments received into the reports, the finalised BA Report (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 Report to the DEA for decision-making.
- The BA Report that is 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 Report for the 30 day review (as explained above). To ensure ongoing access to information, copies of the finalised BA Report 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 Report) to either grant or refuse EA (in line with Regulation 20 (1) of the 2014 NEMA EIA Regulations, as amended on 7 April 2017).

C.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. 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.

C.4 AUTHORITY PARTICIPATION

Authorities and Organs of State received written notification of the proposed activities via email together with all potential I&APs identified for this assessment.

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 19 September 2017) of the 30 day period within which to submit comments on the proposed project, which extended to 23 October 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 Report, 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 D 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

D.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 Draft 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.
- Impacts have been assessed for Alternative 1, 2 and 3 below.

D.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. The DEA has stated that no more than 6 approved facilities in this area (within a 30 km radius) will be awarded preferred bidder status (due to the impact to the SKA). However, this assessment will be based on the precautionary approach i.e. assume that all solar energy facilities (requiring transmission lines) will be developed within the area and therefore assuming worst case scenario.

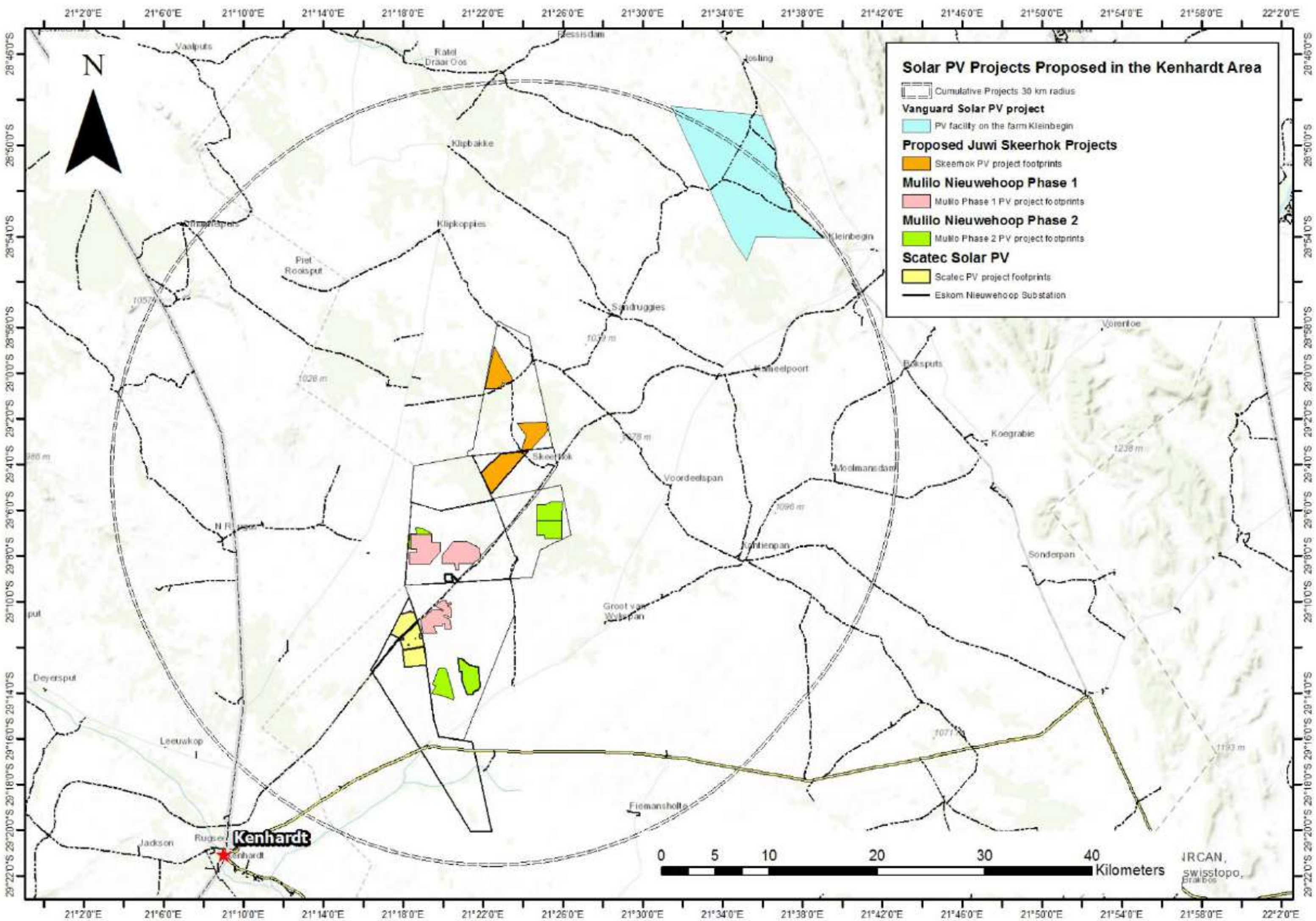

Figure 11: Map of proposed Renewable Energy and Electrical Infrastructure projects considered for the Cumulative Impact Assessment (30km radius)

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:

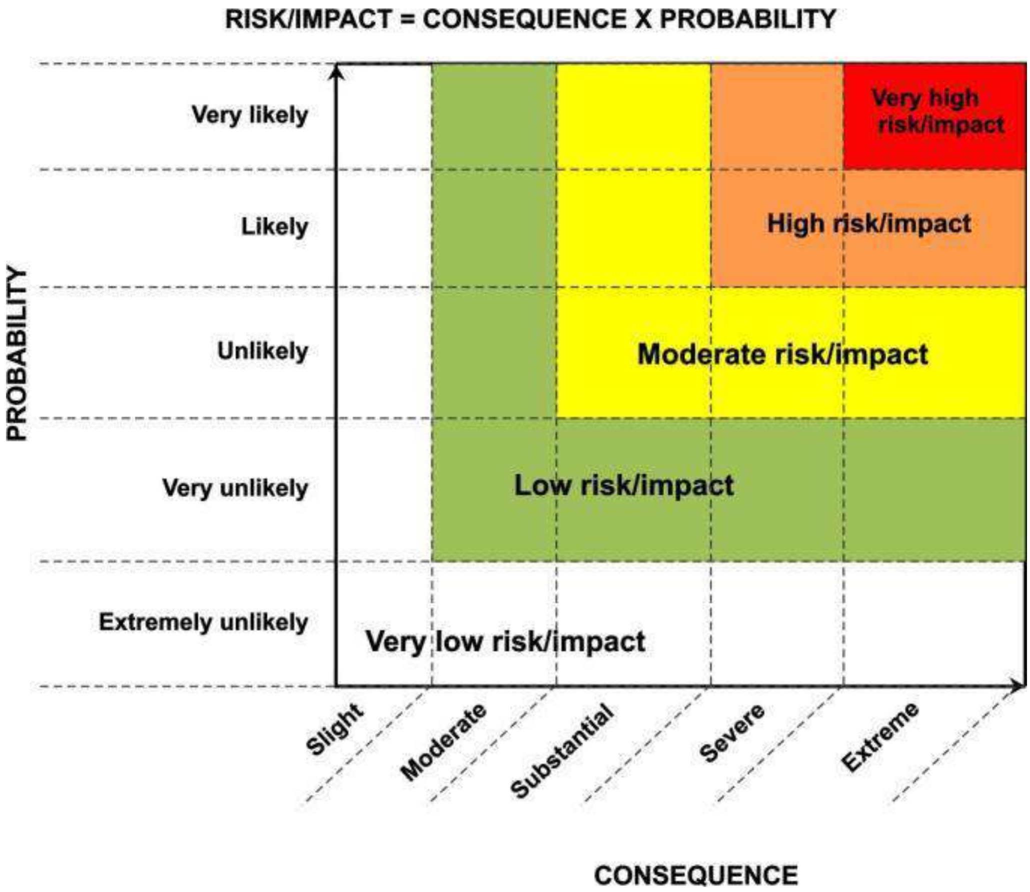

Figure 12: Guide to assessing risk/impact significance as a result of consequence and probability.

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 Figure 12); 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.

The specialist findings presented in this section represents a summary of the detailed and original specialist studies contained in the relevant appendices to this report **(Appendices E1 to E5).** The current summary of specialist findings is provided in the interest of brevity and with a view to facilitating public participation; as contemplated in the NEMA principles. The Competent Authority, with its mandate of substantive review of the EIA report, is therefore urged to also read the original specialist studies in the relevant appendices to this report with the aim of discharging its decision-making function. Should any discrepancy occur between this summary, and the relevant detailed specialist study; the detailed specialist study will prevail.

Notes regarding the specialist studies:

- Each specialist study in Appendix E considered the impacts for all three alternatives as presented by this BA report.
- The Visual Impact Assessment considered the Skeerhok SEF and Transmission Line as a whole from a visual perspective, which is why the specialist study (E4) is a combined report for the SEF and Transmission Line. Only impacts pertinent to the Skeerhok Transmission Line are included in the impact assessment below.
- The VIA was peer reviewed by an external qualified specialist and the details of this review can be seen in Appendix E4.
- Impact Statements for Traffic, Social and Soils and Agricultural Potential were compiled by the EAP using existing studies in the area, and reviewed externally by a qualified specialist. Details of the peer review can be seen in each of the statements attached as Appendix E5. Similarly, these statements included the SEF and Transmission line in one statement.

The tables below for each field of study are impacts for **all three of the alternatives**. In some instances, where there is an impact specific to one of the alternatives, this will be stipulated in **red.**

Cumulative impacts have been discussed in each sub-section below for the respective field of study. **Figure 11** above highlights the projects that were considered in the cumulative impact assessments conducted by the specialists (projects within a 20km radius of the proposed Skeerhok Transmission Line Project).

Table 11: Impact Assessment: ECOLOGY

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION PHASE IMPACTS													
Alteration of habitat structure and composition in and around towers and possibly through the stringing phase of the project	Habitat and species loss	Negative	Site	Long-Term	Substantial	Very likely	Low	Low	• Detailed design and incorporation of habitat and features into the routing of the proposed transmission line. • Undertake plant rescue operations • Implement exotic weed control • Conduct a game sweep of the proposed transmission line route • Carry out the maintenance of vegetation and avoidance of the "blading" or clearance. • A second assessment of the route should be undertaken in or around February to March in order to identify any additional plant specimens of significance that may be evident on route. Such specimens may be relocated/removed (i.e. search and rescue) or avoided (with the relevant permits and approvals in place) prior to the commencement of construction. • The detailed design and confirmation of the proposed tower positions along the proposed powerline route should assist with the avoidance of specific vegetation associes and forms.	Moderate	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
									• Identification and avoidance of the two Aloe associes identified. • An initial pre-construction clearance of all exotic vegetation on route should be undertaken to reduce the possibility of further exotic weed invasion. Continued exotic weed control measures should be implemented during the construction phase that aligns with an exotic vegetation management plan				
Changes in the geomorphological state of drainage lines	Habitat change through changes in topographic drivers	Negative	Site	Medium-Term	Moderate	Likely	High	Low	• Undertaking and completion of earthworks outside of the high rainfall period (if possible). • Maintenance of a high level of housekeeping on route of the proposed transmission line during the construction phase. • Inspection of drainage features immediately outside of the footprint of the proposed transmission line and undertake removal of solid waste and litter on a regular basis.	Low	Very low	5	Medium
The disturbance of fauna and loss of vegetation/habit at through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat change and change in species distribution	Negative	Local	Short term	Slight	Likely	High	Low	• A pre-construction site walk-through should be undertaken shortly before commencement of construction in order to identify any important faunal communities that may have relocated to the line route 2. • The maintenance of points of refugia, where they arise within corridor; avoidance of incursions into areas of possible refugia and sound site management	Low to Moderate	Low	5	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure, primarily the establishment of the proposed concrete or steel towers along the transmission line route, which require some level of excavation and the placement of concrete foundations	Habitat change and change in species distribution	indeterminate	Local	Long term	Slight	Likely	High	Low	None identified.	Low	Very Low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Increases in the prevalence of exotic and invasive plants	Water quality change and general pollution of resource	Negative	Local	Short term	Slight	Likely	High	Low	• Exclusion of major drainage lines from the proposed development footprint. • Avoidance of significant sculpting of land and maintenance of the general topography of the proposed transmission line route. • Placement of energy dissipaters if identified around tower footings within minor drainage lines to reduce velocity of flow through such features and consequential disturbance • Undertake regular visual monitoring and redress of exotic weeds in and around site, particularly during construction.	Low	Very low	5	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATIONAL PHASE IMPACTS													
Increases in the prevalence of exotic and invasive plants	Habitat change	Negative	Site	Long-Term	Moderate	Very likely	High	Low	• Provision of critter paths within the fencing should be considered in the design. • Promote and support faunal presence and activities within the proposed PV facility	Low	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE IMPACTS													
Removal of overhead transmission lines, as well as subtle changes in habitat are likely to result in the alteration of avian behavior in and around the route	Habitat and species change	Neutral	Site	Long-Term	Moderate	Very likely	Low	Low	None identified	Very Low	Very Low	4	Medium
A reversion back to the present seral stage, where continued grazing by livestock and herbivory by game will arise	Habitat and species change	Neutral	Site	Long term	Moderate	Likely	High	Low	None identified	Very Low	Very Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
A reversion of present faunal population states within the subject route	Faunal population change or change in distribution	Neutral	Local	Long term	Moderate	Very likely	High	Low	None identified	Very Low	Very Low	4	Moderate
Minor and subtle changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment	Hydro-geomorphological change	Negative	Local - Regional	Long term	Moderate	Very likely	High	Low	Weed control and land management	Very Low	Very Low	4	High

Table 12: Impact assessment: HERITAGE

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
CONSTRUCTION PHASE DIRECT IMPACTS													
Clearing of site and excavation of foundations and construction of the facility	**Alt. 2 & 3** **Loss of / damage to archaeological sites**	Negative	Site	Permanent	Severe	Very unlikely	Non-reversible	High	Final footprint survey, excavation if needed	Low	Very low	5	High
	Alt. 1 only **Loss of / damage to archaeological sites**	Negative	Site	Permanent	Substantial	Unlikely	Non-reversible	High	Final footprint survey, excavation if needed	Moderate	Very low	5	High
	Alt. 1-3 **Loss of / damage to palaeontological materials**	Negative	Site	Permanent	Severe	Extremely unlikely	Non-reversible	High	Chance finds procedure	Very low	Very low	5	Medium
	Alt. 1-3 **Loss of / damage to graves**	Negative	Site	Permanent	Extreme	Extremely unlikely	Non-reversible	High	Exhumation process	Very low	Very low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE DIRECT IMPACTS													
Presence of the solar energy facility on the landscape and occasional access by maintenance vehicles	**Alt. 1-3** **Impacts to the cultural landscape**	Negative	Local	Long term	Moderate	Very likely	High (rehabilitation after decommissioning)	High	None	Low	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Presence of the solar energy facility on the landscape, frequent access by construction vehicles, creation of dust and landscape scarring	**Alt. 1-3** **Impacts to the cultural landscape**	Negative	Local	Short term	Moderate	Very likely	High (rehabilitation after decommissioning)	High	Minimise work time, Use dust suppression measures	Low	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Clearing of sites, excavation of foundations and construction of the facilities	**Alt. 1-3** **Loss of / damage to archaeological sites**	Negative	Site	Permanent	Severe	Very unlikely	Non-reversible	High	Final footprint survey, excavation if needed	Low	Very low	5	High
	Alt. 1-3 **Loss of / damage to palaeontological materials**	Negative	Site	Permanent	Severe	Extremely unlikely	Non-reversible	High	Chance finds procedure	Very low	Very low	5	High
	Alt. 1-3 **Loss of / damage to graves**	Negative	Site	Permanent	Extreme	Extremely unlikely	Non-reversible	High	Exhumation process	Very low	Very low	5	Medium
	Alt. 1-3 **Impacts to the cultural landscape**	Negative	Local	Short term	Moderate	Very likely	High (rehabilitation after decommissioning)	High	Use visually permeable fencing; Minimise disturbance footprint.	Low	Low	4	High

Table 13: Impact Assessment: VISUAL

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION PHASE DIRECT IMPACTS													
Clearance of vegetation for construction of Transmission Lines and laydown areas	Visual intrusion to views sensitive of visual receptors	Negative	Local	Short-term	Substantial	Very Likely	Moderate	Low	• Minimise the footprint of cleared vegetation. • Where possible, laydown areas and temporary construction equipment and camps should be placed in already in disturbed areas in order to minimise vegetation clearing. • Commence with restoration of disturbed, cleared land as soon as possible. • Maintain rehabilitated surfaces until vegetation is established, sustainable and blends well with surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Control Officer (ECO).	**Moderate**	**Low**	4	High
Increased traffic		Negative	Local	Long-term	Moderate	Likely	High	Low	• Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time • Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only	**Moderate**	**Low**	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	• Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and • Do not exceed the minimum lighting requirement for effective safety and security. • Minimise bright light (uplighting and glare) with appropriate screening. • Reduce light pollution through the use of low-pressure sodium light sources. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • Avoid light spilling beyond the project boundary. • Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. • Switch off lights when not in use.	**Low**	**Very Low**	5	High
Dust		Negative	Local	Short-term	Slight	Very Likely	Very high	Low	• Implement standard construction site dust control methods (i.e. dampening with water) as required.	**Low**	**Very Low**	5	High
Veld fires		Negative	Local	Long-term	Slight	Unlikely	Very high	Low	• Implement fire risk reduction and containment measures, including: - worker awareness; - designated, safe smoking areas; - fire breaks; and • appropriate and working firefighting equipment.	**Low**	**Very Low**	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE DIRECT IMPACTS													
Increased traffic	visual intrusion to views sensitive of visual receptors	Negative	Local	Long-term	Moderate	Likely	High	Low	• Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak. • Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only.	**Moderate**	**Low**	4	High
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	• Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and • Do not exceed the minimum lighting requirement for effective safety and security. • Minimise bright light (uplighting and glare) with appropriate screening. • Reduce light pollution through the use of low-pressure sodium light sources. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • Avoid light spilling beyond the project boundary. • Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. • Switch off lights when not in use.	**Low**	**Very Low**	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE DIRECT IMPACTS													
Established Vertical Electrical infrastructure		Negative	Local	Long-term	Moderate	Very Likely	Moderate	Low	• Use appropriate coloured materials for structures to blend in with the backdrop of the area where this is technically feasible and where the colour or paint will not negatively affect the functionality of the structures. • Maintain painted features and repainted when colours fade or paint flakes. • Choose materials, coatings and paints with minimum reflectivity where possible. • Paint grouped structures the same colour to reduce colour contrast. • Construct powerline towers to be similar to those already existing in the landscape, where possible.	**Moderate**	**Moderate**	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Clearance of vegetation for transmission Line and Laydown areas	Visual intrusion to views sensitive of visual receptors	Negative	Local	Short-term	Substantial	Very Likely	Moderate	Low	• Minimise the footprint of cleared vegetation. • Where possible, laydown areas and temporary construction equipment and camps should be placed in already in disturbed areas in order to minimise vegetation clearing. • Commence with restoration of disturbed, cleared land as soon as possible. • Maintain rehabilitated surfaces until vegetation is established, sustainable and blends well with surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Control Officer (ECO).	**Moderate**	**Low**	4	High
Increased traffic		Negative	Local	Long-term	Moderate	Likely	High	Low	• Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time. • Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only	**Moderate**	**Low**	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	• Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and • Do not exceed the minimum lighting requirement for effective safety and security. • Minimise bright light (uplighting and glare) with appropriate screening. • Reduce light pollution through the use of low-pressure sodium light sources. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • Avoid light spilling beyond the project boundary. • Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. • Switch off lights when not in use.	**Low**	**Very Low**	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Dust		Negative	Local	Short-term	Slight	Very Likely	Very high	Low	• Implement standard construction site dust control methods (i.e. dampening with water) as required.	**Low**	**Very Low**	5	High
Veld fires		Negative	Local	Long-term	Slight	Unlikely	Very high	Low	• Implement fire risk reduction and containment measures, including: - worker awareness; - designated, safe smoking areas; - fire breaks; and • appropriate and working firefighting equipment.	**Low**	**Very Low**	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Cumulative Impacts	Visual intrusion to views sensitive of visual receptors	Neutral	Regional	Long-term	Moderate	Very Likely	High	Low	• Adequate implementation of proposed mitigation measures and best practice to reduce visual impacts by all transmission lines in the vicinity.	**Moderate**	**Moderate**	4	High

Table 14: Impact assessment: AVIFAUNA

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION PHASE IMPACTS													
Clearing of vegetation	Habitat loss/alteration	Negative	Site	Permanent	Substantial	Definite	Low	Moderate	• Water courses, drainage lines, streams and wetlands should be avoided and a no go buffer of 100m be applied around them. • Dams and livestock water points should likewise be avoided with a 100m no go buffer. • Rocky outcrops should be avoided with a 100m no go buffer. • All staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted. • Care should be taken not to introduce or propagate alien plant species/weeds during construction.	Low	Low	3	High
General construction activities	Disturbance	Negative	Local	Short term	Moderate	Probable	High	Moderate	• A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed. • Facility lighting during construction & operation should be kept to a minimum and should make use of latest technology to ensure that light disturbance is minimised. This will also reduce the attraction of insects (and in turn insectivorous birds) to the facility.	Low	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE IMPACTS													
Operation of facility	Bird collision with power line	Negative	Site	Long term	Moderate	Probable	High	Moderate	• The most important mitigation measure is to select the optimal route for the new power line. This has been discussed more in Section 4. We recommend that either Transmission line 2 or 3 be selected. We advise against the use of Transmission line 1, although it is not fatally flawed. • The power line should be fitted with the best available (at the time of construction) anti bird collision line marking devices in order to make the overhead cables more visible to birds. More specifically: ○ Devices should be fitted on the entire length of the power line as collision risk is high all along the alignment for nomadic species such as Ludwig's Bustard. ○ Devices should be fitted on the earth wire/s. ○ On each span, the full span should be fitted with marking devices (i.e. not only the middle 60% as done previously by Eskom). Research has shown that collisions occur even close to pylons (Shaw, 2013). ○ Light and dark colour devices should be alternated so as to provide contrast against both dark and light backgrounds. ○ These devices should be fitted as soon as the earth wires are strung as collision risk begins immediately, not only once the line is commissioned and live. ○ The power line owner will be responsible for ensuring that the marking devices remain in place and effective on the power line for its' full lifespan. Any device failures must be rectified immediately by replacement with new devices. • The power line should be monitored through patrolling its full length at least 4 times per year to measure the impacts on birds and the durability of line marking devices.	High	Low	1	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE IMPACTS													
Operation of facility	Bird electrocution on power line	Positive	Site	Long term	Slight	Probable	High	Low	○ The proposed tower/pylon structure has not been decided in detail. It will however be either concrete or steel monopole. It is critically important that sufficient clearance be allowed between phase-phase and phase-earth hardware on the structure. For large eagles these clearances should be a minimum of 1.8m. ○ In addition the standard Eskom Bird Perch must be installed on every pylon top to provide safe perching substrate for large birds well above the dangerous hardware.	High	Very low	2	High
Operation of facility	Bird nesting on power line	Negative	Local	Long term	Slight	Probable	High	Low	○ For the impact of the birds nesting on the power line/substation, we recommend nest management on a case by case basis under the supervision of an avifaunal specialist, and in conformance with all relevant national and provincial legislation. ○ We recommend that the operational phase EMP include provision for application to the provincial authority for permits for any necessary nest management should the need arise during the operational phase.	Low	Low	5	Low

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE IMPACTS													
Decommissioning activities	Disturbance	Negative	Local	Short term	Moderate	Probable	High	Moderate	- A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed. - Facility lighting during construction & operation should be kept to a minimum and should make use of latest technology to ensure that light disturbance is minimised. This will also reduce the attraction of insects (and in turn insectivorous birds) to the facility.	Low	Low	1	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Cumulative displacement of species as a result of habitat loss or transformation	Habitat loss and disturbance	Negative	Regional	Permanent	Substantial	Definite	Low	Moderate	- See section 3.7 in Appendix E 3 for detailed explanation and recommendations.	High	Moderate	1	High

Table 15: Impact assessment: TRAFFIC

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
CONSTRUCTION AND DECOMMISSIONING PHASE IMPACTS													
Traffic generation	Increase in traffic	Negative	Regional	Short term	Moderate	Very likely	Yes	Replace-able	• A permit should be obtained from the PGNC Department of Public Works, Roads and Transport for any abnormal loads transported. • Provide a Transport Traffic Plan to SANRAL and the PGNC Department of Public Works, Roads and Transport. • Road and safety standards should be adhered to.	Low	Low	4	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Negative	Local	Short term	Moderate	Likely	No	High Irreplaceability	• Adhere to all speed limits applicable to all roads used. • Implement clear and visible signage at access to site at R27 and Transnet Service Road intersection.	High	Moderate	3	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability: Without mitigation /management	Significance of impact/risk = consequence x probability: With mitigation /management (residual risk/impact)	Ranking of impact/risk	Confidence level
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Negative	Local	Medium term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles. • Postpone or reduce dust-generating activities during periods with strong wind. • Earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased. • Ensure that all construction vehicles are roadworthy and adhere to vehicle safety standards implemented by the Project Developer. • Avoid using old and noisy construction equipment and ensure equipment is well maintained.	Moderate	Low	4	Medium
Traffic generation	Change in quality of surface condition of the roads	Negative	Local	Short term	Slight	Likely	Yes	Replace-able	• Construction activities will have a higher impact than the normal road activity and therefore the road should be inspected on a weekly basis for structural damage; • A Road Maintenance Plan should be developed for the section of the Transnet Service Road that will be used to addresses the following: ○ Grading requirements; ○ Dust suppressant requirements; ○ Drainage requirements; ○ Signage; and ○ Speed limits.	Low	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATIONAL PHASE IMPACTS													
Traffic generation	Increase in traffic	Negative	Regional	Long term	Slight	Very likely	High	Replace-able	• Adhere to requirements made within Transport Traffic Plan; • Limit access to the site to personnel; • Increase traffic will be negligible.	Very low	Very low	5	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Negative	Local	Long term	Moderate	Likely	No	High irreplaceability	• Adhere to all speed limits applicable to all roads used. • Implement clear and visible signage at access to site at R27 and Transnet Service Road intersection.	High	Moderate	3	Medium
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Negative	Local	Medium term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles; • Limit noisy maintenance/operational activities to daytime only.	Moderate	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATIONAL PHASE IMPACTS													
	Change in quality of surface condition of the roads	Negative	Local	Long term	Slight	Likely	Yes	Replace-able	• Implement requirements of the Road Maintenance Plan.	Low	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Traffic generation	Increase in traffic	Negative	Regional	Long term	Slight	Very likely	High	Replace-able	• Adhere to requirements made within Transport Traffic Plan; • Limit access to the site to personnel; • Increase traffic will be negligible.	Very low	Very low	5	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Negative	Local	Long term	Moderate	Likely	No	High irreplaceability	• Adhere to all speed limits applicable to all roads used. • Due to negligible traffic increases, increase in accidents is minimal.	Moderate	Low	3	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Negative	Local	Medium term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles; • Limit noisy maintenance/operational activities to daytime only.	Moderate	Low	4	Medium

Table 16: Impact assessment: SOCIAL

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION AND OPERATION PHASE IMPACTS													
Influx of job seekers into the Kenhardt area	Disruption of existing social structures	Negative	Local	Medium to Long-term	Substantial	Likely	Low	Moderate	• Develop and implement a Workforce Recruitment Plan • Reserve employment, where practical, for local residents • Clearly define and agree upon the PAP • Develop a database of PAP and their relevant skills and experience • Develop and implement a Stakeholder Engagement Plan	Moderate	Low	4	Medium
Outsiders moves into the Kenhardt area	Increases in social deviance	Negative	Local	Medium-term	Substantial	Likely	Low	Moderate	• Develop and implement a Workforce Recruitment Plan • Reserve employment, where practical, for local residents • Clearly define and agree upon the PAP • Develop a database of PAP and their relevant skills and experience • Develop and implement a Stakeholder Engagement Plan • Delivery on the Economic development Plan must be contractually binding on the proponent	Moderate	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Expectations created regarding possible employment	Increased frustration in the local community	Negative	Local	Short-term	Moderate	Likely	High	Moderate to low	• Develop and implement the Stakeholder Engagement Plan	Low	Very low	5	Medium
Local spending	Socio-economic benefits as a result of the multiplier effect	Positive	Local	Medium to long-term	Moderate	Likely	n/a	n/a	• Procure goods and services, where practical, within the study area • Obtain regularly required goods and services from as large a selection of local service providers as possible	Low	Low	4	Medium
Local employment	Socio-economic benefits	Positive	Local	Long-term	Substantial	Very likely	n/a	n/a	• Develop and implement a Workforce Recruitment Policy	Moderate	Moderate	3	High
Economic Development Plan	Contribute to local employment, local spending and human capacity development	Positive	Local	Long-term	Substantial	Very likely	n/a	n/a	• The proponent should engage with local NGOs, CBOs and local government structures to identify and agree upon relevant skills and competencies required in the Kenhardt community • Such skills and competencies should then be included in the Economic Development Plan • Where possible, align Economic development Plan with Local Municipality's IDP	Moderate	Moderate	3	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE IMPACTS													
Decommissioning of the proposed development	Job losses	Negative	Local	Long-term	Substantial	Very likely	Moderate	Moderate	• The proponent should comply with relevant South African labour legislation when retrenching employees • The project owner should also implement appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning • All project infrastructures should be decommissioned appropriately and thoroughly to avoid misuse	Moderate	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Exacerbated in-migration	Disruption of social structures	Negative	Local	Medium to long-term	Substantial	Likely	Low	Moderate	n/a	Moderate	N/A	3	Medium

Table 17: Impact assessment: SOILS AND AGRICULTURAL POTENTAIL

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION AND DECOMMISSIONING PHASE DIRECT IMPACTS													
Vehicle traffic and dust generation	Veld degradation	Negative	Site	Medium term	Slight	Likely	Moderate	Low	• Minimize footprint of disturbance. • Confine vehicle access on roads only. • Control dust generation during construction and decommissioning activities by adopting standard construct site dust control methods (such as dampening surfaces with water), where required. Because of water scarcity, this should only be done where and when dust generation is a significant problem.	Very Low	Very Low	5	High
Constructional and decommissioning activities that disturb the soil profile.	Loss of topsoil	Negative	Site	Medium term	Slight	Likely	Moderate	Low	• Strip and stockpile topsoil from all areas where soil will be disturbed. • After cessation of disturbance, re-spread topsoil over the surface. • Dispose of any sub-surface spoils from excavations where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.	Very Low	Very Low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION, OPERATION AND DECOMMISSIONING PHASE DIRECT IMPACTS													
Occupation of the land by the project infrastructure	Loss of agricultural land use	Negative	Site	Long term	Slight	Very Likely	High	Low	• None	Very Low	Not applicable	5	High
Constructional and decommissioning activities that disturb the soil profile.	Loss of topsoil	Negative	Site	Medium term	Slight	Likely	Moderate	Low	• Strip and stockpile topsoil from all areas where soil will be disturbed. • After cessation of disturbance, re-spread topsoil over the surface. • Dispose of any sub-surface spoils from excavations where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.	Very Low	Very Low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION AND DECOMMISSIONING PHASE INDIRECT IMPACTS													
Change in surface characteristics and surface cover.	Erosion	Negative	Site	Long term	Slight	Likely	Low	Low	• Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.	Low	Very Low	5	High
Project rental	Additional land use income	Positive	Site	Long term	Slight	Very Likely	High	Low	• None	Very Low	Very Low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Occupation of the land by the infrastructure of multiple projects	Regional loss of agricultural land	Negative	Regional	Long term	Likely	Likely	Moderate	Moderate	• None	Moderate	Not Applicable	3	Low

D.2 Environmental impact statement

D.2.1 Overall Impact Assessment including Alternatives 1, 2 and 3 of the Proposed Transmission 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 laydown area) are not applicable as the proposed project location is dependent on the location of the proposed SEF. Location alternatives of the proposed Transmission Line are also dependent on and determined by the location of the proposed SEF and the proposed Eskom Nieuwehoop Substation, as well as environmental sensitivities identified by the specialists, landowner willingness and feasibility in terms of cost effectiveness. As previously explained the location of the Eskom substation is fixed, which influences the connection and routing of the Transmission Line thereto. Nevertheless, three location alternatives for the Transmission 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).

- <u>Terrestrial Ecology and Hydrology Impact Assessment:</u>

A Terrestrial Ecology and Hydrology Impact Assessment (Appendix E.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.

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

Table 18: Summary of the Overall Impact Significance (Post Mitigation) for the Terrestrial Ecological and Hydrological Impact Assessment (Alternative 1, 2 and 3)

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

Overall, the above impacts 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 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, 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 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.

Given the above information, it is evident that with the judicious placement of the proposed transmission line towers and the use of the proposed corridor route as envisaged, that little negative ecological ramifications will arise, with the *proviso* that the proposed mitigation measures are implemented. Skeerhok Alternative 1 and 3 do not show any significant features that would preclude their use, however given the information at hand **Skeerhok Transmission Line Alternative 2 is recommended** from a terrestrial ecological perspective. Evidently, the proposed Skeerhok Alternative 2:

- Will avoid the necessity to traverse any drainage features including minor dendritic drainage lines;
- Traverses primarily graminoid and low scrub habitat and generally allows for the avoidance of larger woody species;
- Avoids any areas of considered ecological value.

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

A Heritage Impact Assessment (Appendix E.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, operation and decommissioning phases of the proposed project on the palaeontology, archaeology and the cultural landscape.

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, 2 and 3)

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

Overall, the above potential impacts on Heritage and Palaeontology are predicted to be of a **low to very low significance** with the implementation of mitigation measures. The Heritage Impact Assessment notes that although a number of significant heritage resources have been identified in the vicinity of the proposed electrical infrastructure development, the most important ones have been avoided by all proposed development corridors and will be conserved *in situ*. A few smaller sites will probably be avoidable by the final chosen alignment but otherwise may need mitigation work. As Alternative 1 has more sites associated with it and is generally longer, Alternatives 2 and 3 are seen as more favourable from a heritage point of view.

- **Avifauna Impact Assessment:**

An Avifauna Impact Assessment (Appendix E.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 avifauna.

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, 2 and 3)

Phase and Type of Impact	Overall Significance After Mitigation
Construction Phase: Direct Impacts	Low
Operational Phase: Direct Impacts	Low
Decommissioning Phase: Direct Impacts	Low
Cumulative Impacts	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.** No impacts were assessed as being of high significance with or without the implementation of mitigation.

The Skeerhok Grid connection site is important habitat for an assemblage of arid zone bird species, many of which are endemic. From an avifauna perspective, the preferred route for the power line is Alternative 2. The specialist recommended against the use of Alternative 1, although it is not fatally flawed.

- **Visual Impact Assessment:**

A Visual Impact Assessment (Appendix E.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 surrounding sensitive viewers and receptors.

Table 21 below illustrates a summary of the overall impact significance, with the implementation of mitigation measures, identified in the Visual Impact Assessment.

Table 21: Summary of the Overall Impact Significance (Post Mitigation) for the Visual Impact Assessment (Alternative 1, 2 and 3)

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

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 **low to very low,** if mitigation measures are successfully implemented. Furthermore, the overall significance of the cumulative visual impact on sensitive visual receptors is expected to be Moderate (with successful mitigation measures implemented). No impacts were assessed as being of high significance after the implementation of mitigation.

The preferred route is Alternative 2 from a visual impact perspective since it is shorter and it will affect fewer sensitive visual receptors, however no fatal flaws were associated with the other alternatives.

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 Skeerhok Transmission Line 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, Alternatives 1, 2 and 3 of the proposed transmission line were assessed in this BA Report. It is understood, however, that only one alternative of the proposed transmission line routing and connection to the 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 2 is recommended mainly because it displays a shorter route and reduced extent in comparison to Alternative 1 and 3. However, as indicated above, the specialists have confirmed that there are no fatal flaws associated with Alternative 1 and 3 and that these cannot be dismissed as a viable alternative.

Considering that Alternative 1 and 3 of the proposed Transmission Line routing 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 1 or 3 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 Transmission Line and associated electrical infrastructure is dependent on the location of the proposed Skeerhok SEF, Nieuwehoop 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. An environmental features and sensitivity map has been produced (and included in 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). The proposed Skeerhok Transmission Line project is therefore required as part of the bidding process to confirm that the proposed Skeerhok SEF is enabled and equipped with the necessary infrastructure to connect to the national grid. <u>Therefore, overall the proposed Skeerhok Transmission Line project will fundamentally support and enable the functioning of the proposed Skeerhok SEF and it will ensure that it is allowed to contribute to the abovementioned renewable energy targets proposed by the DOE.</u>

The development of solar 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 IDP. 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 Skeerhok SEF), 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 Kenhardt region. The proposed project will play a key role in enabling and facilitating the construction of the proposed Skeerhok SEF 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 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 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 Transmission Line servitude should not be cleared of vegetation. Vegetation removal should be kept to a minimum and cleared below the Transmission 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 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 E2 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.
- 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. 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 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.
- 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 Transmission 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.

Kelly Stroebel

NAME OF EAP

9th March 2018

SIGNATURE OF EAP | DATE

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

SECTION F:

APPENDICES

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

SECTION F:

APPENDICES

BASIC ASSESSMENT REPORT

APPENDIX A: Details of EAP, Expertise and Declaration

CONTENTS

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Curriculum Vitae of Paul Lochner – Technical Advisor and Quality Assurance (EAPSA) Certified

Name of firm	CSIR
Name of staff	Paul Lochner
Profession	Environmental Assessment and Management
Position in firm	Manager: CSIR Environmental Management Services
Years' experience	24 years
Nationality	South African

Biographical Sketch

Paul Lochner commenced work at CSIR in 1992, after completing a degree in Civil Engineering and a Masters in Environmental Science, both at the University of Cape Town. His initial work at CSIR focused on sediment dynamics and soft engineering applications in the coastal zone, in particular, beach and dune management. He conducted several shoreline erosion analyses and prepared coastal zone management plans for beaches. He also prepared wetland management plans.

As the market for environmental assessment work grew, he led Environmental Impact Assessments (EIAs), in particular for coastal resort developments and large-scale industrial developments located on the coast; and Environmental Management Plans (EMPs), in particular for wetlands, estuaries and coastal developments. He has also been involved in researching and applying higher-level approaches to environmental assessment and management, such as Strategic Environmental Assessment (SEA). In 1998-1999, he coordinated the SEA research programme within the CSIR, which led to him being a lead author of the Guideline Document for SEA in South Africa, published by CSIR and national Department of Environmental Affairs (DEA) in February 2000.

In 1999 and 2000, he was the project manager for the legal, institutional, policy, financial and socio-economic component of the Cape Action Plan for the Environment ("CAPE"), a large-scale multi-disciplinary study to ensure the sustainable conservation of the Cape Floral Kingdom. This was funded by the Global Environmental Fund (GEF) and prepared for WWF-South Africa. The study required extensive stakeholder interaction, in particular with government institutions, leading to the development of a Strategy and Action Plan for regional conservation.

In July 2003, he was certified as an Environmental Assessment Practitioner by the Interim Certification Board for Environmental Assessment Practitioners of South Africa.

He has authored several guidelines for government. In 2004, he was lead author of the *Overview of IEM* document in the updated Integrated Environmental Management (IEM) Information Series published by national Department of Environmental Affairs and Tourism (DEAT). In 2005, he was part of the CSIR team that prepared the series entitled *Guidelines for involving specialists in EIA processes* for the Western Cape Department of Environmental Affairs and Development Planning (DEADP); and he authored the *Guideline for Environmental Management Plans* published by Western Cape government in 2005. In 2006-2007, he worked closely with the (then) Dept of Minerals and Energy (DME) of South Africa to prepare a Guideline for Scoping, Environmental Impact Assessment and Environmental Management Plans for mining in South Africa.

Over the past 20 years has been closely involved with several environmental studies for industrial and port-related projects in Coega Industrial Development Zone (IDZ), near Port Elizabeth. This included the SEA for the establishment of the Coega IDZ in 1996/7, an EIA and EMP for a proposed aluminium smelter in 2002/3, and assistance with environmental permit applications for air, water and waste. At the Coega IDZ and port, he has also conducted environmental assessments for port development, LNG storage and a combined cycle gas turbine power plant, manganese export, rail development, marine pipelines, and wind energy projects.

Since 2009, he has undertaken numerous EIAs for the renewable energy sector, in particular for wind and solar photovoltaic energy projects. In these EIAs, he has been project leader and integrated the specialist findings from a range of specialist disciplines.

He is currently project leader on two Strategic Environmental Assessments (SEAs) that are being undertaken for national DEA. These SEAs are to support the implementation of the Strategic Integrated Projects (SIPs) that are being promoted by the Presidential Infrastructure Coordinating Committee (PICC). The SEA for Wind and Solar Photovoltaic Energy for South Africa is being conducted over 2013-2014, and the SEA for electricity grid infrastructure commenced January 2014.

Since 2009, Paul has been the manager of the Environmental Management Services (EMS) group within CSIR. This group currently consists of approximately 20 environmental assessment practitioners and a group assistant, with offices in Stellenbosch and Durban. EMS focuses on conducting complex environmental studies in challenging environments, such as remote and data poor regions in Africa (e.g. Cameroon, Gabon, Angola, Namibia and Ethiopia). We also specialise in environmental studies for emerging and innovative technologies, drawing on research and applied scientific expertise within CSIR. Our role is to assist in ensuring the sustainability of projects in terms of environmental and social criteria, by providing a range of environmental services that extend across the project lifecycle, from the pre-feasibility stage through to feasibility, commissioning, operations and closure. We provide this service to government, international agencies, private sector and non-government organisations.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Paul Lochner has been involved in to this date:

Completion Date	Project description	Role	Client
In progress	**SEA for Aquaculture** Development in South Africa (marine and freshwater)	Project leader	DEA and DAFF
In progress	**SEA for the Square Kilometre Array** radio-telescope in the Karoo, South Africa	Project leader	DEA and DST
2015-2017	**SEA for Shale Gas Development** in South Africa	Project co-leader	Dept of Environmental Affairs (DEA), DMR, DOE, DST, DWS
2015-2016	SEA for the development of **Electrical Grid Infrastructure** for South Africa	Project leader	DEA
2016-2017	EIA for the 75 MW x 12 **solar photovoltaic** energy projects near Dealesville, Free State	Project Leader	Mainstream Renewable Power SA
2014-2015	SEA of **planning** for the far south Cape Peninsula	Project Leader	City of Cape Town
2013-2015	EIA for the Ishwati Emoyeni 140 MW **wind energy project** and supporting electrical infrastructure near Murraysburg, Western Cape	Project Leader	Windlab
2013-2015	EIA for the Saldanha marine outfall **pipeline**	Project Leader	Frontier Saldanha Utilities
2012-2015	SEA for identification of **renewable energy zones** for wind and solar PV projects in South Africa	Project leader	DEA
2012-2013	**Environmental Screening Study for a desalination plant** for the City of Cape Town	Project leader	City of Cape Town & WorleyParsons
2012-2013	EIA for **LNG Import** to the Mossel Bay Gas-to-Liquid refinery (stopped end of Scoping)	Project leader	PetroSA
2012-2013	EIA for the **desalination plant** for the Saldanha area	Project leader	West Coast District Municipality & WorleyParsons
2012-2013	EIA for the **manganese export terminal** at the Port of Ngqura and Coega IDZ	Project leader	Transnet
2011 - 2012	EIA for the **100 MW solar photovoltaic** project proposed by Mainstream Renewable Power at Blocuso, near Keimoes in the	Project leader	Mainstream Renewable Power

Completion Date	Project description	Role	Client
	Northern Cape		
2011 – 2012	EIA for the **100 MW solar photovoltaic** project proposed by Mainstream Renewable Power at Roode Kop Farm, near Douglas, in the Northern Cape	Project leader	Mainstream Renewable Power
2011 – 2012	EIA for the 75 MW **solar photovoltaic project** proposed by Solaire Direct at **GlenThorne**, near Bloemfontein in the Free State	Project leader	Solaire Direct
2011 – 2012	EIA for the 75 MW **solar photovoltaic project** proposed by SolaireDirect at **Valleydora**, near Springfontein in the Free State	Project leader	Solaire Direct
2010-2011	More than 10 Basic Assessments (BAs) for **solar photovoltaic projects** in the western cape, Northern Cape, Eastern Cape and Free State	Project leader	Various clients including Dutch, German, French and South African companies
2010/2011	**EIA for the Langerfontein** wind project near Darling, Western Cape.	Project leader	Mr Herman Oelsner, Khwe Khoa
2010/2011	**EIA for a 100 MW wind project at Zuurbron and a 50 MW wind project Broadlands** in the Eastern Cape	Project leader	WindCurrent SA (German-based company)
2010/2011	**EIA for the proposed 143 MW Biotherm wind energy project near Swellendam**, Western Cape, South Africa	Project leader	Biotherm South Africa (Pty) Ltd
2010/2011	**EIA for the proposed InnoWind wind energy projects near Swellendam, Heidelberg, Albertinia and Mossel Bay (totalling approx 210 MW),** Western Cape, South Africa	Project leader	InnoWind South Africa (Pty) Ltd
2009/2010	**EIA for the proposed Electrawinds wind energy facility** of 45-75 MW capacity in the Coega IDZ, Eastern Cape	Project leader	Electrawinds N.V. (Belgium)
2009/2010	**EIA for proposed 180 MW Jeffreys Bay wind energy project,** Eastern Cape	Project Leader and co-author	Mainstream Renewable Power South Africa
2009/2010	**Basic Assessment for the national wind Atlas for South Africa**	Project leader	SANERI and SA Wind Energy Programme, Dept of Energy
2009/2010	**EIA for the proposed Gecko soda**	Project leader	Gecko, Namibia

Completion Date	Project description	Role	Client
	plant, Otjivalunda and Arandis, Namibia (cancelled)		
2009-2010	**EIA for the proposed desalination plant** at Swakopmund, Namibia	Project leader	NamWater, Namibia
2009	**EMP for the Operational Phase of the Berg River Dam**, Franschoek, South Africa	Project leader and report co-author	TCTA, South Africa
2009/2010 *(on hold)*	**EIA for the proposed crude oil refinery** at Coega, South Africa	Project leader and lead author	PetroSA, South Africa
2008	**Environmental Risk Review** for proposed LNG/CNG import to Mossel Bay, South Africa	Project leader and lead author	PetroSA, South Africa
2008	**Review of the Business Plan** for catchment management for the Berg Water Dam Project, Franschhoek, South Africa	Project reviewer and co-author	TCTA, South Africa
2007 – 2010	**EIA for proposed Jacobsbaai Tortoise Reserve eco-development**, Saldanha, Western Cape	Project Leader and co-author	Jacobsbaai Tortoise Reserve (Pty) Ltd
2007 – 2010	**Independent reviewer** for the EIA proposed Amanzi lifestyle development, Port Elizabeth	Independent reviewer appointed to advise EAP	Public Process Consultants and Pam Golding
2007 – 2008	**EIA for proposed 18 MW Kouga wind energy project,** Eastern Cape	Project Leader and co-author	Genesis Eco-Energy (Approved by DEDEA in March 2009)
2007	**Review of EIA for the proposed Hanglip Eco-Development**, Plettenberg Bay, Western Cape	Co-author of review of EIA, undertaken on behalf of DEADP	Dept of Environmental Affairs & Development Planning, Western Cape
2006-2007	**Scoping phase for the EIA for the proposed Coega LNG-to-Power Project** at the Port of Ngqura, Coega IDZ	Project Leader and co-author	Eskom and iGas
2006-2007	**Guideline** for Scoping, Environmental Impact Assessment and Environmental Management Plans for mining in South Africa	Project leader and co-author	Dept of Minerals and Energy (DME), South Africa
2006	**Environmental Impact Assessment (EIA)** for the extension of the Port of Ngqura, Eastern Cape	Project Leader and co-author	Transnet
2006	**Integrating Sustainability Into Strategy: Handbook** (Version 1)	Project Leader and co-author	CSIR (STEP research report)

Completion Date	Project description	Role	Client
2005	**Technology Review** for the proposed aluminium smelter at Coega, South Africa	Project Leader and lead author	Alcan, Canada
2005	**Environmental and Social Impact Assessment (ESIA) report** for the proposed alumina refinery near Sosnogorsk, Komi Republic, Russia	Project manager and co-author	Komi Aluminium, Russia, IFC, EBRD
2005	**Guideline for Environmental Management Plans (EMPs)** for the Western Cape province, including conducting a training course for provincial government	Author	Dept of Environmental Affairs & Development Planning, Western Cape
2005	**Guideline for the review of specialist studies** undertaken as part of environmental assessments	Member of Steering Committee and project facilitator	Dept of Environmental Affairs & Development Planning, Western Cape
2004	**Review of Strategic Management Plan** for Table Mountain National Park (2001-2004)	Reviewer and co-author	South African National Parks
2004	**Strategic Needs Assessment Process** for mainstreaming sustainable development into business operations	Researcher and co-author	CSIR (internal research)
2004	**Environmental Monitoring Committees** booklet in the IEM Information Series for DEAT	Contributing author	Department of Environmental Affairs and Tourism (DEAT)
2004	**Overview of Integrated Environmental Management** (IEM) booklet in the IEM Information Series	Lead author and researcher	DEAT
2003	**Environmental Screening Study** for gas power station, South Africa	Project Manager and lead author	Eskom, iGas and Shell
2003	**Environmental Management Programme** (EMP) Framework for the proposed Coega Aluminium Smelter; and assistance with preparing permit and licence applications	Project Manager and lead author	Pechiney, France
2003	**Environmental Management Plan** for the Operational Phase of the wetlands and canals at Century City, Cape Town	Project leader and lead author	Century City Property Owners' Association
2002	**Environmental Impact Assessment** for the proposed Pechiney aluminium smelter at	Project Manager and lead author	Pechiney, France

Completion Date	Project description	Role	Client
	Coega, South Africa		
2002 - 2003	**Research project:** Ecological impact of large-scale groundwater abstraction on the Table Mountain Group aquifer	Project Manager	Water Research Commission
2002	**Environmental Management Plan** for the Eskom Wind Energy Demonstration Facility in the Western Cape	Co-author	Eskom
2001-2002	**Environmental Impact Assessment** for the Eskom Wind Energy Demonstration Facility in the Western Cape	Quality control & co-author	Eskom
2001	**Environmental Due Diligence** study of four strategic oil storage facilities in South Africa	Project manager and co-author	SFF Association
2000	**Cape Action Plan for the Environment**: a biodiversity Strategy and Action Plan for the Cape Floral Kingdom - legal, institutional, policy, financial and socio-economic component	Project manager and contributing writer	World Wide Fund for Nature (WWF): South Africa
1999	**Environmental Management Plan** for the establishment phase of the wetlands and canals at Century City, Cape Town	Project manager and lead author	Monex Development Company
1999	**Environmental Management Programme** for the Thesen Islands development, Knysna	Process design and Co-author	Chris Mulder Associates Inc; Thesen and Co.
1999	**Management Plan** for the coastal zone between the Eerste and Lourens River, False Bay, South Africa	Project manager and lead author	Heartland Properties and Somchem (a Division of Denel)
1998	**Environmental Assessment** of the Mozal Matola Terminal Development proposed for the Port of Matola, Maputo, Mozambique	Project manager and author.	*SNC-Lavalin-EMS*
1998	**Strategic Environmental Assessment (SEA)** for the Somchem industrial complex at Krantzkop, South Africa	Project manager and co-author	Somchem, a Division of Denel
1997	**Strategic Environmental Assessment (SEA)** for the proposed Industrial Development Zone and Harbour at Coega, Port Elizabeth, South Africa	SEA project manager and report writer	Coega IDZ Initiative Section 21 Company
1996	**Environmental Impact**	Project manager and report	Thesen and Co.

Completion Date	Project description	Role	Client
	Assessment of Development Scenarios for Thesen Island, Knysna, South Africa	writer	
1996	**Environmental Impact Assessment** of the Management Options for the Blouvlei wetlands, Cape Town	Project manager and report writer	Ilco Homes Ltd (now Monex Ltd)
1995	**Environmental Impact Assessment** for the Saldanha Steel Project, South Africa	Report writing and management of specialist studies	Saldanha Steel Project
1994	**Environmental Impact Assessment** for the upgrading of resort facilities on Frégate Island, Seychelles	Member of the project management team, co-author, process facilitator	Schneid Israelite and Partners
1994	**Environmental Impact Assessment** for exploration drilling in offshore Area 2815, Namibia	Project manager and co-author	Chevron Overseas (Namibia) Limited
1994	**Management Plan** for the Rietvlei Wetland Reserve, Cape Town	Project manager and lead author	Southern African Nature Foundation (now WWF-SA)
1993	**Beach management plan** for Stilbaai beachfront and dunes, South Africa	Project manager and lead author	Stilbaai Municipality
1993	**Beach and dune management plan for Sedgefield** for the beach east of the mouth of the Swartvlei estuary	Project manager and lead author	Nel and De Kock Planners, George
1993	**Coastal Stability analysis and beach management plan** for the Table View coastline north of Blaauwberg Road, Cape Town	Project manager and lead author	Milnerton Municipality

EMPLOYMENT RECORD

- **1992 to present** Involved in coastal engineering studies; and various forms of environmental assessment and management studies. Council for Scientific and Industrial Research – Environmental Management Services (EMS) - Stellenbosch

QUALIFICATIONS/EDUCATION

- M. Phil. Environmental Science (University of Cape Town)
- B.Sc. Civil Engineering (awarded with Honours) (University of Cape Town)

LANGUAGE CAPABILITY

LANGUAGES	***Speaking***	***Reading***	***Writing***
English	Excellent	Excellent	Excellent
Afrikaans	Moderate	Moderate	Moderate

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Curriculum Vitae of Surina Laurie – Project Leader (*Pr. Sci. Nat.*)

Name of firm	CSIR
Name of staff	Surina Laurie
Profession	Environmental Assessment Practitioner
Position in firm	Project Manager/Senior Environmental Assessment Practitioner
Years' experience	6 years
Nationality	South African

Biographical Sketch

Surina has more than 6 years' experience as an Environmental Assessment Practitioner (EAP). She completed both her BSc in Conservation Ecology and MPhil in Environmental Management (part-time) at the University of Stellenbosch. With her honours project, she worked closely with the Endangered Wildlife Trust Riverine Rabbit Working Group and was responsible for determining the conservation opportunity for the Riverine Rabbit in the Karoo. With this project, she gained valuable experience in how to interact and manage stakeholders in such a way that a project's objectives and conservation goals are met without the stakeholders not being included in the decision-making process. The management of stakeholders and the ability to incorporate and/or adequately reflect their input are considered to be an essential component of an Environmental Impact Assessment (EIA) process.

With her Masters' thesis she researched and addressed why there is a need to undertake a Cost Benefit Analysis (CBA) as part of any EIA. The need for a CBA stems from the fact that losing environmental services will have an economic impact on a regional/national level in the long term but this is usually not considered during an EIA process. A CBA will look at both the economic benefits (profit) from a project and the economic losses because of loss of ecosystem services or rehabilitation costs. By including a CBA in an EIA, both the economic and environmental financial implications (not just the environmental significance of an impact) of a project will be considered by the decision making authority prior to the issuing of Environmental Authorisations or permits. To further expand her knowledge in this field, she has recently obtained a Postgraduate Certificate in Environmental Economics from the University of London.

She has experience as a project manager and project leader for Basic Assessments and Scoping and Environmental Impact Assessments for various sectors, including renewable energy, industry and tourism.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Surina Laurie has been involved in to this date:

Completion Date	Project description	Role	Client
2016-present	Strategic Environmental Assessment for the effective and efficient roll-out of large scale wind and solar energy projects in South Africa (Phase 2)	Project Manager	Department of Environmental Affairs
2016	Environmental Screening Study for the potential development of two Solar PV projects in the North West Province	Project Manager	Veroniva
2016	Basic Assessment process for the proposed construction of supporting electrical infrastructure to the Victoria West Wind Energy Facility, Victoria West, Northern Cape	Project Manager	South Africa Mainstream Renewable Power Developments (Pty) Ltd
2016	Amendment application to the Victoria West renewable energy facility in order to add additional wind turbines to site, Victoria West, Northern Cape	Project Manager	South Africa Mainstream Renewable Power Developments (Pty) Ltd
2015 - 2016	Scoping and Environmental Impact Assessment for 3 x 75 MW Solar PV facilities and associated electrical infrastructure near Kenhardt, Northern Cape a	Project Leader	Mulilo Renewable Project Development (Pty) Ltd
2015 - 2016	Scoping and Environmental Impact Assessment for 5 x 100 MW Solar PV facilities near Dealesville, Free State.	Project Leader	29Solar Capital
2015	Review of the validity of the appeals received against the EA issued for the construction of an 11 MW Hydro Power Station, Groblershoop, Northern Cape Province	Project Manager	Department of Environmental Affairs
2014 -2016	Integrated Scoping and EIA process for the development of twelve (12) Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Facilities with a generating capacity of 75 MW/100 MW each, near Dealesville, Free State.	Project Manager	South Africa Mainstream Renewable Power Developments (Pty) Ltd
2014 - 2015	Integrated Scoping and EIA process for the construction of three Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Facilities with a generating capacity of 75 MW each on the farms remaining extent of Portion 3 of the Farm Gemsbok Bult 120 and Boven Rugzeer remaining extent of 169, located 30 km north-east of Kenhardt. Two of	Project Manager	Mulilo Renewable Project Development (Pty) Ltd

Completion Date	Project description	Role	Client
	the projects will be located on the farm remaining extent of Portion 3 of the Farm Gemsbok Bult 120 and one on Boven Rugzeer remaining extent 169.		
2013-2014	Basic Assessment for the construction of three additional petroleum storage tanks at the Cape Town Harbour.	Environmental Consultant	FFS Refiners (Pty) Ltd
2013-2014	Scoping and EIA for the construction of a Sewage Package Plant on Robben Island.	Environmental Consultant	Department of Public Works
2013	Development of an EMPr for the undertaking of maintenance work on the Stilbaai Fishing Harbour's Slipway located in Stilbaai, Western Cape, South Africa. In order to be compliant to the requirements of the National Environmental Management Act (Act 107 of 1998) and Environmental Impact Assessment (EIA) Regulations, a Maintenance Management Plan (MMP) needed to be developed to manage the environmental impacts associated with maintenance work that is scheduled to be undertaken on the Stilbaai Fishing Harbour's Slipway as well as any future on-going maintenance requirements.	Environmental Consultant	Department of Public Works
2012-2014	Waste Management License for the proposed storage of Ferrous HMS 1+2, Shredded Ferrous and Bales located at the K/L Berth at Duncan Road, Port of Cape Town	Environmental Consultant	The New Reclamation Group (Pty) Ltd
2012-2014	Scoping and EIA for the construction a biodiesel refinery in the Coega Industrial Development Zone (IDZ). The proposed project entails the import of used vegetable oil from the USA and converting it through various processes to biodiesel which will be exported to Europe. The proposed project requires an Air Emissions License, a Waste Management License and Environmental Authorisation.	Environmental Consultant	FIS Biofuels (Ltd)
2013-2013	Basic Assessment for the proposed redevelopment of Berths B, C and D in Duncan Dock at the Port of Cape Town.	Assistant Environmental Consultant	FPT (Pty) Ltd

Completion Date	Project description	Role	Client
2011- 2012	Development of an EMPr for the Eerstelingsfontein Opencast Project (EOP).	Assistant Environmental Consultant	Exxaro Resources Limited
2011-2014	Basic Assessment for the proposed reinstatement of the Blue Stone Quarry located on Robben Island.	Assistant Environmental Consultant	Department of Public Works
2011	Scoping and EIA for the proposed upgrade to the Struisbaai WWTW.	Assistant Environmental Consultant	Cape Agulhas Municipality
2011	Basic Assessment for the construction of a cellular mast.	Environmental Consultant	MTN (Pty) Ltd
2010-2011	Basic Assessment for the construction of a Heritage Centre.	Environmental Consultant	Waenhuiskrans Arniston Community Development Trust
2010-2011	Scoping and EIA for the rezoning of the area from open space to residential, the construction of six residential units and the upgrading of the existing Waste Water Treatment Plant.	Environmental Consultant	Private developer

EMPLOYMENT RECORD

- **2014 to present** Project Manager- Environmental Assessment Practitioner. Council for Scientific and Industrial Research – Environmental Management Services (EMS) - Stellenbosch
- **2011 to 2014** Environmental Consultant. WSP Environmental (Pty) Ltd - Gauteng
- **2010 to 2011** Junior Environmental Consultant - Somerset West

QUALIFICATIONS/EDUCATION

- Postgraduate Certificate Environmental Economics (University of London)
- Project Management Course (University of Cape Town Graduate School of Business)
- MPhil Environmental Management (University of Stellenbosch)
- BSc Conservation Ecology (University of Stellenbosch)

LANGUAGE CAPABILITY

LANGUAGES	***Speaking***	***Reading***	***Writing***
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

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Curriculum Vitae of Kelly Stroebel – Project Manager/ EAP (*Cand. Sci. Nat.)*

Name of firm	CSIR
Name of staff	Kelly Stroebel
Profession	Environmental Assessment Practitioner
Position in firm	Environmental Assessment Practitioner
Years' experience	4 years
Nationality	South African

Biographical Sketch

Kelly holds a Bachelor of Science with Honours in Environmental Science from Rhodes University in Grahamstown and is currently pursuing a Masters at the University of Stellenbosch. Her undergraduate degree was a Bachelor of Science with majors in Environmental Science and Zoology. She is currently working as an environmental assessment practitioner at the Council for Scientific and Industrial Research (CSIR). Kelly has been the Project Manager of several EIA's in South Africa and several Basic Assessments for the Special Needs and Skills Development Programme. She has assisted in the SIP projects including the National Wind & Solar Strategic Environmental Assessment (SEA) and Electricity Grid Infrastructure SEA as SEA which were commissioned by the national Department of Environmental Affairs. On a personal level, Kelly enjoys the outdoors, traveling and SCUBA diving and is passionate about the field of environmental science and management.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Kelly Stroebel has been involved in to this date:

Completion Date	Project description	Role	Client
In progress	**EIA's in the South African energy sector**	Project Manager/EAP	Private energy companies and organs of state
In progress	**Special Needs and Skills Development Programme (DEA-CSIR)**	Project Manager conducting Environmental services such as basic Assessments and Environmental Screening Studies.	Various SMME's and Community Trusts
2015	**Strategic Environmental Assessment (SEA)** for Electricity Grid Infrastructure	Project member-stakeholder engagement and project support.	National Department of Environmental Affairs
2015	**EIA for two proposed Desalination plants on the KZN**	Project member- Public Participation Process, stakeholder	Umgeni Water

Completion Date	Project description	Role	Client
	coast.	engagement and project support.	
August 2014	**National Strategy for Sustainable Development Review (NSSD1)**	Project member- research and report development.	National Department of Environmental Affairs
2013-2014	**Strategic Environmental Assessment (SEA)** for roll out of photovoltaic solar and wind energy in South Africa.	Project member- Stakeholder engagement and project support	National Department of Environmental Affairs

EMPLOYMENT RECORD

- **2015 to present** Environmental Scientist and Assessment Practitioner. Council for Scientific and Industrial Research – Consulting and Analytical Services (CAS) - Stellenbosch
- **2014** Environmental Scientist and Assessment Practitioner (Intern). Council for Scientific and Industrial Research – Consulting and Analytical Services (CAS) - Stellenbosch
- **2013** Environmental Education Counselor - Fernwood Cove Summer Camp, USA.
- **2012** Graduate Assistant: Rhodes University Department of Environmental Science.
- **2011** Vacation Internship: Environmental Management Department of Mittal Steel, Newcastle.
- **2011** Vacation Internship: Northern Kwa-Zulu Natal branch of WWF.

QUALIFICATIONS/EDUCATION

- BSc Hons. Environmental Science (Rhodes University, Grahamstown, South Africa)
  - Honours modules including Environmental Impact Assessment, Statistics, Climate Change Adaptation, Urban Ecology and Environmental Water Quality.
  - Honours thesis: "Water use and conservation by households of different economic status in King Willliam's Town"
- Bachelor of Science with Distinction (Rhodes University, Grahamstown, South Africa)
  - Undergraduate courses including Environmental Science, Zoology, Ichthyology, Chemistry, Earth Science, Botany and Computer Science.
- IEB Matric Certificate, 5 Distinctions (St Dominic's Academy, Newcastle)

TRAINING, CONFERENCES AND PROFFESIONAL REGISTRATIONS

- Member of the Conference Organizing Committee (COC) for the IAIAsa Annual Conference 2017
- Project Management Practices and Principles with MS projects with the University of Pretoria: Distinction obtained (2016)
- Introduction to Earth Observation using ENVI with the University of Stellenbosch (2016)
- Public Participation Course with IAP2 (2016)
- Conflict Management Accredited through Conflict Dynamics (2015)
- Media and Science Training Accreditation through Jive Media Africa (2015)
- IAIA WC Workshop for Integrating Climate Change into EIA practice (2015)
- Presented on the DEA-CSIR "Special Needs and Skills Development Programme" at the 2014 & 2015 Annual IAIA (International Association for Impact Assessment) South Africa Conference.
- Environmental Impact Assessment Training Course accreditation through Coastal and Environmental Services, Grahamstown (2012)
- DEA&DP Training on the EIA Regulations (2014)
- Registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) (Reg #: 100151/14)

- Member of the South African Affiliate of the International Association for Impact Assessment (Membership no: 3588)

LANGUAGE CAPABILITY

LANGUAGES	***Speaking***	***Reading***	***Writing***
English	Excellent	Excellent	Excellent
Afrikaans	Moderate	Moderate	Moderate

CSIR
Jan Cilliers Street
PO Box 320
Stellenbosch 7600
South Africa

Phone: +27 21 888 2432
Fax: +27 21 888 2693
Email: bmqokeli@csir.co.za

Curriculum Vitae of Babalwa Mqokeli – Project Manager/GIS (*Cand. Sci. Nat.)*

Name of firm	CSIR
Name of staff	Babalwa Mqokeli
Profession	Environmental Assessment Practitioner
Position in firm	Junior Environmental Assessment Practitioner
Years' experience	2 years
Nationality	South African

Biographical Sketch

Babalwa holds a Masters degree in Ecological Science from the University of KwaZulu-Natal. She has 2 years of experience in the environmental management field, as an ecological scientist. She is currently working as an environmental assessment practitioner at the Council for Scientific and Industrial Research (CSIR). Babalwa has been a Project Manager for a variety of Basic Assessment projects in the mining and agricultural sector, under the DEA-CSIR Special Needs and Skills Development Programme. She is currently assisting in a solar energy EIA, as a Project Officer. Babalwa is passionate about environmental management and planning.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Babalwa Mqokeli has been involved in to this date:

Completion Date	Project description	Role	Client
In progress	**EIA's in the South African energy sector**	Project member	Private energy companies and organs of state
In progress	**Special Needs and Skills Development Programme (DEA-CSIR)**	Project Manager conducting Environmental services such as basic Assessments and Environmental Screening Studies for agricultural and mining projects.	Various SMME's and Community Trusts
In progress	**Strategic Environmental Assessment (SEA)** for Renewable Energy Development Zones	Project member-stakeholder engagement and project support.	National Department of Environmental Affairs
In progress	**Permit Application Process for *Boscia albitrunca* (Shepherd's Tree)**	Project member	North West Department of Economic and Enterprise Development

EMPLOYMENT RECORD

- **2017 to present** Environmental Assessment Practitioner. Council for Scientific and Industrial Research – Environmental Management Services (EMS) Unit - Stellenbosch
- **2015** Environmental Assessment Practitioner (Intern). Council for Scientific and Industrial Research – Environmental Management Services (EMS) Unit - Stellenbosch
- **2015** Biology 101 Teacher Assistant. University of KwaZulu-Natal - Pietermaritzburg
- **2013** Conservation Research Intern. Nature's Valley Trust (WWF-SA Environmental Leaders Programme) - Plettenberg Bay.

QUALIFICATIONS/EDUCATION

- MSc Ecological Science (University of KwaZulu-Natal, Pietermaritzburg, South Africa)
- BSc Hons. Ecological Science (University of KwaZulu-Natal, Pietermaritzburg, South Africa)
- BSc Biological Science (University of Zululand, Empangeni, South Africa)
    - Undergraduate courses including Integrated Environmental Management, Aquatic Conservation & Management, Animal Ecology (Terrestrial, Freshwater & Marine), Risk Assessment & Ecotoxicology, Environmental Law & Waste Management, Introduction to Surface Water Hydrology, Botany.
- Matric Certificate (Durban Girls' Secondary School, Durban)

LANGUAGE CAPABILITY

LANGUAGES	***Speaking***	***Reading***	***Writing***
English	Excellent	Excellent	Excellent
IsiXhosa	Excellent	Excellent	Excellent
IsiZulu	Excellent	Excellent	Excellent
Afrikaans	Poor	Moderate	Moderate

EAP Declaration

APPENDIX 9
DECLARATION OF THE EAP

I, Kelly Stroebel declare that –

General declaration:

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, 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 will take into account, to the extent possible, the matters listed in regulation 8 of the Regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 48 of the Regulations and is punishable in terms of section 24F of the Act.

33

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

Signature of the environmental assessment practitioner:

CSIR

Name of company:

03/04/2018

Date:

APPENDIX 9
9.2 UNDERTAKING UNDER OATH/ AFFIRMATION

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

Signature of the environmental assessment practitioner

CSIR

Name of company

03/04/2018

Date

"I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have an objection to taking the oath, and that he/she considers it to be binding on his/her conscience, and which was sworn to and signed before me and that the administering oath complied with the regulations contained in Government Gazette No. R 1258 of 21 July 1972, as amended.

SIGNATURE

I. Gruma
FULL NAMES

Commissioner of Oaths
Designation: BRANCH MANAGER ex officio Republic of South Africa
Date: 2018-04-03
Place: STELLENBOSCH
Business Address: CNR. BIRD & PLEIN STR.

Signature of the commissioner of oaths

2018-04-03

Date

BRANCH MANAGER
2018-04-03
7599 STELLENBOSCH
TAKBESTUURDER

BASIC ASSESSMENT REPORT

APPENDIX B:
Maps and Photographs

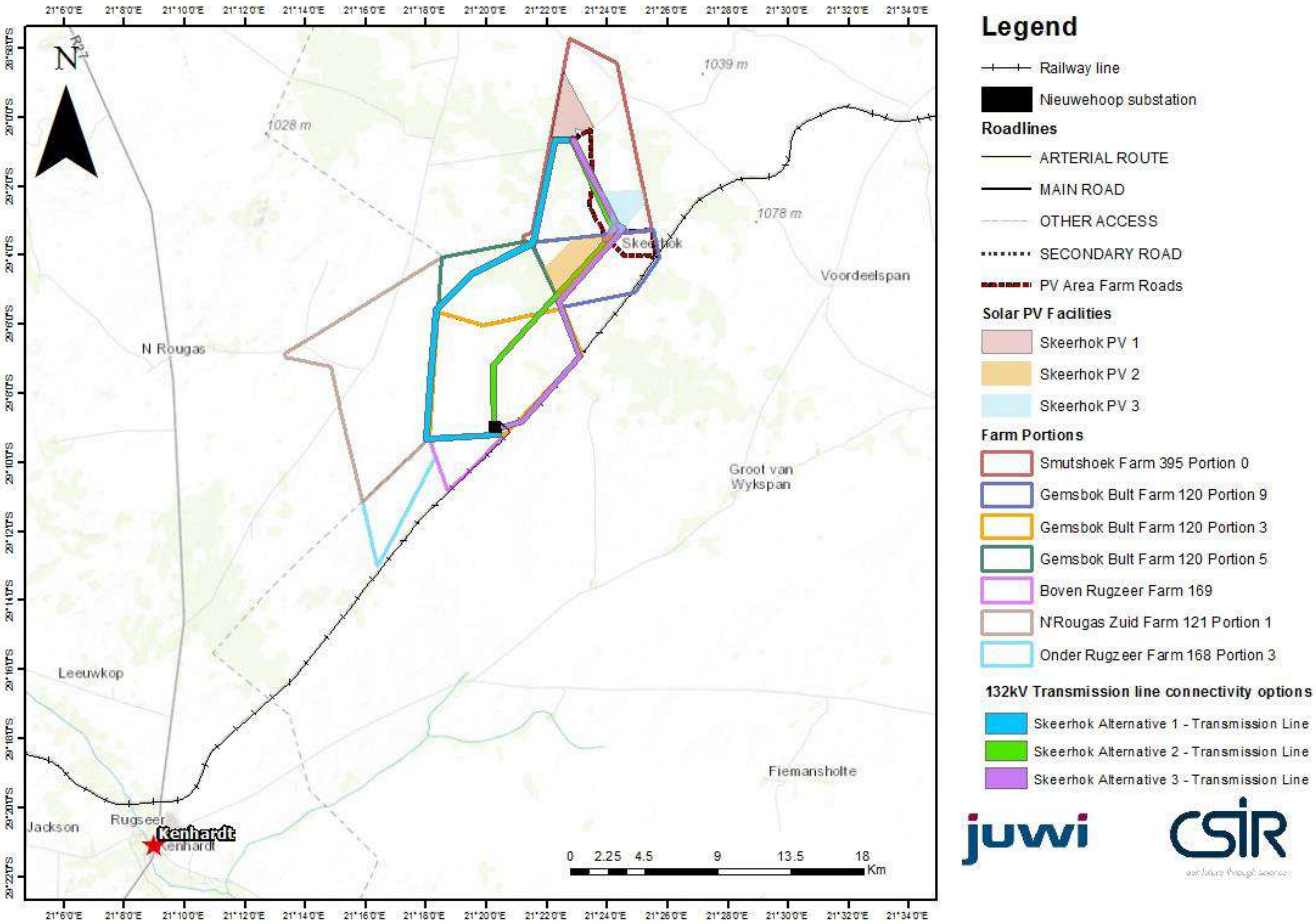


Figure 1: Locality Map of the proposed 132kV Transmission line connectivity options (Showing affected farm portions)

Corner Points Co-ordinates Maps and Tables

Table 1: Co-ordinates of the Corner Points of the Skeerhok Alternative 1 Transmission line connectivity option

Transmission Line	Point	Latitude	Longitude
Skeerhok Alternative 1	1.A	29° 3'34.54"S	21°23'55.03"E
	1.B	29° 3'8.40"S	21°24'20.26"E
	1.C	29° 0'39.16"S	21°22'50.58"E
	1.D	29° 0'40.39"S	21°22'16.92"E
	1.E	29° 3'37.58"S	21°21'31.72"E
	1.F	29° 4'34.43"S	21°19'29.43"E
	1.G	29° 5'34.66"S	21°18'19.78"E
	1.H	29° 9'18.81"S	21°18'1.70"E
	1.I	29° 9'11.91"S	21°20'20.92"E
	1.J	29° 8'54.93"S	21°20'22.22"E

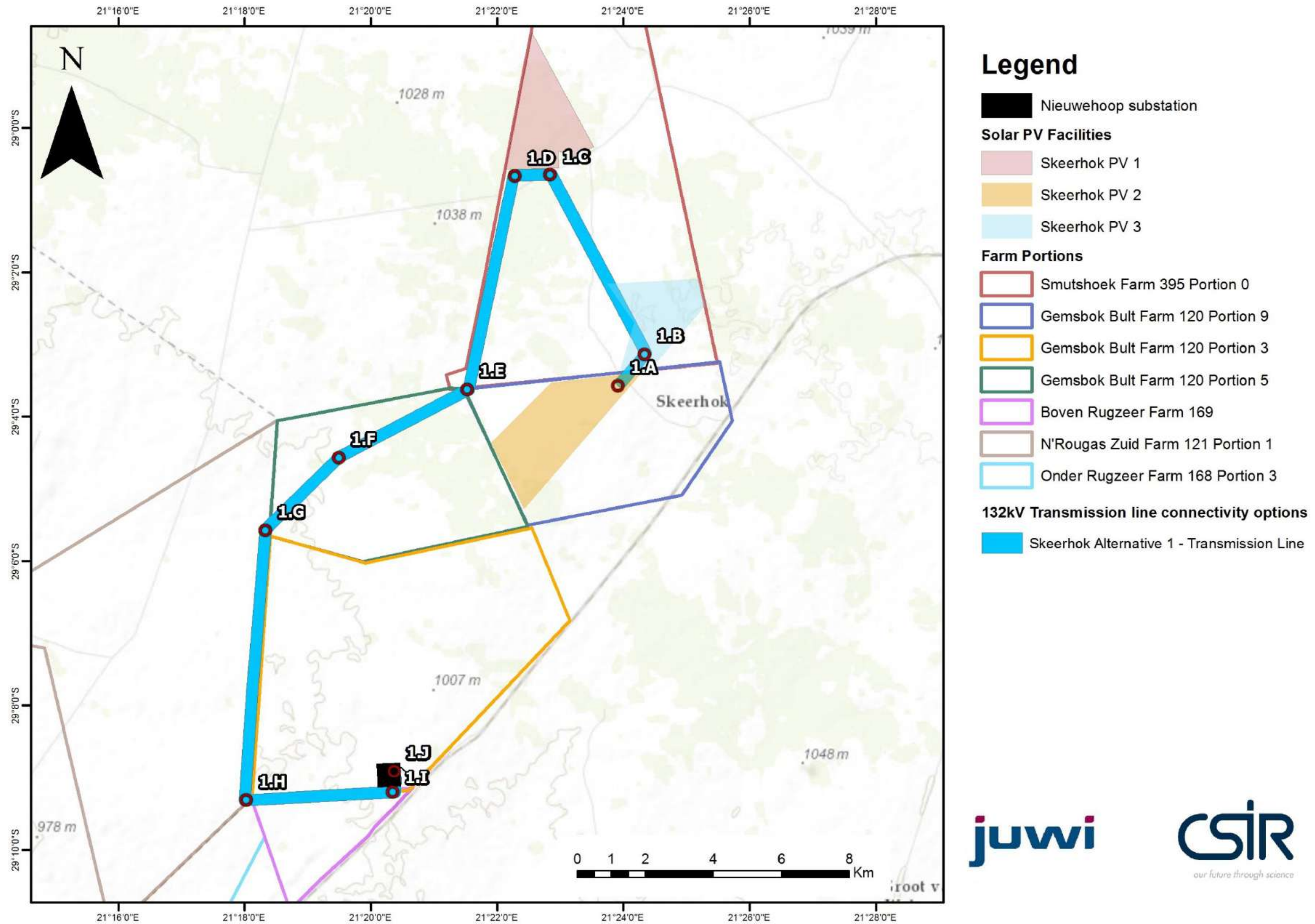


Figure 2: Corner co-ordinates of the proposed Skeerhok Alternative 1 Transmission Line option (please refer to table 1 for the co-ordinates of points 1.A to 1.J)

Table 2: Co-ordinates of the Corner Points of the Skeerhok Alternative 2 Transmission line connectivity option

Transmission Line	Point	Latitude	Longitude
Skeerhok Alternative 2	2.A	29° 0'34.19"S	21°22'48.36"E
	2.B	29° 3'10.03"S	21°24'9.38"E
	2.C	29° 3'3.73"S	21°24'21.50"E
	2.D	29° 3'32.63"S	21°24'0.18"E
	2.E	29° 7'10.59"S	21°20'13.31"E
	2.F	29° 8'50.72"S	21°20'15.62"E

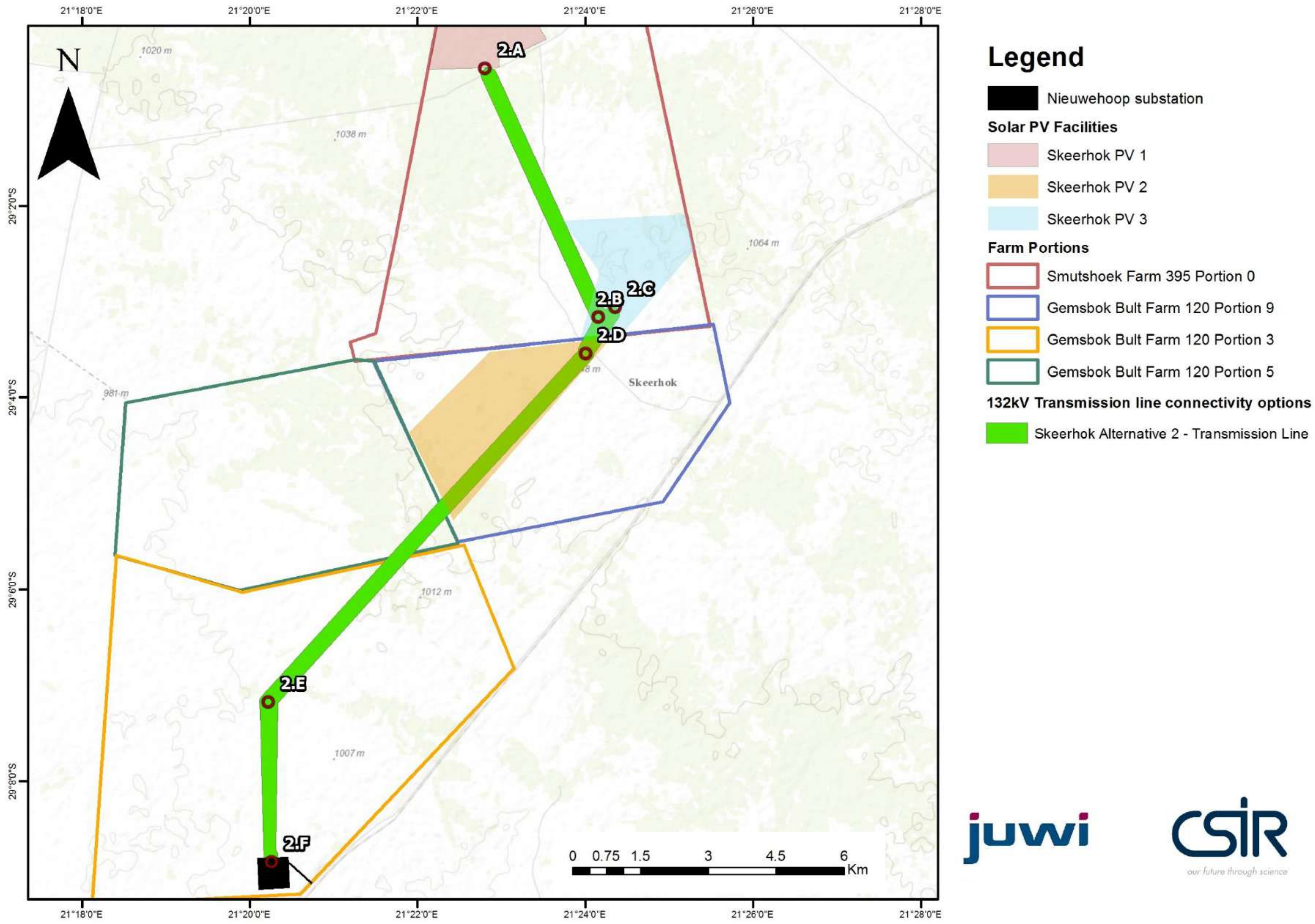


Figure 3: Corner co-ordinates of the proposed Skeerhok Alternative 2 Transmission Line option (please refer to table 2 for the co-ordinates of points 2.A to 2.F)

Table 3: Co-ordinates of the Corner Points of the Skeerhok Alternative 3 Transmission line connectivity option

Transmission Line	Point	Latitude	Longitude
Skeerhok Alternative 3	3.A	29° 0'34.88"S	21°22'48.51"E
	3.B	29° 3'8.51"S	21°24'18.99"E
	3.C	29° 3'35.38"S	21°23'51.96"E
	3.D	29° 3'7.26"S	21°24'20.85"E
	3.E	29° 3'13.62"S	21°24'30.27"E
	3.F	29° 5'19.66"S	21°22'22.91"E
	3.G	29° 6'55.61"S	21°23'3.85"E
	3.H	29° 8'48.09"S	21°21'11.23"E
	3.I	29° 9'3.29"S	21°20'18.12"E

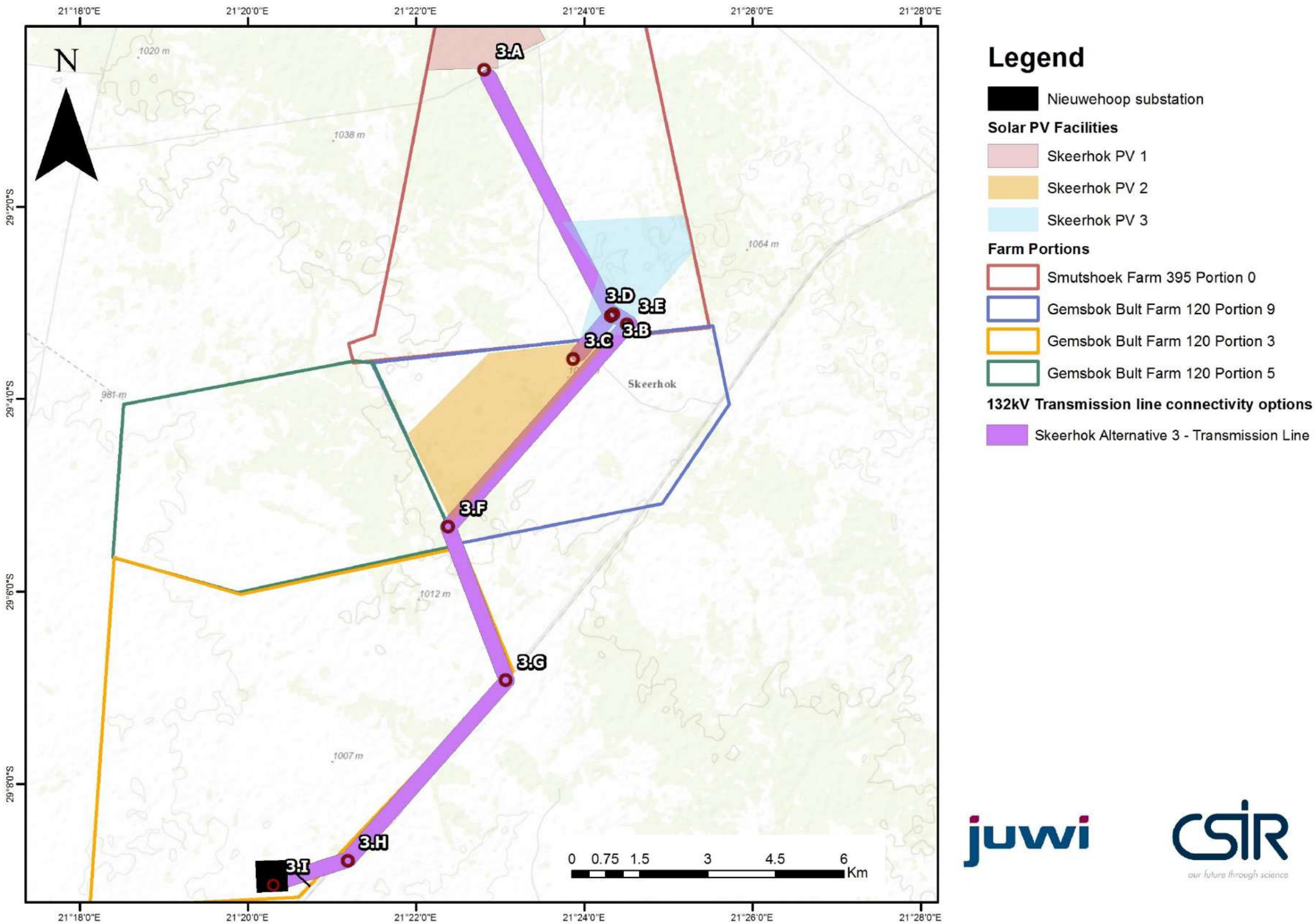


Figure 4: Corner co-ordinates of the proposed Skeerhok Alternative 3 Transmission Line option (please refer to table 3 for the co-ordinates of points 3.A to 3.I)

Environmental Sensitivity Map

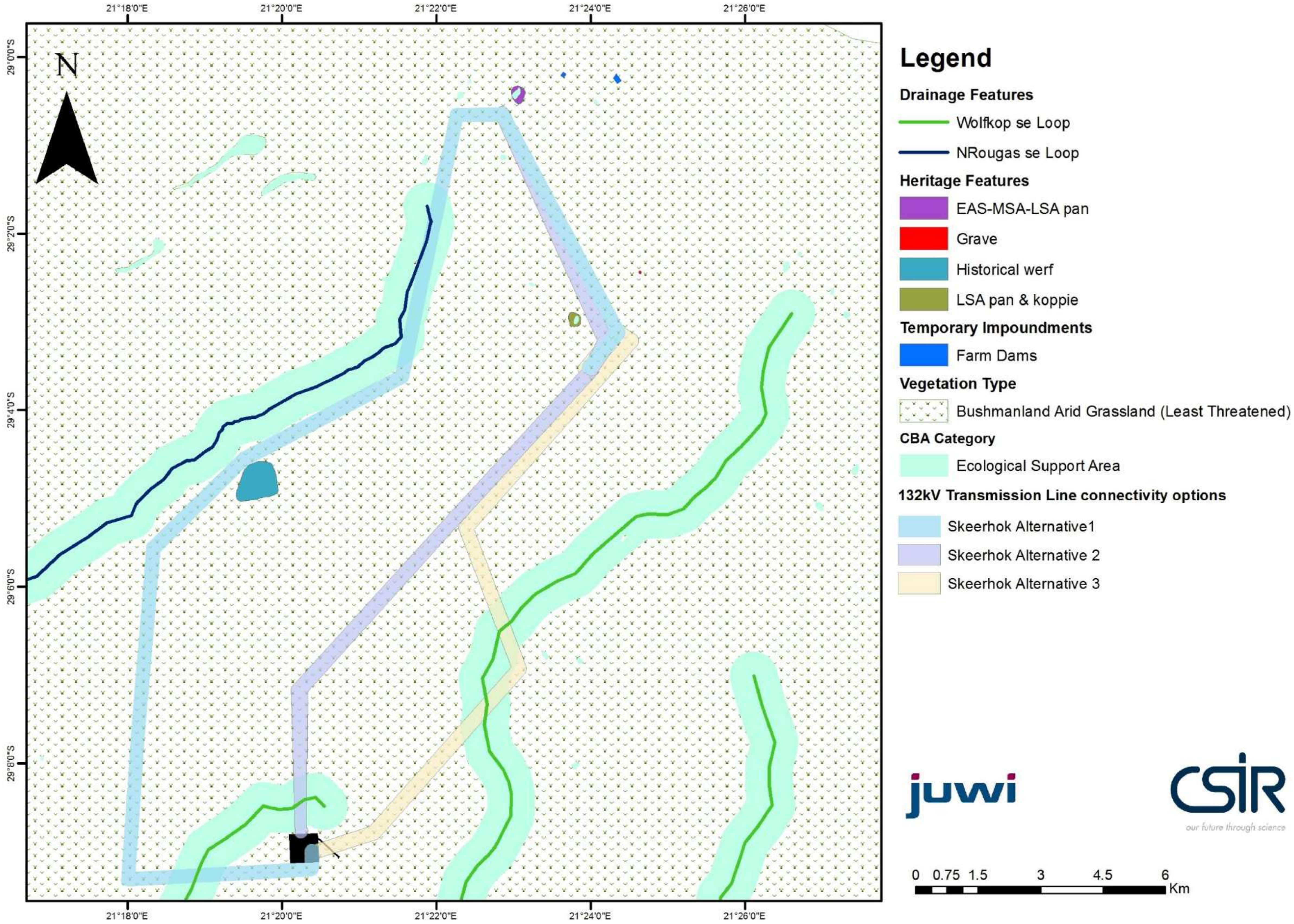


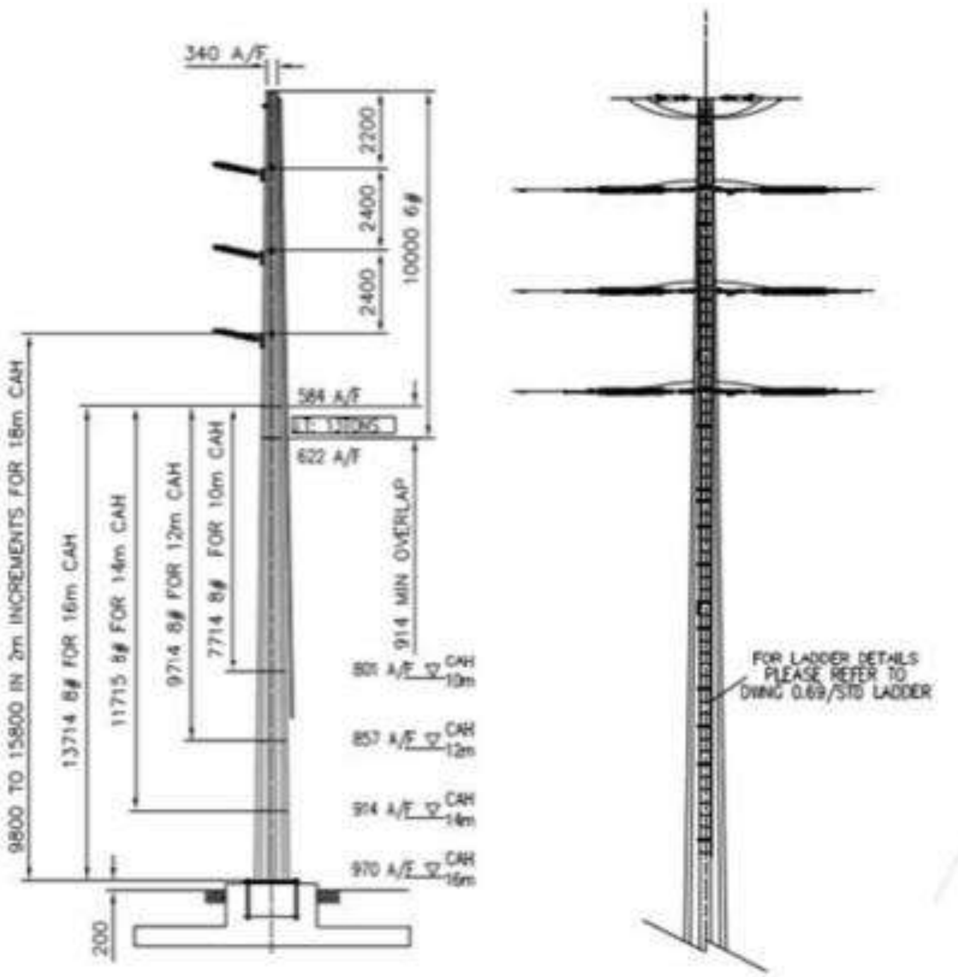
Figure 5: Environmental Sensitivities in relation to the proposed Skeerhok Transmission Line connectivity options

BASIC ASSESSMENT REPORT

APPENDIX C:
Facility Illustrations

Guyed 7622

Modified 7611



T2002 Strains

Option A: Guyed Monopoles (also known as Hybrid Monopoles	Option B: Self-Supporting suspension structures	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 132kV Transmission Line

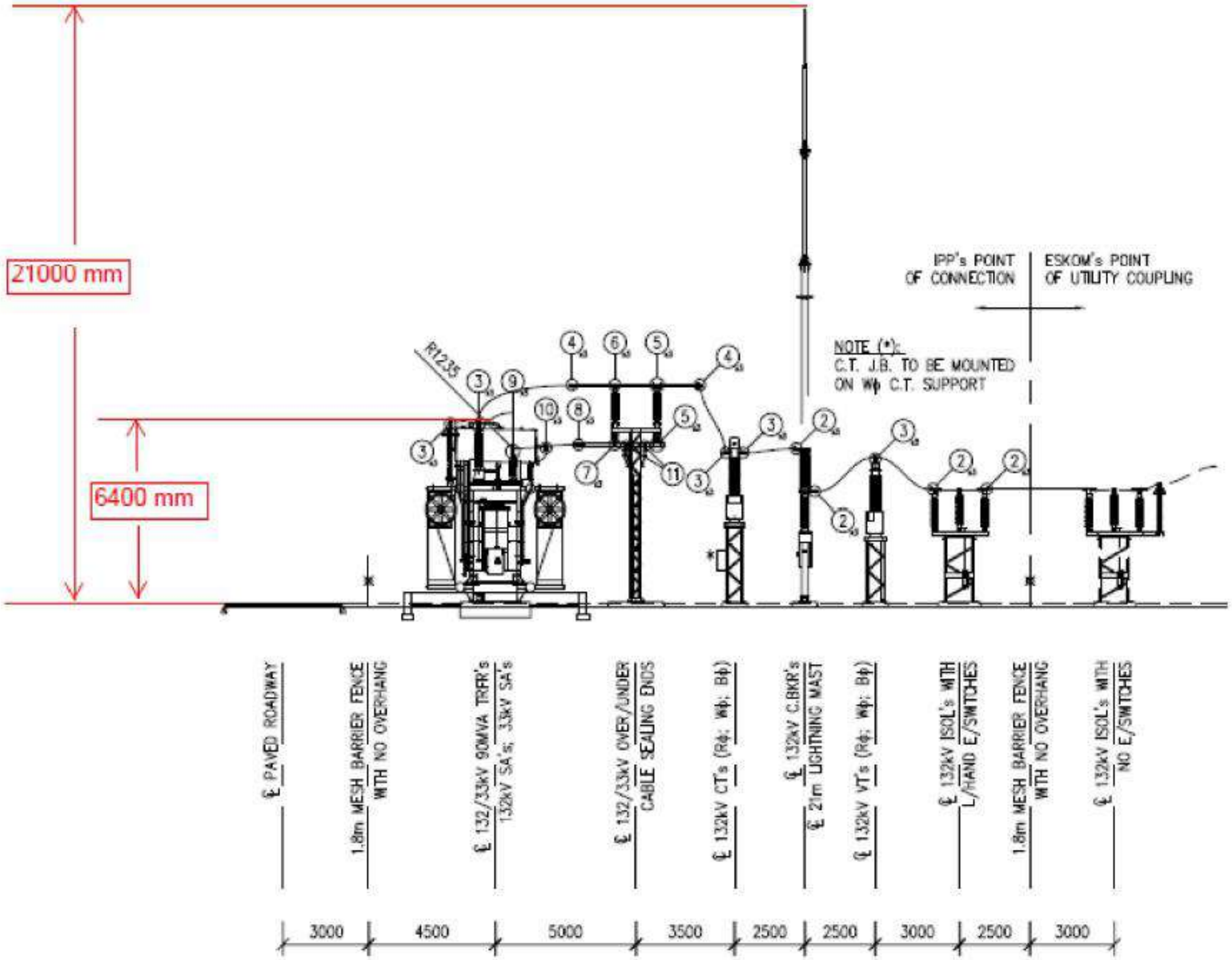


Figure 2: Indicative drawing of the proposed on-site substation

BASIC ASSESSMENT REPORT

APPENDIX D:
Public Participation

contents

1. Proof of Placement of Newspaper Advertisements and Site Notice Board

KENNISGEWING VAN OMGEWINGSIMPAKEVALUERINGPROSESSE VIR DIE ONTWIKKELING VAN DRIE FOTOVOLTAïSE SONKRAGAANLEGTE EN GEASSOSIEERDE ELEKTIESE INFRASTRUKTUUR, NOORD-OOS VAN KENHARDT IN DIE NOORD-KAAP

CSIR our future through science

juwi

Kennis word hierdeur gegee in terme van die NEMA Omgewings Impak Asseserings (EIA) Regulasies onder sub-regulasie 41 (2) (a) gepromulgeer in Staatskoerant No. 40772 van 7 April 2017 van die Nasionale Wet op Omgewingsbestuur (Wet 107 van 1998, soos gewysig) (NEMA), dat juwi Renewable Energies’ (Pty) Ltd (die Aansoeker) van voorneme is om drie fotovoltaïese (FV) sonkragaanlegte met ’n opwekkingsvermoë van 100 MW elk en elektriese infrastruktuur op te rig naby Kehardt in die Noord Kaap. Die elektirese komponent sal geassesseer word as deel van ‘n aparte Basiese Bestekopname Proses. Die voorgestelde fasiliteite sal opgerig word op Gedeeltes 0 van Smutshoek Plaas 395 en Gedeelte 9 van Gemsbok Bult Plaas 120, geleë ongeveer 43 km noord oos van Kenhardt. Die voorgestelde kraglyne (132 kV kraglyn vir elke 100 MW sonkrag fasiliteit) sal aansluit by die Nieuwehoop Substasie.

In terme van die Nasionale Wet op Omgewingsbestuur (Wet 107 van 1998, soos gewysig) (NEMA) en die NEMA Omgewings Impak Asseserings (EIA) Regulasies gepromulgeer in Staatskoerant No. 40772 en Staatskennisgewing (GNR) 324 en 327 op 7 April, vereis die beoogde projekte dat Omvangsbepaling-en Omgewingsevaluering (OIE) prosesse onderneem moet word sowel as ‘n aparte Basiese Bestekopname proses vir die kraglyne.
Die Wetenskaplike en Nywerheidsnavorsingsraad (WNNR) is deur juwi aangestel om die vereiste prosesse te onderneem.
U word hiermee genooi om as ’n belangstellende en/of geaffekteerde party te registreer **(teen nie later as 23 Oktober 2017 nie)**. Dit sal ons in staat stel om u op ons projek databasis by te voeg en ook sodat u enige kommentaar of kwelpunte aangaande die projek kan opper. Hierdie kommentaar sal by die Omvangsbepalingsverslag en Basiese Bestekopname verslag ingesluit word.
Vir verdere inligting en/of om as ’n belangstellende en geaffekteerde party te registreer, kontak:
Ms Kelly Stroebel (Omgewings Impak Asseserings Konsultant van WNNR (CSIR)

Posadres: Posbus 320, Stellenbosch, 7599 // **Tel**:(021) 888 2432//**Faks**:(021) 888 2693//

e-pos: kstroebel@csir.co.za

6 OKTOBER 2017 DIE GEMSBOK BLADSY 19

'Vrye onderrig, toegeruste onderwysers' hoeksteen van onderwys

GEMSBOK-UPINGTON: Vanjaar se viering van Wêreldonderwysersdag het "Vrye onderrig, toegeruste onderwysers" as tema, met die fokus op die institusionele outonomie en akademiese vryheid van onderwysers.

Ek Praat Prontuit

Deur Mérie Scheepers

Is dit te veel gevra?

GEMSBOK-UPINGTON: As 'n mens deur Upington ry, sal jy maklik sê dit is 'n mooi dorp. Die paaie in die middedorp is sonder slaggate en die grasperke van die parke is skoon en netjies met lopende sproeiers en 'n mens is al die tyd bewus daarvan dat ons langs die rivier woon.

KENNISGEWING VAN OMGEWINGSIMPAKEVALUERINGPROSESSE VIR DIE ONTWIKKELING VAN DRIE FOTOVOLTAÏSE SONKRAGAANLEGTE EN GEASSOSIEERDE ELEKTRIESE INFRASTRUKTUUR, NOORD-OOS VAN KENHARDT IN DIE NOORD-KAAP

juwi CSIR

Note from the CSIR: The Gemsbok is a weekly Afrikaans newspaper which is distributed every Wednesday and made available from Wednesday to Friday; it is dated for a Friday (in this case, 6 October 2017).

ENGLISH TRANSLATION OF NEWSPAPER ADVERTISMENT ABOVE

NOTICE OF BASIC ASSESSMENT AND SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESSES

THE PROPOSED DEVELOPMENT OF THREE SOLAR PHOTOVOLTAIC FACILITIES AND ASSOCIATED ELECTRICAL INFRASTRUCTURE, NORTH-EAST OF KENHARDT, NORTHERN CAPE PROVINCE

Notice is given in terms of the Environmental Impact Assessment (EIA) Regulations, under sub-regulation 41 (2) (a), published in Government Gazette (GG) No 40772 of 7 April 2017, of the National Environmental Management Act 1998 (Act No. 107 of 1998, as amended) (NEMA), that juwi Renewable Energies' (Pty) Ltd (hereinafter referred to as "juwi") proposes to construct and operate 3 x 100 Megawatt (MW) Solar Photovoltaic (PV) Facilities and associated electrical infrastructure (subject to a separate Basic Assessment Process) near Kenhardt in the Northern Cape Province. The proposed Facilities will be constructed on two land portions, namely Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120, located approximately 43 km north-east of Kenhardt. The proposed Solar Facilities will be connected to the Nieuwehoop Substation via a 132 kV transmission line for each 100 MW Facility.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the NEMA EIA Regulations published in Government Notice Regulation (GNR) 324 and 327 on 7 April 2017 Government Gazette No 40772, the proposed projects require full Scoping and EIA Processes as well as a separate BA process.

To ensure that you are included on the project register as an Interested and Affected Party (I&AP), as well as to raise any issues and concerns for inclusion in the Scoping/EIA Reports, you are kindly requested to register your interest in the projects and submit any comments you may have to the CSIR (at the details indicated below): **Ms. Ms Kelly Stroebel, CSIR, PO Box 320, Stellenbosch 7599, Phone: (021) 888 2432, Fax: (021) 888 2693 or Email: kstrobel@csir.co.za**. You have until on or before **23 October 2017** to do so (30 days from the date of this publication - including weekends, but excluding public holidays).

Site Notice Board – English

JOINT NOTICE OF BASIC ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

PROPOSED DEVELOPMENT OF THREE SOLAR PHOTOVOLTAIC FACILITIES AND ASSOCIATED ELECTRICAL INFRASTRUCTURE, NORTH-EAST OF KENHARDT, NORTHERN CAPE PROVINCE

Notice is given in terms of Environmental Impact Assessment (EIA) Regulations under, sub-regulation 41 (2) (a), published in Government Gazette 40772 of 7 April 2017, of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA), that juwi Renewable Energies (Pty) Ltd (herein after referred to as "juwi") proposes to construct and operate 3 x 100 Megawatt (MW) Solar Photovoltaic (PV) Facilities and associated electrical infrastructure (subject to a separate Basic Assessment Process) near Kenhardt in the Northern Cape Province. The proposed Facilities will be constructed on two land portions, namely Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120, located approximately 43 km north-east of Kenhardt. The proposed Solar Facilities will be connected to the Nieuwehoop Substation via 132 kV transmission lines for each 100 MW Facility.

A full Scoping and EIA Process is required for the construction of the three Solar PV Facilities. A separate Basic Assessment Process is also required and will be undertaken for the development of the proposed transmission lines. The CSIR has been appointed by juwi to undertake the required Basic Assessment and Scoping and EIA Processes for the proposed projects. The need for a Basic Assessment and Scoping and EIA is triggered by the following potential listed activities listed in GNR 324,325 and 327:

Government Notice	Listed Activity Number
GNR 327, 7 April 2017	Activity 11; Activity12 (x) and (xii); Activity 19 (i); Activity 24 (ii) and Activity 28 (ii)
GNR 325, 7 April 2017	Activity 1; Activity 14 and Activity 15
GNR 324, 7 April 2017	Activity 18

Since the proposed 100 MW Solar PV Facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process will be undertaken for the proposed projects. However, separate Applications for Environmental Authorisation (EA) will be lodged with the Competent Authority (i.e. the National Department of Environmental Affairs (DEA)) for each proposed Solar PV Facility and transmission line. Separate reports (i.e. Basic Assessment and Scoping and EIA Reports) will be compiled for each project.

To ensure that you are included on the project register as an Interested and Affected Party (I&AP), as well as to raise any issues and concerns for inclusion in the Scoping/EIA Reports, you are kindly requested to register your interest in the projects and submit any comments you may have to the CSIR (at the details indicated below).

Ms Kelly Stroebel
PO Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2693
Email: kstrobel@csir.co.za

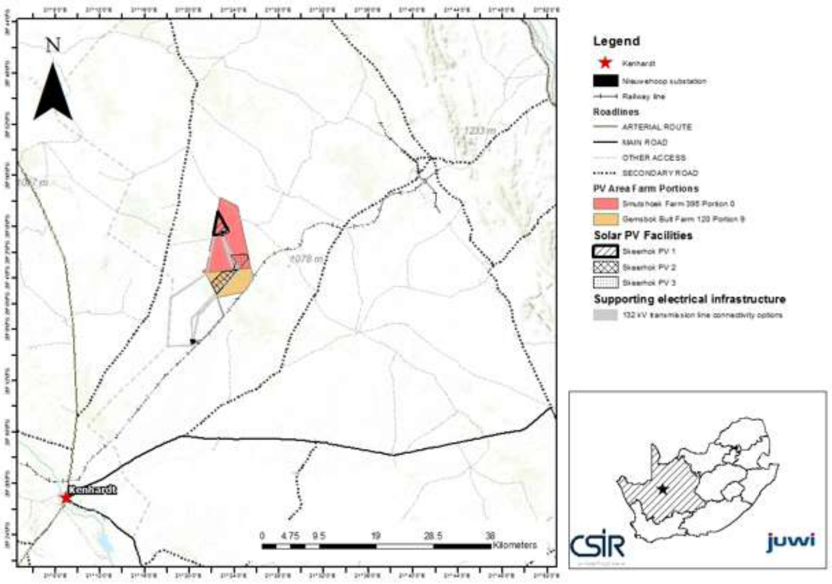


Figure: Locality Map depicting the location of the proposed three Solar Photovoltaic Facilities

Site Notice Board - Afrikaans

GEKOMBINEERDE KENNISGEWING VAN OMGEWINGSIMPAKSTUDIE (OIS) EN BASIESE BESTEKOPNAME PROSESSE

GEINTEGREERDE PUBLIEKE DEELNAME PROSES VIR DIE VOORGESTELDE DRIE FOTOVOLTAÏSE SONKRAGAANLEGTE VAN 100 MW ELK EN MEEGAANDE ELEKTRIESE INFRASTRUKTUUR VIR JUWI NABY KENHARDT IN DIE NOORD-KAAP PROVINSIE

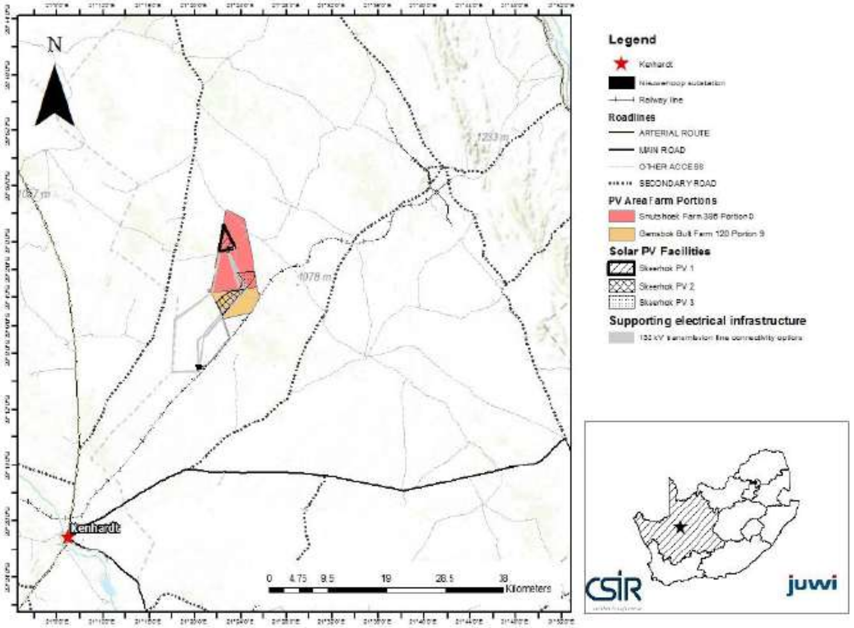
Hiermee word kennis gegee in terme van Regulasie 41 (2) van die Omgewingsimpakstudie (OIS) Regulasies soos gepubliseer in Staatskoerant No 40772 op 7 April 2017, van die Nasionale Omgewingsbeheer Wet, 1998 (Wet No 107 van 1998) (NEMA), dat juwi Renewable Energies' (Pty) Ltd (hierna verwys as "juwi") van voorneme is om drie fotovoltaïse sonkragaanlegte van 100 MW elk en drie geassosieerde kraglyne te installer en te bedryf naby Kenhardt in die Noord Kaap. Die kraglyne sal deel uitmaak en geassesseer word in drie aparte Basiese Evalueringsprosesse wat later onderneem sal word. Die voorgestelde fotovoltaïse sonkragaanlegte sal aansluit by die Nieuwehoop Substasie via drie 132 kV kraglyne (een vir elke fotovoltaïse sonkragaanleg. Die voorgestelde fotovoltaïse sonkragaanlegte sal opgerig word op die volgende plase: Gedeeltes 0 van Smutshoek Plaas 395 en Gedeelte 9 van Gemsbok Bult Plaas 120, geleë ongeveer 43 km noord oos van Kenhardt.

Die beoogde drie fotovoltaïse sonkragaanlegte vereis dat 'n Omvangsbepaling-en Omgewingsevaluering (OIE) proses onderneem moet word. Die dire kraglyne vereis dat 'n Basiese Evalueringsproses onderneem word. Die Wetenskaplike en Nywerheidsnavorsingsraad (WNNR) is deur juwi aangestel om die vereiste prosesse te onderneem. Die prosesse word benodig omdat die volgende aktiwiteite soos gelys in Staatskennisgewings R 324, R 325 en R 327 van toepassing is:

Staatskennisgewing	Gelyste aktiwiteite
GNR 327, 7 April 2017	Aktiwiteite 11; 12 (x) en (xii); 19 (i); 24 (ii) en 28 (ii)
GNR 325, 7 April 2017	Aktiwiteite 1; 14 & 15
GNR 324, 7 April 2017	Aktiwiteit 18

Aangesien al drie son plaas projekte in dieselfde geografiese area geleë is en dieselfde tipe aktiwiteit behels sal 'n geïntegreerde Publieke Deelname Proses onderneem word. Drie aparte aansoeke en OIE verslae sal ingedien word vir evaluering deur die Nasionale Departement van Omgewingsake vir die fotovoltaïse sonkragaanlegte. Drie aparte aansoeke sal ook ingedien word vir die geassosieerde kraglyne en dit sal onderhewig wees aan drie aparte Basiese Bestekopname prosesse waarvoor drie aparte verslae opgestel gaan word.

Om te verseker dat u vir die projekte as 'n Belangstellende en Geaffekteerde Party (B&GP) geregistreer word of om enige kwessie uit te lig aangaande die projekte, word u vriendelik versoek om te registreer vir die projek en u kommentaar aan WNNR se projek bestuurder (inligting hieronder) te stuur.



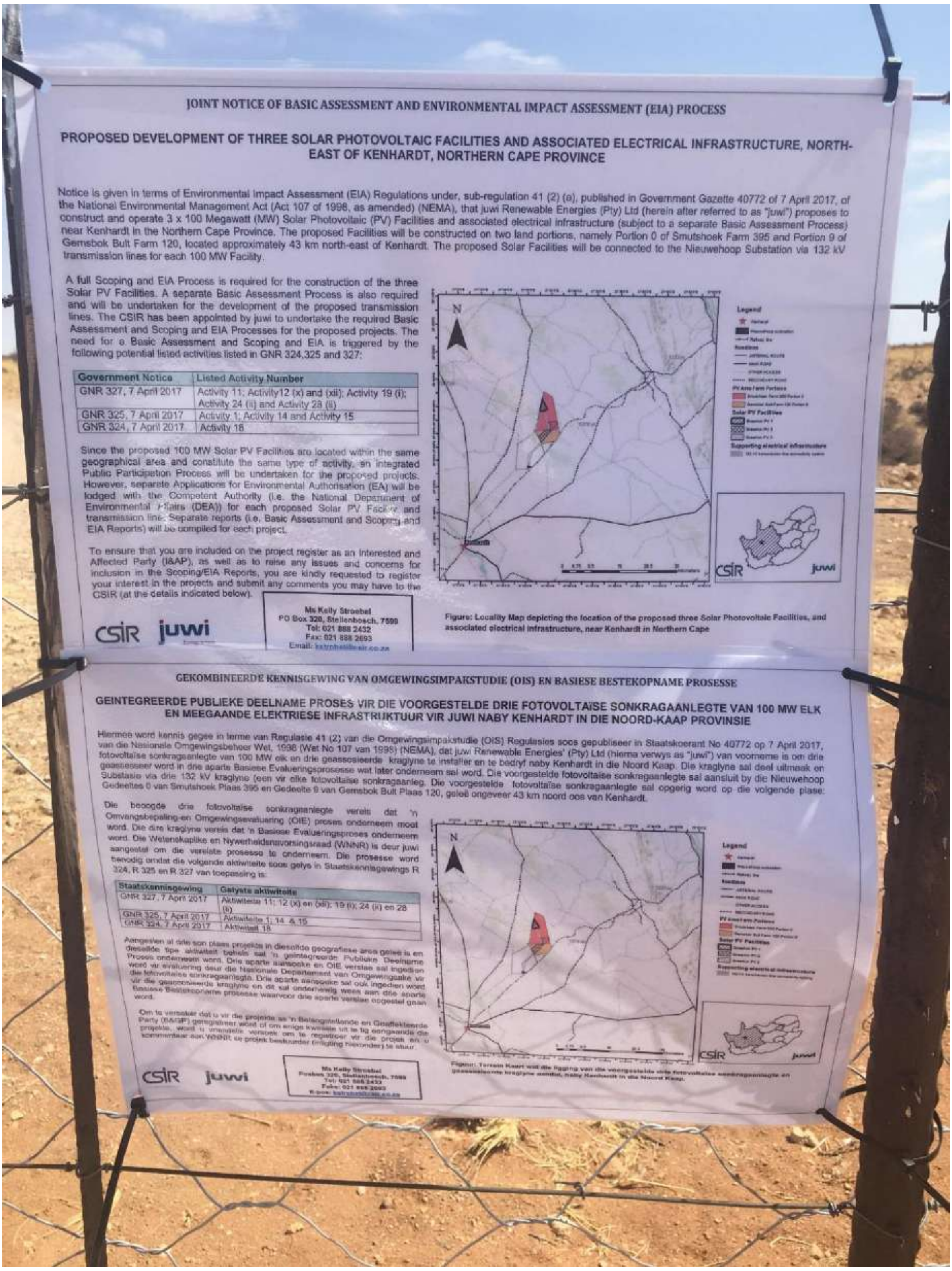
Figuur: Terrein Kaart wat die ligging van die voorgestelde drie fotovoltaïse sonkragaanlegte en geassosieerde kraglyne aandui, naby Kenhardt in die Noord Kaap.

CSIR juwi

Ms Kelly Stroebel
Posbus 320, Stellenbosch, 7599
Tel: 021 888 2432
Faks: 021 888 2693
E-pos: kstrobel@csir.co.za

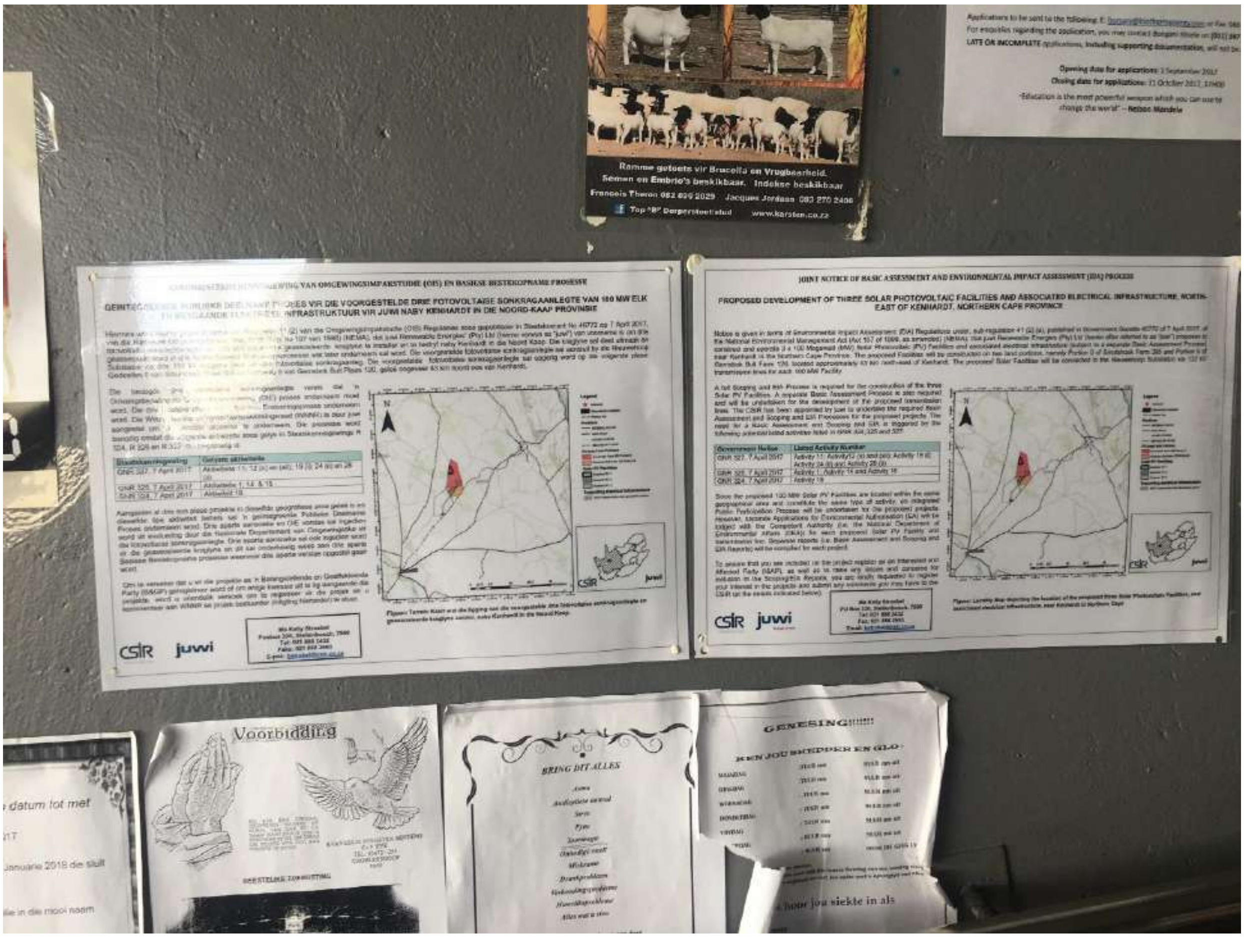
Proof of Placement of Site Notice Boards: 19th September 2017

Site Notice Board (English and Afrikaans) placed at the entrance to the SEF site, GPS Co-ordinates of the site notice: 29° 4'3"S; 21° 25'35"E

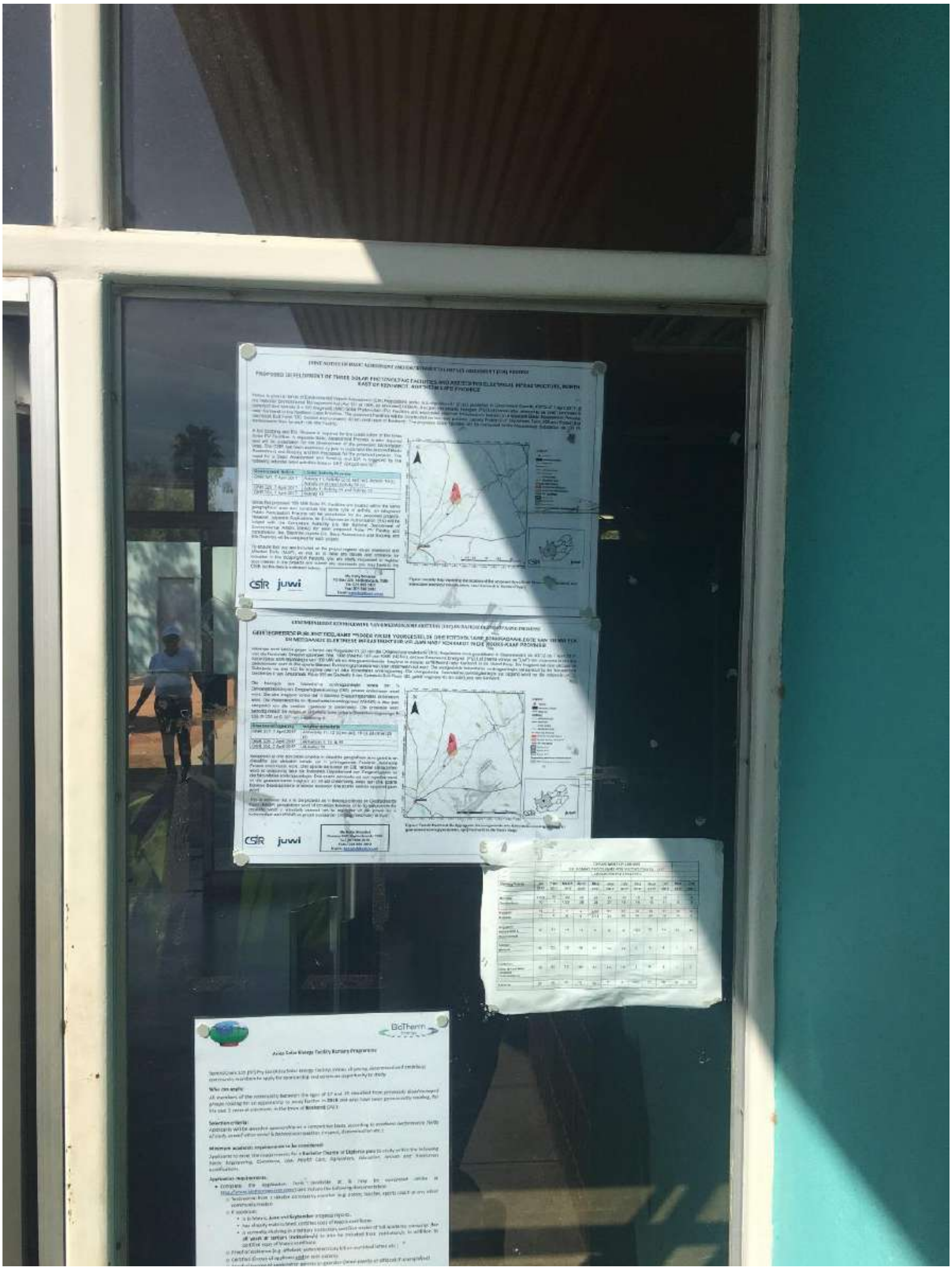


Site Notice Board (English and Afrikaans) placed at the entrance to the SEF site.
GPS Co-ordinates of the site notice: 29^{0} 4'3"S; 21^{0} 25'35"E

Additional Locations of the site notices placed on 19th September 2017



Site Notice Board (English and Afrikaans) placed at the Kenhardt Petrol Station.



Close up image of the Site Notice Board (English and Afrikaans) placed at the Kai !Garib Municipality Offices in Kenhardt.

Site Notice Board (English and Afrikaans) placed at the entrance to the Transnet road (alongside the railway line), which serves as one of the access routes to the SEF sites (Skeerhok PV 1, 2 and 3)

2. Correspondence Sent to I&APs, Organs of State and Stakeholders (prior to the Release of the Basic Assessment Report for I&AP Review, i.e. during the Project Initiation Phase)

Note from the CSIR: During the Project Initiation Phase, an integrated PPP was undertaken for the proposed BA Project and the juwi Skeerhok PV 1, 2 and 3 SEF projects.

Letter 1 dated 20 September 2017: Notification of the BA (and SEF) Processes

CSIR Environmental Management Services
P. O. Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2472
Email: kstroebel@csir.co.za

CSIR
our future through science

20 September 2017

Dear Interested and Affected Party

RE: RELEASE OF DRAFT SCOPING REPORTS FOR THE PROPOSED DEVELOPMENT OF THREE SOLAR PHOTOVOLTAIC (PV) FACILITIES (REFERRED TO AS SKEERHOK PV 1, SKEERHOK PV 2 AND SKEERHOK PV 3) ON PORTION 9 OF GEMSBOK BULT 120 AND PORTION 0 OF SMUTSHOEK 395, NORTH-EAST OF KENHARDT, NORTHERN CAPE PROVINCE

juwi Renewable Energies (PTY) Ltd (i.e. "juwi") is proposing to develop three 100 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and associated electrical infrastructure (including 132 kV transmission lines for all three 100 MW facilities) on Portion 9 of Gemsbok Bult 120 and Portion 0 of Smutshoek 395, and the connection points to the Eskom Nieuwehoop Substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120, approximately 70 km south of Upington and 43 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2017 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 40772 and Government Notice (GN) R327, R326, R325 and R324 on 7 April 2017, a full Scoping and EIA Process is required for the construction of the three Solar PV facilities. A separate Basic Assessment Process will be undertaken for the development of the proposed transmission lines, associated electrical infrastructure and connection to the Eskom Nieuwehoop Substation. The Council for Scientific and Industrial Research (CSIR) has been appointed by the Project Applicant to undertake the separate required Basic Assessment and Scoping and EIA Processes for the proposed projects.

The proposed 100 MW Solar PV facility projects (requiring a Scoping and EIA Process) and the Basic Assessment project are referred to as:

Scoping and EIA Processes: Proposed 75 MW Solar PV Facilities	Basic Assessment Processes: Proposed 132 kV Transmission Lines and Associated Electrical Infrastructure
▪ Skeerhok PV 1 ▪ Skeerhok PV 2 ▪ Skeerhok PV 3	▪ Skeerhok PV – Transmission Line

Table 1 below indicates the Project Applicant details, as well as brief project details.

Table 1: Details of the Scoping and EIA Projects

Project Reference	Project Applicant	Generation Capacity	Project Footprint	Available Development Area
Skeerhok PV 1	juwi Renewable Energies (PTY) Ltd	100 MW	300 ha	400 ha
Skeerhok PV 2		100 MW	300 ha	570 ha
Skeerhok PV 3		100 MW	300 ha	350 ha

juwi is an integrated independent power producer that is focused on making solar energy a sustainable and affordable source on a global scale. Linked to enhancing its operations within South Africa, each 100 MW Solar PV facility will cover an approximate area of 300 ha (as noted in Table 1 above). The area available to develop at the preferred sites exceeds the required project footprint area, and therefore there is scope to avoid major environmental constraints through the final design and layout of the facility. The proposed projects will entail the construction of a solar field, buildings, electrical infrastructure, internal access roads, and associated infrastructure and structures.

Since the proposed 100 MW Solar PV facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process (PPP) will be undertaken for the proposed projects. However, separate Applications for Environmental Authorisation (EA) have been lodged with the Competent Authority (i.e. the National Department of Environmental Affairs (DEA)) for each proposed Scoping and EIA project and will be lodged for the Basic Assessment project. Furthermore, separate reports (i.e. Basic Assessment and Scoping and EIA Reports) will be compiled for each project. The Basic Assessment Report will be made available for Interested and Affected Party (I&AP) and stakeholder review together with the EIA Reports.

In line with the above, as a registered I&AP on the project database, you are hereby notified of the release of the Scoping Reports for the Skeerhok PV 1, Skeerhok PV 2 and Skeerhok PV 3 projects to all registered I&APs and stakeholders for a 30-day review period, which will extend from **20 September 2017 to 23 October 2017.**

Hard copies of the Scoping Reports are available for public viewing at the Kenhardt Library (in Park Street). The Draft Scoping Reports can also be downloaded from the following website: https://www.csir.co.za/environmental-impact-assessment

All comments received during this 30 day review period will be recorded and included in the Final Scoping Reports for submission to the National DEA for decision-making in line with Regulations 21 and 22 of the 2014 EIA Regulations (GN R326). As a registered I&AP on the project database, you will be notified of the submission of the Final Scoping Reports to the DEA for decision-making.

Should you have any queries or require additional information please do not hesitate to contact the undersigned using the contact details provided above.

Sincerely,

Surina Laurie
Project Leader
CSIR Environmental Management Services

Kelly Stroebel
Project Manager
CSIR Environmental Management Services

Proof of Delivery of Email containing (with letter above) sent to all I&APs on 20 September 2017

Message Id:	59BF90AA.8AD : 70 : 17837
Subject:	juwi Skeerhok PV projects; release of DSR's for public comment
Created By:	KStroebel@csir.co.za
Scheduled Date:	
Creation Date:	18/09/2017 11:23
From:	Kelly Stroebel

Recipients:

Recipient	Action	Date & Time
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3. I&AP Database

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement	Notice of Release of Draft BA Report	Email: Notice of Submission of Final BA Report to DEA	Notice of EA for BA
Organs of State							
1.	Mmatlala	Rabothatha	National DEA: Integrated Environmental Authorisations	✓			
2.	Muhammad	Essop	National DEA: Integrated Environmental Authorisations	✓			
3.	Wilma	Lutsch	National DEA: Biodiversity and Conservation	✓			
4.	Skumsa	Mancotywa	National DEA: Protected Areas Unit				
5.	Herman	Alberts	National DEA: Integrated Environmental Authorisations	✓			
6.	A	Yaphi	Provincial Department of Environment and Nature Conservation (DENC): Northern Cape	✓			
7.	M	Mathews	Provincial DENC: Northern Cape	✓			
8.	Samantha	De la Fontaine	Provincial DENC: Northern Cape	✓			
9.	Elsabe	Swart	Provincial DENC: Northern Cape	✓			
10.	Sibonelo	Mbanjwa	Provincial DENC: Northern Cape	✓			
11.	Luzane	Tools-Bernado	Provincial DENC: Northern Cape	✓			
12.	Eric	Ngxanga	ZF Mgcawu District Municipality - Municipal Manager	✓			
13.	Frikkie	Ruping	ZF Mgcawu District Municipality - Environmental Manager	✓			

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement	Notice of Release of Draft BA Report	Email: Notice of Submission of Final BA Report to DEA	Notice of EA for BA
14.	H.T	Scheepers	!Kheis Municipality - Municipal Manager	✓			
15.	Gloria	Matlakala	!Kheis Municipality	✓			
16.	JG	Lategan	Kai ! Garib Municipality - Municipal Manager	✓			
17.	M.	Clarke	Kai ! Garib Municipality - Manager: Electromechanical Services	✓			
18.	Mashudu	Randwedzi	Department of Water and Sanitation	✓			
19.	Melinda	Mei	Department of Water and Sanitation	✓			
20.	Shaun	Cloete	Department of Water and Sanitation	✓			
21.	Chantèl	Schwartz	Department of Water and Sanitation	✓			
22.	Mandla	Ndzilili	Ministry of Environment and Nature Conservation	✓			
23.	Mashudu	Marubini	National Department of Agriculture, Forestry and Fisheries (DAFF)	✓			
24.	Thoko	Buthelezi	National DAFF - AgriLand Liaison office	✓			
25.	D	Nhlakad	National DAFF - AgriLand Liaison office	✓			
26.	Anneliza	Collett	National DAFF - AgriLand Liaison office	✓			
27.	H. J.	Buys	National DAFF (Land Use and Soil Management)	✓			
28.	Jacoline	Mans	Provincial DAFF	✓			
29.	Khuthala	D.	DAFF	✓			
30.	Ali	Diteme	Provincial Department of Agriculture, Land Reform & Rural Development	✓			
31.	Pieter	Buys	National Energy Regulator of South Africa	✓			
32.	IA	Bulane	Department of Public Works, Roads and Transport	✓			

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement	Notice of Release of Draft BA Report	Email: Notice of Submission of Final BA Report to DEA	Notice of EA for BA
33.	Denver	Van Heerden	Department of Public Works, Roads and Transport	✓			
34.	Rene	de kock	South African Roads Agency Limited - Northern Cape (Western Region)	✓			
35.	Nicole	Abrahams	South African Roads Agency Limited (Western Region)	✓			
36.	M	Lepheane	Department of Labour	✓			
37.	A	Botes	Department of Social Development	✓			
38.	Riaan	Warie	Northern Cape Economic Development Agency	✓			
39.	Andrew	Timothy	Directorate Heritage, Department - Sports, Arts and Culture	✓			
40.	Lizell	Stroh	South African Civilian Aviation Authority	✓			
41.	John	Geeringh	ESKOM	✓			
42.	Kevin	Leask	ESKOM	✓			
43.	Justine	Wyngaardt	ESKOM (Western Operating Unit, Distribution)	✓			
44.	Lindi	Haarhoff	ESKOM (Nieuwehoop Substation)	✓			
45.	Sharon	Steyn	Northern Cape Chamber of Commerce and Industry	✓			
46.	P.J.J	van Rensburg	Agri Northern Cape	✓			
47.	H.	Myburgh	Agri Northern Cape	✓			
48.	Adrian	Tiplady	SKA SA	✓			
49.	Marina	Lourens	Transnet Freight Rail	✓			
50.	Gilbert	Nortier	Transnet Freight Rail	✓			
51.	Mayvyn	Bhana	Transnet	✓			

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement	Notice of Release of Draft BA Report	Email: Notice of Submission of Final BA Report to DEA	Notice of EA for BA
52.	Clive	Stephenson	Transnet	✓			
53.	Director		Department of Energy Northern Cape	✓			
54.	Ragna	Redelstorff	South African Heritage Resources Agency[1]	✓			
55.	Natasha	Higgitt	South African Heritage Resources Agency	✓			
56.	Kgauta	Mokoena	Department of Mineral Resources	✓			
57.	Elliot	Sibeko	Department of Telecommunication & Postal Services	✓			
58.	Director		Department of Communications	✓			
59.	Chris	Coetzee	Southern African Large Telescope (SALT) Sutherland	✓			
60.	Raoul	Van den Berg	Southern African Large Telescope (SALT) Sutherland	✓			
Stakeholders (NGOs and Conservation Organisations)							
61.	Simon	Gear	Birdlife South Africa	✓			
62.	Janine	Goosen	Birdlife South Africa	✓			
63.	Lubabalo	Ntsolo	C.A.P.E. Co-ordination Unit: Northern Cape	✓			
64.	Freyni	du Toit	Grasslands Society of Southern Africa	✓			
65.			Endangered Wildlife Trust, Wildlife and Energy Programme	✓			

[1] Note that submissions to the South African Heritage Resources Agency (SAHRA) have been made via the online SAHRIS. The details provided are those of the designated case officer assigned to the application.

Number	First Name	Surname	Company/ Organisation	Notice of Project Announcement	Notice of Release of Draft BA Report	Email: Notice of Submission of Final BA Report to DEA	Notice of EA for BA
66.	Dr. Howard	Hendricks	South African National Parks - Snr GM: Policy & Governance Conservation Services Division	✓			
67.	Dr. Joh R	Henschel	SAEON Arid Lands Node	✓			
68.	Praneel	Ruplal	Independent Communications Authority of South Africa (ICASA)	✓			
Landowner/Adjacent Landowners							
69.	P	Karsten	Landowner	✓			
70.	D	Strauss	Landowner	✓			
71.	H	Van Wyk	Landowner	✓			
Additional I&APs							
72.	Mitchell	Hodgson	Scatec Solar	✓			
73.	Claude	Bosman	Veroniva (PTY) Ltd - Renewable Energy	✓			
74.	Karen	Low	Mulilo Renewable Energy Developments	✓			

Note from the CSIR: This Appendix only incorporates public participation processes undertaken for the project announcement/initiation phase, as this DBAR is going to be released to the public for the 30 day comment period. To date no comments have been made with regards to this BA project. Thus, copies of correspondence to I&APs for release of this DBAR for the 30 day comment period, as well as copies of the comments received from I&APs will be included in the FBAR. A comments and responses trail incorporating all comments received from I&APs during the 30 day comment period, as well as responses, will also be included in the FBAR.

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

APPENDIX E1:

Ecology

ECOLOGICAL IMPACT ASSESSMENT:

Basic Environmental Assessment for the Proposed Powerlines to serve the Skeerhok 100 MW Solar Photovoltaic Facilities, near Kenhardt, Northern Cape Province

Report prepared for:

CSIR – Environmental Management Services

P O Box 320

Stellenbosch, 7599

South Africa

Report prepared by:

Simon C Bundy – SDP Ecological

P.O. Box 1016

Ballito 4420

South Africa

February 2018

SPECIALIST EXPERTISE

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 of Natural Scientific Professionals 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
BSc Biological Science MSc University of Natal, Diploma Project Management (1997) Executive Education, PhD candidate Dept 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 of the Scatec Kenhardt PV facilities for CSIR. (2014 - 2015)
Ecological analysis and review of various farms within the Kenhardt region of the Northern Cape in respect of the establishment of PV facilities.

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.

Coastal and Dune management plan for iSimangaliso Wetland Park Authority (2016)
Specialist investigation into the ecological state of dune cordons, drivers of change and establishment of set back lines along the iSimangaliso coastline.

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 AM, Mather AA 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, Simon C Bundy, 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.

Signature of the specialist: ________________  ________________

Name of Specialist: _Simon C Bundy____________________________________

Date: ______________19 February 2018_______________________________

EXECUTIVE SUMMARY

An Ecological Impact Assessment which included consideration of the habitat and faunal components associated with the land portions affected by the proposed supporting electrical was undertaken during the period June to November 2017. This particular assessment was undertaken to inform the Basic Assessment process associated with the establishment of a 132 kV powerline that will serve the proposed Skeerhok 100 MW Solar Photovoltaic Facilities to be established in the region.

The investigations looked specifically at habitat form and structure and the relationship of such form and structure to the surrounding geology and geomorphology. The assessment sought to identify the ecological status of the immediate area in which the three powerline route alternatives have been proposed to be established and further identify key ecological components and biophysical drivers along the three proposed line routes. Such information was then considered in a comparative manner in order to identify the most applicable route from an ecological perspective. In addition, the forecasting of direct, indirect and cumulative levels of impact arising from the establishment of the powerline was evaluated.

The routes are all considered to fall within a xeric environment (dry or semi desert) and as such the areas are subject to significant seasonal to daily fluctuations in meteorological and physical factors which influence the prevailing ecology. In addition to the above, anthropogenic interventions associated with both the presence of livestock on the land in question, as well as indirect influences arising from the establishment of infrastructure (roads and rail) have served to alter other bio physical factors, including surface hydrology and the nature and composition of habitat.

The routes form part of the catchments serving the Hartbees River and ultimately the Orange River, which lies to the north of the subject area, with some of the routes traversing minor dendritic drainage features that serve these systems. These drainage lines are inundated on an intermittent basis, often only following rainfall episodes periods that are greater than a year. The presence of these features was utilized as the key determinant in the identification of the most applicable route and it is the route that avoids these dendritic features which has been selected as the most applicable route for the establishment of the powerlines. The alternative line routes, namely Skeerhok powerline alternatives 1 and 3, may also be considered as options for the placement of the powerline as no reasons to preclude these routes were identified as long as a prudent approach is given to the placement of towers and maintenance infrastructure along these corridors.

No additional ecological features were noted to lie within the powerline servitudes, with the exception of the possible presence of one or more protected plant species, which, with the judicious alignment of the powerlines within the corridors, can be avoided. Mitigation measures that may address or redress identified potential impacts on the broader terrestrial landscape, have been identified in the report and proposed in the Environmental Management Programme.

Having given due consideration to the three proposed routes and their ecological state, as well as the nature of the powerlines, it is our opinion that Skeerhok Powerline Alternative 2, is the preferred route and its establishment cannot be precluded from the site on ecological grounds, provided that suitable measures, as espoused in this report are implemented.

LIST OF ABBREVIATIONS

BA	Basic assessment
CARA	Conservation of Agricultural Resources Act
CBA	Critical BioDiversity Area
DEA	Department of Environmental Affairs
ESA	Ecological support area
EIA	Environmental Impact Assessment
ELP	Electrical light pollution
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
TWINSPAN	Two Way Indicator Species Analysis

GLOSSARY

Definitions	
Arid	Areas which receive low levels of rainfall or there is a moisture deficit.
Crepuscular	Fauna that is active at twilight
Dendrogram	A diagram showing relationships determined through a cluster analysis
Calcrete	A carbonate horizon formed in semi-arid regions. Also known as a caliche.
Dolerite	Form of igneous rock.
Drainage line	A geomorphological feature in which water may flow during periods of rainfall.
Edaphic	Pertaining to soils.
Fossorial	Pertaining to burrowing animals or those which live underground
Geophyte	Plants with underground storage organs.
Graminoid	Grasses or grass-like. Also monocotyledonous plants.
Gully	An erosion line exceeding 30cm in depth where water flow is concentrated and erosion resulting from flow is clearly evident.
Halophytic	Reliant upon increased salt concentrations (within soils or water)
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
Multivariate analysis	A statistical method of evaluating non linear relationships between groups of data.
Non perennial	Flow is intermittent and irregular
Rill	Shallow erosion lines less than 30cm deep
Xeric	A dry, as opposed to wet (hydric) or mesic (intermediate) environment.

COMPLIANCE WITH THE APPENDIX 6 OF THE AMENDED 2014 EIA REGULATIONS

Requirements of Appendix 6 – GN R326	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;	Pg 2
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Pg 4
c) an indication of the scope of, and the purpose for which, the report was prepared;	S 1.1.1.
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	S 1.1.4.
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	S 1.1.3
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	S 1.3
g) an identification of any areas to be avoided, including buffers;	S1.3. &
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;	S1.3, S1.5 and 1.6
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	S1.1
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	S1.6
k) any mitigation measures for inclusion in the EMPr;	S1.6
l) any conditions for inclusion in the environmental authorisation;	S1.6
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	S1.8
n) a reasoned opinion- i. as to whether the proposed activity or portions thereof should be authorised; and ii. if the opinion is that the proposed activity 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;	S1.9
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	S1.6
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	S1.5
q) any other information requested by the competent authority.	n/a

TABLE OF CONTENTS

TABLES AND FIGURES

ECOLOGICAL IMPACT ASSESSMENT

This chapter presents the findings of the Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna) that was prepared by Simon Bundy (of SDP Ecological and Environmental Services (SDP)) as part of the Basic Assessment (BA) associated with the establishment of powerlines from the proposed Skeerhok photovoltaic projects to the Nieuwehooop substation, located near Kenhardt, within the Northern Cape Province.

1.1. INTRODUCTION AND METHODOLOGY

1.1.1. Scope and Objectives

juwi is proposing to develop three 100 MW Solar Energy Facilities (SEFs) within the same geographical area on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120 close to Kenhardt in the Northern Cape. Separate full Scoping and EIA Processes are being undertaken for these proposed SEFs and are referred to as Skeerhok PV 1 (DEA Reference Number: 14/12/16/3/3/2/1033), Skeerhok PV 2 (DEA Reference Number: 14/12/16/3/3/2/1034) and Skeerhok PV 3 (DEA Reference Number: 14/12/16/3/3/2/1035). The development of the transmission line and associated electrical infrastructure is proposed to connect the proposed SEFs to the national grid via the Eskom Nieuwehoop Substation. Following the construction phase, the proposed transmission line and associated electrical infrastructure will either be transferred into the ownership of Eskom or remain in the ownership of juwi. The proposed development of the transmission line and associated electrical infrastructure is subject to a separate Basic Assessment (BA) process (this Report). (Figure 1).

Such an application entails the provision of information that allows the mandated authority to draw a considered conclusion on the impacts that the proposed project will have on the local environment and identify any other environmental matters that may require mitigation or moderation either in the planning, construction or operation phases of the project.

This bio physical evaluation is associated with three potential powerline routes that will serve to connect Skeerhok PV1, PV2 and / or PV3 to the Nieuwehoop substation. The proposed powerline which will follow the most optimal route alignment, is to be constructed by juwi in order to allow for the direct provision of solar generated power to the National Eskom grid. The three proposed routes were subject to evaluation during the period September to November 2017, with such evaluation entailing a literature review and site evaluation, during which specific site information and data were collected and evaluated. In addition, the identification of key ecological features along the proposed line routes was undertaken and an interpretation of the prevailing habitat form is provided within this report.

All information was evaluated and interpreted in order to provide an understanding of the nature of the prevailing environment at a landscape and habitat level, together with specific evaluation of data relating to habitat form and structure. A key focus of the investigation was to identify anomalies within the prevailing, generally uniform environment common to the area. Such variance may be considered to be indicative of differing habitat forms, which under consideration, may be of higher order ecological value in relation of the prevailing environment.

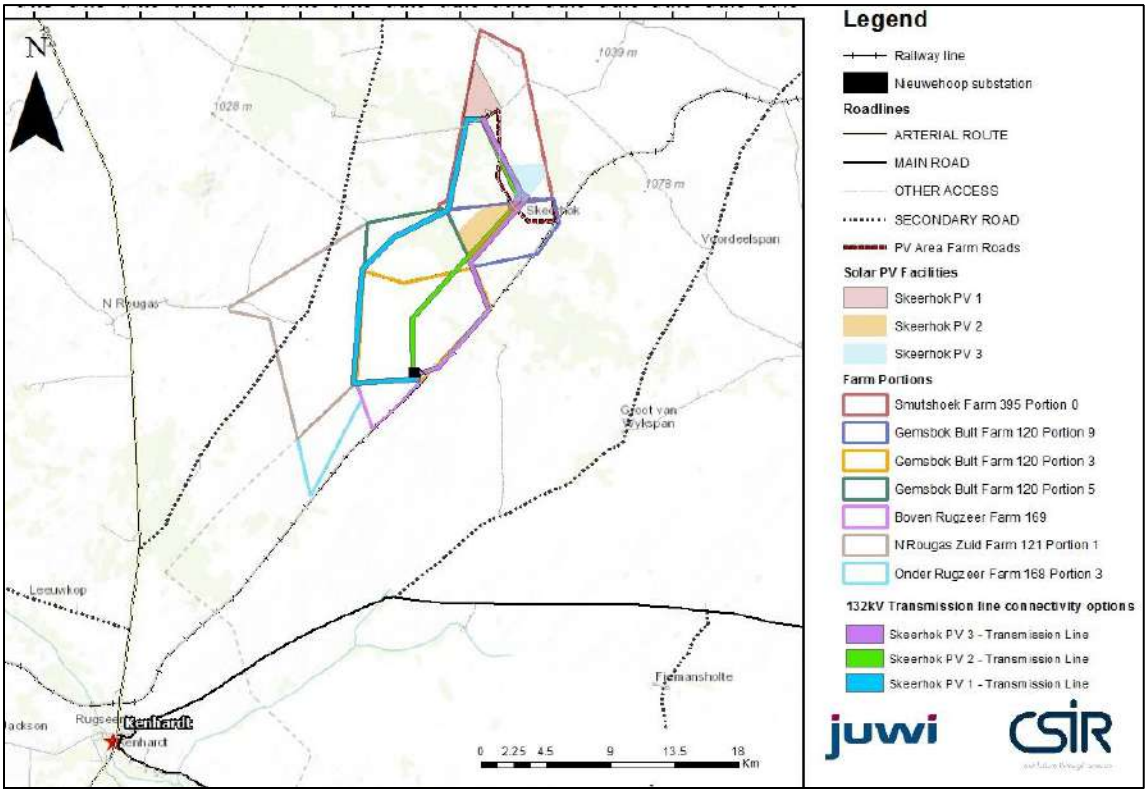

Figure 1. Map depicting the three powerlines that will link the Skeerhok PV facilities with the Nieuwehoop substation.

1.1.2. Terms of Reference

The overall objectives of the Ecological Impact Assessment are to:

- Identify and establish an understanding of the three routes under consideration at a landscape scale of evaluation with particular consideration being given to aquatic or important terrestrial habitats, as they may be identified.

- Provide an evaluation and status of habitat composition and significance within the route in order to evaluate the potential impact of the proposed powerline on the ecological function of the subject area.

- Assess the potential impacts arising from the powerline route on both the habitat and fauna within the study area. Such impacts may be directly applicable to the route and contained within the route boundaries, or may be indirect impacts, which may have ramifications outside of the route boundary. Consideration of cumulative impacts arising from similar developments or activities within the region should also be given consideration.

- Provide guidance on the implementation of mitigation measures that may serve to moderate any negative impacts that may arise on route 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:

- Review detailed information relating to the project description and precisely define the environmental risks to the terrestrial and aquatic environment (including aquatic or wetland environments) and consequences for the localized ecology.

- Compile a baseline description of the terrestrial and aquatic ecology (including avifauna) of the study area, and provide an overview of the entire study area in terms of ecological significance and sensitivity (i.e. in terms of the major habitat forms within the study area, giving due consideration to terrestrial ecology (flora), terrestrial ecology (fauna) and freshwater ecosystems/wetlands).
- Provide specific ecological data in respect of the floral, faunal and aquatic components of the site using ground-truthing methods, with an emphasis on those areas considered to be of "high" and possibly, "moderate" sensitivity (based on the desktop study).
- Based on the desktop study, undertake field work and sampling across the site to record relevant data and to compile an overview of the habitat under review.
- Collate all data collected during the field work and undertake a statistical review using methodologies that allows for comparison of biological data.
- Consider wetlands (endoreic pans) and associated water resources within the site in terms of significance within the catchment, habitat value and significance and delineation of extent through preliminary on site evaluation and the use of aerial imagery interpretation (where these arise).
- Determine if a Water Use Licence is required.
- Undertake a faunal investigation on site based on the points identified during the preliminary aerial photographic interpretation.
- Provide a detailed terrestrial and aquatic ecological sensitivity map of the site, including mapping of disturbance and transformation on site.
- Identify and rate potential direct, indirect and cumulative impacts on the terrestrial and aquatic ecology, communities and ecological processes within the site during the construction, operation and decommissioning phases of the project.
- Provide input to the Environmental Management Programme, including mitigation and monitoring requirements to ensure that the impacts on the terrestrial and aquatic ecology are limited.
- Compile an assessment report qualifying the risks and potential impacts on terrestrial and aquatic ecology in the study area and impact evaluations.

1.1.3. Approach and Methodology

A literature review and desktop analysis was undertaken prior to site reconnaissance, making use of various sources including the South African National Biodiversity Institute (SANBI) data and other relevant information, including spatial data. Recent and historical, aerial imagery of the route was reviewed in order to identify points for investigation during the field survey.

Utilising the above information, a field investigation was undertaken whereby:

- The proposed transmission line corridors (with corridor widths of approximately 300m) were subject to an evaluation using recent historical imagery, with some comparative review of older imagery. Notably, only one powerline route will be utilized, however this is dependent upon the approval to construct one or more of the three PV facilities envisaged within the Skeerhok project area (Figure 1).
- Field reconnaissance was undertaken during the period of 5 to 7 September 2017, whereby the electrical infrastructure corridors, as well as adjacent points along the corridors, were given consideration. Consideration was given to:

    1. Geomorphological features identified from aerial imagery.
    2. Habitat form and structure along the proposed transmission line route, including species composition.
    3. Other factors of a bio-physical nature were given consideration.

Figure 1 above shows the three proposed electrical infrastructure corridors that are to serve one or more of the proposed Skeerhok projects.

In evaluating the corridors, all data was collated and evaluated, including the following steps:

1. The position and nature of drainage features proximal to and within the proposed transmission line route/corridor.

2. Botanical species present within and along the proposed transmission line route/corridor were noted and their alignment with the prevailing Bushmanland Arid Grassland veld type was given consideration.

3. The presence of exotic and identified alien invasive species was given consideration.

4. Faunal presence including that of avian species was noted, including species that were noted within the region, but not within the study area. Evidence of faunal activity was also noted and given consideration.

5. Identification of any habitat anomalies that may be identified in such analysis, in particular any aquatic or wetland environments.

1.1.4. Assumptions and Limitations

The site assessment and collation of data was undertaken during the period 5 – 7 September 2017, at a period of seasonal change. Weather records for the region indicate that there had been a significantly improved rainfall during the summer period from January to March 2017 although summer rainfall is showing a distinct downward trend (www.worldweatheronline.com). Since a peak of 25mm in April 2017, there has however, been a significant decrease in rainfall with only 1mm being recorded between July 2017 and the time of the site reconnaissance. Such meteorological stressors mean that some botanical species, in particular geophytes, are not generally evident. This may affect both the analytical and observation results of the investigation.

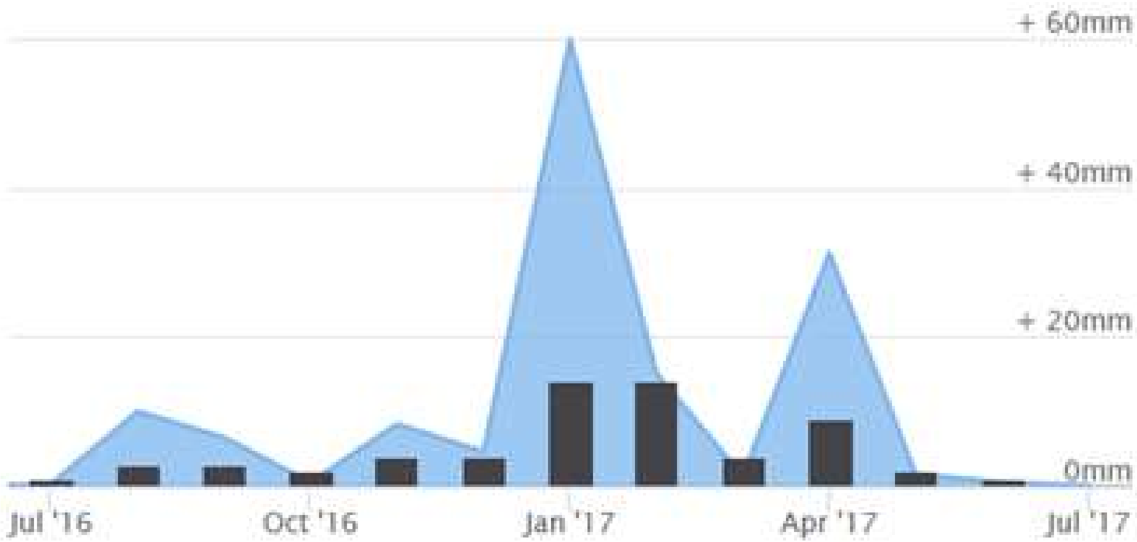

Figure 2. Rainfall records for Kenhardt July 2016 to July 2017 Raindays (, Rainfall ()
Source : www.worldweatheronline.com.

In terms of the assessment of potential cumulative impacts included in this specialist study, these take into consideration certain developments that occur with a 20 km radius of the proposed project, as shown in Section D of the BA Report.

1.1.5. Source of Information

This assessment was undertaken utilising:

- 1:50 000 topographic mapping sourced from the Surveyor General's office; and
- Aerial imagery sourced from Google Earth.
- Aerial imagery sourced from ESRI

In addition, use was made of the following data:

- Wetland and riparian habitat GIS data sourced from the National Freshwater Ecological Priority Area Programme of SANBI;
- SANBI veld types data; and
- Literature as referenced.

1.2. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO TERRESTRIAL, AQUATIC ECOLOGY AND HYDROLOGICAL FEATURES

The proposed transmission line and associated infrastructure will include the following:

- A 132 kV transmission line with concrete foundations and steel tower structures (i.e. pylons). The line will consist of either self-supporting suspension structures or guyed monopoles that will be constructed to a maximum height of 32 m. The span lengths are estimated to range between 200 m and 300 m. The servitude for the 132 kV power line will be 52 m wide. Associated electrical infrastructure at the Eskom Nieuwehoop Substation will be constructed in order to ensure that the substation is capable of receiving the additional electricity that is generated by the proposed Skeerhok PV facilities. This infrastructure includes, but is not limited to, feeders, Busbars, transformer bays and extension to the platform at the Eskom Nieuwehoop Substation.

- An on-site substation (with a capacity of 22/33 kV to 132 kV). The on-site substation building is expected to extend to approximately 30 m in height, with a maximum footprint of 1 hectare. It is important to note that all high voltage infrastructure leading up to the Point of Connection (i.e. Skeerhok PV facilities' section of the proposed collector/on-site substation) have been considered within the three EIA Processes (i.e. for Skeerhok PV 1. PV 2 and PV 3). High voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed collector/on-site substation) up to the line bay at the Eskom Nieuwehoop Substation may be handed over to Eskom and has been assessed separately as part of this BA Process (i.e. Skeerhok Alternative 1, 2 and 3 – Transmission Lines).

- For powerline maintenance existing service and access roads will be utilised as much as possible for maintenance purposes. Where no existing access is present, due to the low traffic anticipated it will be provided in the form of earth tracks, as opposed to formalised roads. For sections that will require the use of the existing Transnet service road, discussions have been initiated with Transnet and the Project Applicant regarding the potential use of this road.

Connectivity alternatives

Three powerline connection route alternatives have been identified are considered below, namely:

1. Skeerhok powerline Alternative 1
2. Skeerhok powerline Alternative 2
3. Skeerhok powerline Alternative 3

A description of each alternative is summarised in Table 1 and shown in Figure 3 below:

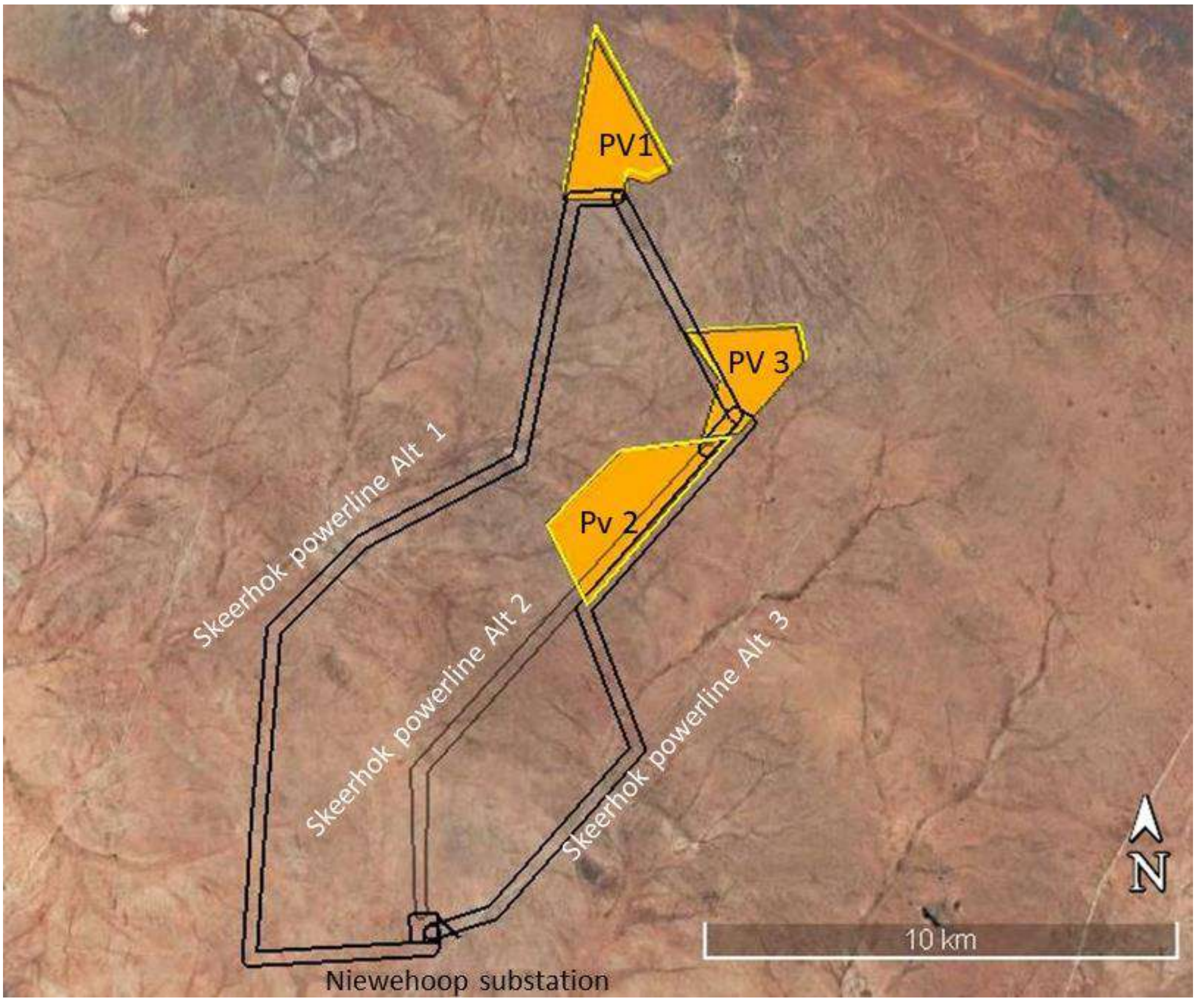

Figure 3. Aerial map indicating PV facilities and PV powerline corridor options

The main factors that have been utilized in determining these route options are:

- The most cost-effective route and distance between all three SEFs to the Nieuwehoop Substation; and
- Proximity and the alignment of the corridor to an existing Eskom servitudes.
- The option that allows for the avoidance of sensitive features identified within the corridors

The construction of the powerlines will require the removal of larger vegetation along the line route and at the tower bases, excavation and the complete clearance of vegetation from these points are required.

Table 1. Comparative information relating to powerline route options

	Skeerhok Alternative 1	Skeerhok Alternative 2	Skeerhok Alternative 3
Line length	30 km	18 km	19 km
Farm portions affected	• Portion 0 of Smutshoek Farm 395 • Portion 9 of Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120 • Portion 3 of Gemsbok Bult Farm 120 • Portion 1 of N'Rougas Zuid Farm 121 • Portion 3 of Onder Rugzeer Farm 168 • Portion 0 of Boven Rugzeer Farm 169	• Portion 0 of Smutshoek Farm 395 • Portion 3 of Gemsbok Bult Farm 120 • Portion 9 Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120	• Portion 0 of Smutshoek Farm 395 • Portion 9 of Gemsbok Bult Farm 120 • Portion 3 of Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120
Foundation	Concrete	Concrete	Concrete
Pylon	Steel tower	Steel tower	Steel tower
Tower type	self-supporting suspension structures or guyed monopoles	self-supporting suspension structures or guyed monopoles	self-supporting suspension structures or guyed monopoles
Height	32 m	32 m	32 m
Span length	200 – 300 m	200 – 300 m	200 – 300 m
Servitude width	40 m	40 m	40 m
Features/Description	Proximal to existing powerline	Lies centrally across fallow grazing lands	Follows roadway

1.3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

According to Mucina and Rutherford's veld type classification of 2006, Kenhardt and surrounding regions fall within the Bushmanland Arid Grassland veld type (NKb3). (Figure 4). This veld type is located ostensibly south of the Orange River, but may include a number of smaller habitat forms within its broader extent. Other habitat forms include "Bushmanland Vloere" and "Gordonia Duneveld", however these habitats are not affected by the proposed corridors.

The area in general can be considered to have a low rainfall of less than 200 mm per annum (SA Weather Services, *www.**weathersa**.co.za*) although the recorded average rainfall for the period 2000 to 2012 approximates 238 mm within an average of 51 rain days per year (www.worldweatheronline.com). As such the area has been described as a "semi-arid region" (Bailey, 1979). Using the Koppen-Geiger climate classification method (www.koeppen-geiger.vu-wien.ac.at), the area is classified "BWh", which is indicative of an *arid hot environment*, this classification is supported by Esler *et. al.,* (2006) who have defined areas with an annual rainfall of less than 200 mm as being “deserts”. This *desert* status may be the case in the Kenhardt region under its lower rainfall periods. In addition, the highest, annual temperatures for the region are recorded between January and February, with maximum temperatures being 37˚C (www.worldweatheronline.com). Extreme temperatures thus coincide with the peak rainfall period. Such correlation may give rise to the low groundwater recharge rates projected for the region, this being estimated at approximately 0.03 mm / annum (Musekiwa and Majola, 2011).

With the above in mind, the most definitive physical drivers of the Bushmanland Arid Grassland veld type that lies within the study area, are meteorological and will relate to surface and subsurface hydrology. Other physical drivers will include localised geologies and edaphics. These factors are evidently incorporated into the “critical biodiversity areas” (CBAs) compiled by the various conservation authorities. Figure 5 indicates the spatial data relating to CBAs in and around the corridors, indicating areas that are deemed to be “critical” as well as areas that are to be considered “ecological support areas”. Using this data, only one proposed corridor (Skeerhok Powerline Alternative 1 –) located to the north west, has been identified as falling within or proximal to an ecological support area (ESA).

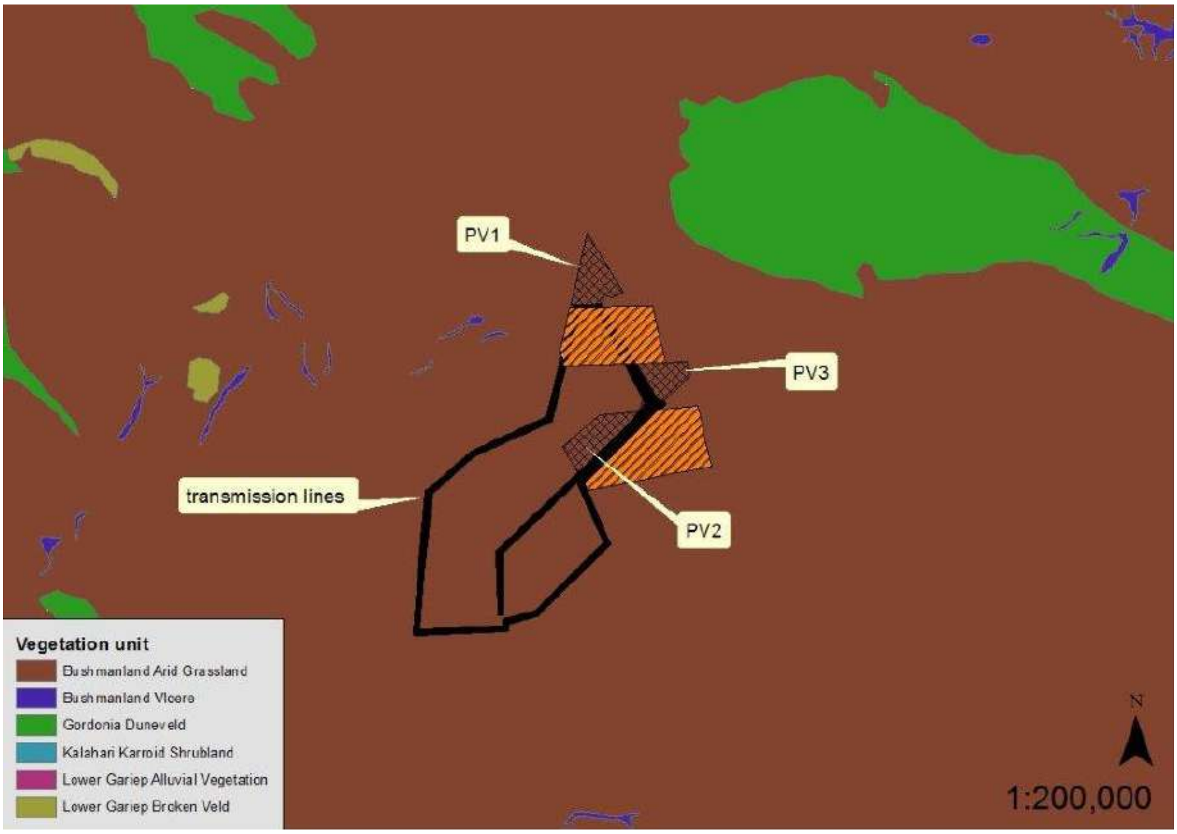

Figure 4 . Map indicating powerline routes and affected vegetation type.

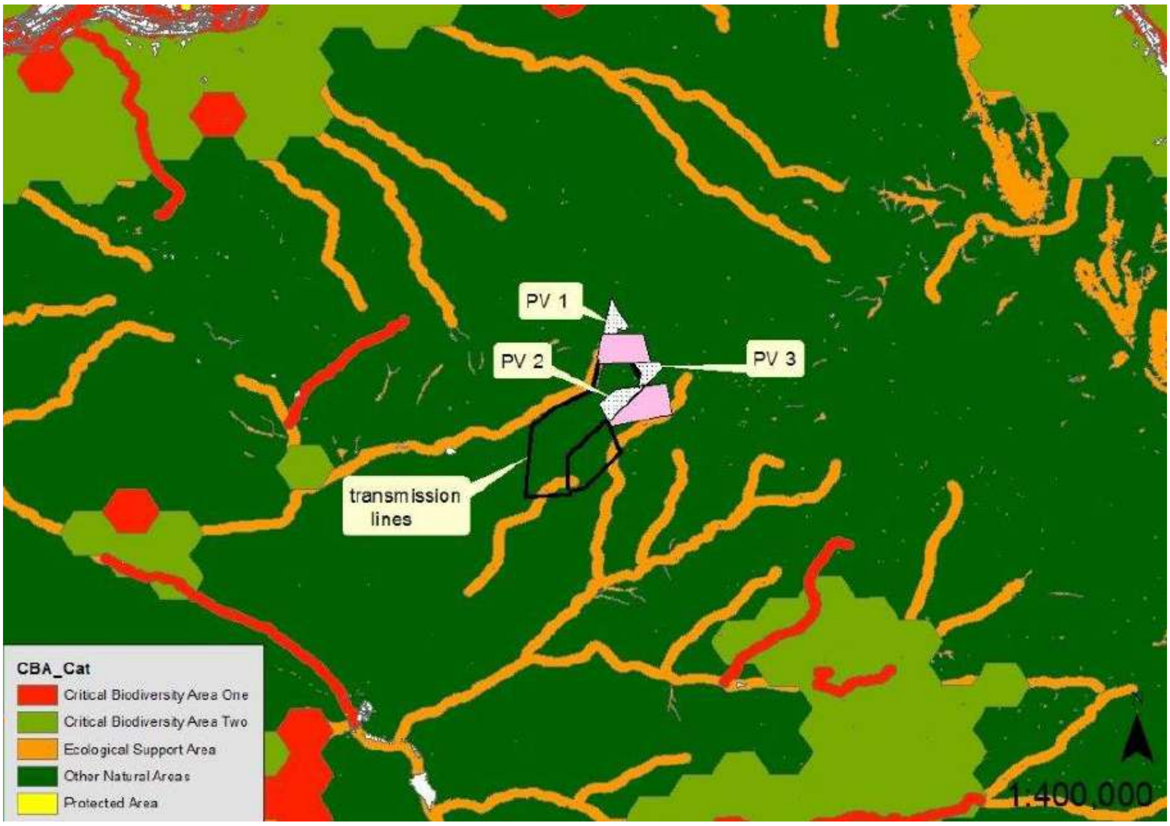

Figure 5: Map indicating CBAs, ESAs and other natural habitat within the study region. Note that only the northern line route (Skeerhok Alternative Powerline Route 1) is located proximal to an ESA.

1.3.1 Terrestrial Habitat and Vegetation

The proposed corridor routes traverse terrain that can be described as generally level and of limited ecomorphological variance, with an average fall of approximately 1% and the maximum grades encountered being 4%. Few elevated features are evident across the corridors with the local geology comprising of a mix of sandy soils overlying predominantly dolerite and calcrete geologies. Although occasional quartzite outcrops are common across the area and may be considered to be important refugia for fauna and less common botanical associations, the proposed routes are generally devoid of these features. Figure 6 below indicates the general nature of the site and the presence of suspension towers which are proximal to the Skeerhok Alternative 1.

All three corridors traverse an area that has been evidently subjected to grazing by livestock with limited larger and occasional woody trees being evident primarily in the far northern portions of Skeerhok Alternative 1. These woody specimens comprise primarily of *Acacia karoo*, but may include an occasional specimen of *Boscia albitrunca* and *Aloe dichotoma* (Figure 7). Generally, both *B albitrunca* and *A dichotoma* fall outside of the corridor or can be avoided in the final routing of the powerline within the corridor. Both these species are listed as protected species. *Aloe claviflora*, a protected aloe of prone habit may also be present intermittently across the corridor.

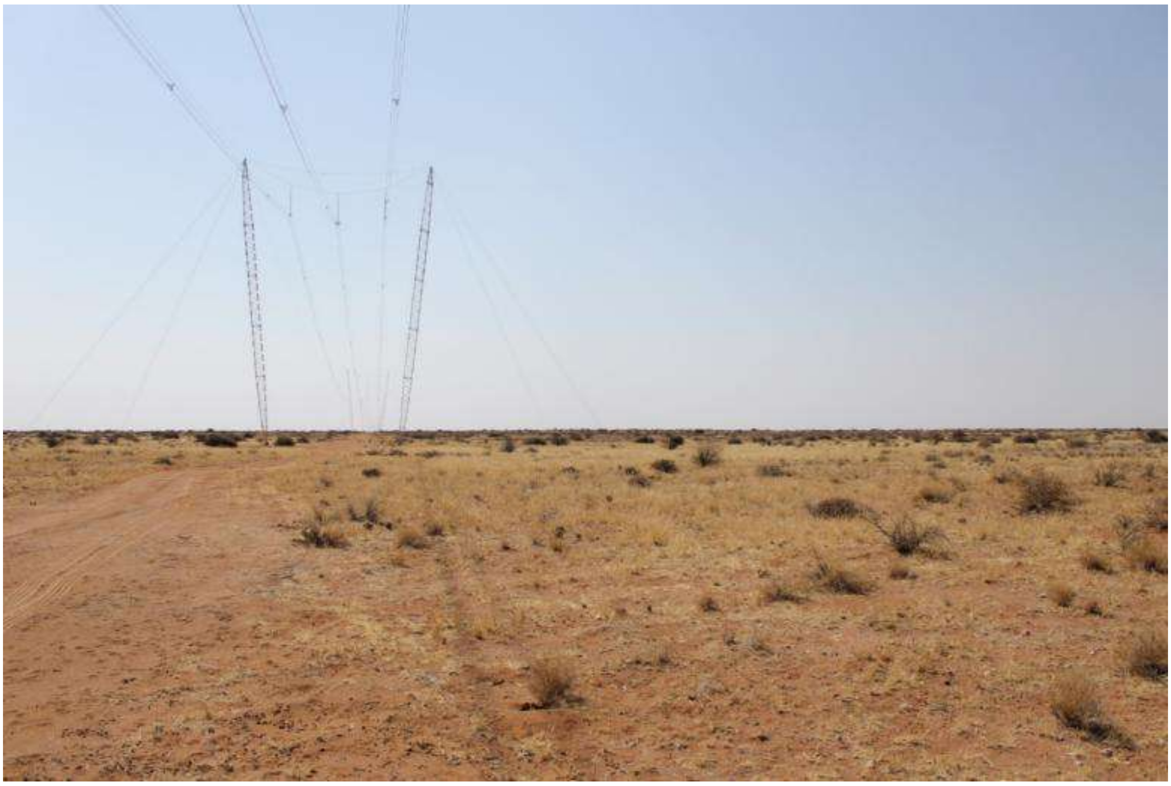

Figure 6: Image indicating the general nature of Skeerhok Powerline Alternative 1. Note existing powerline, which will in part run parallel to the Skeerhok Powerline Alternative 1

Figure 7 Image showing existing powerline near Skeerhok Alternative 1, with *A dichotoma* present in close proximity to tower.

Skeerhok Alternative 1 evidently shows the presence of larger woody specimens within the habitat structure, however Skeerhok Alternative 2 and 3 traverse areas of distinctly graminoid habitat form (Figure 8). Occasional associations of *Acacia karoo* and *Lyceum cinereum* as well as *Salsola aphylla* are present at low points within these corridors, being primarily associated with dendritic drainage features.

The more scrub habitat form is generally pervasive across the two southerly corridor options as can be noted in Figures 8 and 9 where the intermittent *Lyceum - Acacia* associations are evident in close proximity to the Nieuwehoop substation. It follows that the habitat form and structure that prevails across these two corridor options is generally of uniform structure, offering limited species diversity.

Figure 8. Image of habitat form and structure along the proposed Skeerhok Alternative 2.

Figure 9 Image of Nieuwehoop substation showing graminoid veld with occasional *Acacia - Lyceum* associations and individual specimens.

Table 2, below provides a list of common vegetation species encountered within the corridors.

Table 2. List of observed species within study site. Species of conservation significance are identified.

Species	Conservation Significance	
	NC NCA *	NFA#
Acacia karroo		
Acacia mellifera		
Aizoon elongatum		
Aloe claviflora	X	
Aloe dichotoma	X	
Aptosimum spinescens		
Aristida ascensionis		
Aristida congesta		
Asparagus suaveolens		
Blepharis capensis		
Boscia albitrunca	X	X
Cadaba aphylla		
Datura ferox$		
Enneapogon cenchroides		
Eragrostis nindensis		
Eriocephalus encoides		
Euphorbia glanduligera		
Felicia muricata		
Lessertia annularis		
Lyceum cinereum		
Mesembryanthemum guerichianum		
Monechma incanum		
Pentzia spinescens		
Rhigozum trichotomum		
Riccia albornata		

Species	Conservation Significance	
	NC NCA *	NFA#
Salsola aphylla *Schmidtia pappophoroides* *Stipagrostis anomala* *Stipagrostis ciliata* *Tetragonia arbuscular* *Tribulus cristatus* *Tribulus pterophorus$*		

*NC NCA = Northern Cape Nature Conservation Act (1998) #NFA = National Forest Act (1998)
$ = exotic

1.3.2 Hydrological features, "Aquatic" and Riparian Habitat

The proposed powerline routes generally lie within the catchment of the Hartebees Rivier, which is a large ephemeral system that drains the region around the town of Kenhardt, and serves the Orange River which lies to the north west. (Figure 10). A minor portion of Skeerhok Alternative 1 lies to the north of a low elevated ridge which forms the boundary of the catchment between the Hartbees Rivier and the more northerly Brak Rivier and Sout Rivier.

Figure 10 provides a regional spatial representation of the drainage features located within the study area and associated with the various corridors. Surface flow within the study area is primarily by means of shallow channels that may vary on a temporal basis according to factors such as changes in the prevailing wind regime, vegetation growth or the movement of livestock. As such, these dendritic channels are often ephemeral in nature and do not show specific hygrophilous vegetation characteristics as may be defined, nor do they show the presence of geohydromorphic soils. The absence of these indicators is due primarily to the fluctuating levels of inundation in these drainage features, over extended periods of time which is also driven by the intensity and erratic nature of rainfall experienced in this region. Farmers in the region note that these features show short term inundation during high rainfall periods, in events that arise "every 4 to 5 years" (S Strauss *pers. comm*.). These features are often termed "whaadies", a term derived from the Arabic name for these intermittently flowing streams. Flow is generally sluggish under these conditions, and following the cessation of rains, the water rapidly drains from site on account of the percolative, sandy conditions, or is lost to evaporation. Soils in these systems, may as a consequence of such evaporation, prove to be slightly saline in nature (Mucina and Rutherford, 2006). Given the absence of definitive geohydromorphic indicators, the major drainage lines within the region have been delineated according to hydrogeomorphological features and an apparent change in vegetation form from a sparse and arrested growth form, to a more verdant state, associated with drainage. Hydrogeomorphological features are indicated primarily by evidence of flow or deposition of materials (Brinson et al 1993; USDA 2008) while verdant vegetation establishment is a combination of both improved plant-water relations and increased nutrient availability. Major drainage features are therefore associated with a combination of both verdant vegetation structure and form, as well as significant geomorphic indicators, while the depth and expanse of dendritic drainage features can also be utilized to distinguish between minor drainage lines (generally considered to be 'rills' and ephemeral in nature) and more permanent features ('gullies'), which are more defined in morphological character.

Although short lived, in terms of the presence of water within these features, these drainage lines do bestow intermittent hydrological benefit to the landscape and can be considered groundwater "recharge zones" in respect of the local subsurface hydrology. From a biotic perspective, the drainage lines do serve as seasonally important refugia and congregation points for *inter alia* invertebrates (e.g. Class Odonata) and vertebrates (e.g. Order Anura) (faunal aspects are described further in Section 1.3.4 of this report). The saline conditions mentioned above may also prove to give rise to a more halophytic plant community that differs from the prevailing habitat.

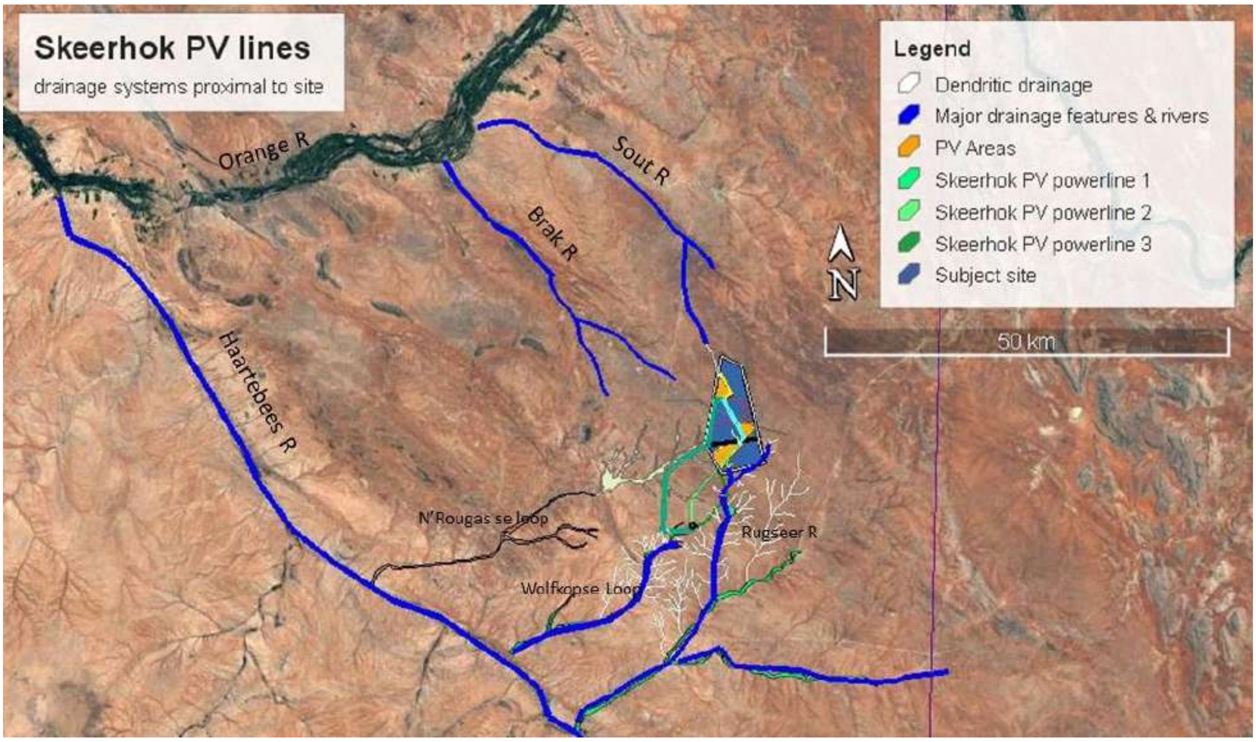

Figure 10. Map indicating drainage systems at a regional scale in relation to 3 alternative powerline routes proposed for the Skeerhok PV projects.

Surface drainage within the catchments is generally, through a number of minor dendritic drainage features which feed two larger drainage systems, namely the N'Rougas se Loop and the Wolfkop se Loop, located to the south. Some drainage may also serve the more southerly Rugseers Rivier, however connectivity with this system has generally been occluded with the construction of the Sishen Saldanha Railway line. The three corridor options presented in Figure 10 fall within one or more of the three primary catchments in the region, these being the N'Rougas se loop, Wolfkopse loop and Rugseers River, which in turn all drain into the Hartbees River.

The N' Rougas se Loop, being a significant drainage feature has been identified as an ESA in terms of the SANBI CBA data presented in Figure 5. Such designation is attributed to the potential for this drainage feature to allow for the transfer of propagules and other vegetative matter between areas, using water as a vector or local fauna which in turn, may be associated with such features. Skeerhok Alternative1 lies proximal to this ESA and traverses in part, some of the dendritic drainage features of the upper catchment of N' Rougas se Loop. Comparatively, the Wolfkopse Loop, a small drainage feature, has not been designated as an ESA.

The attenuating effect of the Sishen – Saldanha railway line has served to reinforce and expand a wetland feature lying within a drainage line serving the Rugseer river (Figure 11). This feature has been attenuated by the construction of the railway and its attending roadway creating a semi-natural pan. This pan is apparently utilized for the abstraction of water and may in turn be augmented by groundwater. It follows that the feature may act as a refugia for water fowl and serve to draw other fauna to the immediate surrounds. Skeerhok Alternative 3 lies proximal to this feature as it follows a traverse that for much of its route, falls adjacent to the railway line (Figure 11).

Figure 11: An image of the semi natural wetland feature associated with the Rugseer river and established in part, as a consequence of the construction t of the Saldanha-Sishen railway. Skeerhok Alternative powerline 3 will traverse this feature.

1.3.3 Fauna

1.3.3.1 Terrestrial

Fauna that are endemic to the region are considered to be typical of a xeric environment, with limited habitat variation across the study area giving rise to a primarily uniform distribution of such species.

As is typical of the region, a large number of fossorial and burrowing species, including mammals and invertebrates, were identified across the subject area. Such species included ground squirrel (*Xerus inauris)* and suricates (meerkat) (*Suricata suricata*). Also sporadically present within the site are aardvark (*Orycteropus afer*), as well as the porcupine (*Hystrix africaeaustralis*).

Identified during the site reconnaissance was the Bushmanland tent tortoise (*Psammobates tentorius verroxii*), (Figure 12), one of three sub species of tent tortoise within South Africa. This relatively small tortoise is not typical of the "tent tortoise family", in terms of its carapace shape and form. Although listed in the IUCN Red List of Threatened Species (http://www.iucnredlist.org) as 'least concern", the tortoise is generally sparsely distributed across the desert regions of South Africa. Other tortoise species that are likely to occur within the subject area include the serrated tortoise (*Psammobates oculiferus*) and possible species of padloper (*Homopus spp*). Tortoise succumb to habitat change, particularly where points of refuge may be altered – e.g. the loss of scrapes and burrows in the ground or changes in forage material and as such may be directly affected by construction activities such as those associated with towers and other electrical infrastructure. Mortalities may also arise during the construction and operation phases, as a consequence of increased vehicular traffic affecting animals both on roadways that lie outside of the site and within construction areas.

Figure 12. Bushmanland tent tortoise (*Psammobates tentorius verroxii*) identified on site.

Reptiles, smaller vertebrates and other invertebrates are also likely to show varying trends in populations across the subject site. As indicated above, habitat and climatic state are the major drivers of faunal presence within the region, with most species being transitory in any given area and their presence being subject to the availability of vegetation cover, water and other resources.

The impact of the powerlines on terrestrial fauna is considered to be “moderate to low”, with the most vulnerable species that are likely to be directly affected by mortalities, being tortoise. The most significant effect of the powerlines on the tortoise will arise during the construction period, where vehicular traffic, both on road and off road, may give rise to increased mortality levels.

Table 3, below indicates species observed within the subject area, primarily on the adjacent proposed PV areas or where evidence of their presence was noted. Table 3 also includes species that are likely to be encountered in the broader region. The larger fauna listed, are generally only encountered intermittently, within the subject area and are likely to be present either on account of their traversing of the site or on account of suitable grazing grounds occurring within the subject area. The use of the broader area as a point of refugia is limited due to the generally uniform terrain and low variation in the nature of the site and low level vegetative cover.

Table 3. List of terrestrial species identified within site and likely to be present within the region/site. Species of conservation importance are also Identified.

Animals encountered	Common name	**Observations**	**TOPS (2007)**	**Conservation Importance (IUCN Red List) ***
Mammals				
Orycteropus afer	Aardvark	Foraging evidence		LC
Felis nigripes	Black-footed cat			VU
Atelerix frontalis	South African hedgehog	Pers.comm J Orven 2015	Protected	LC
Canis mesomelas	Black back jackal			Not listed
Xerus inauris	Cape ground squirrel	Observed 2015		Not listed
Lepus capensis	Cape hare	Observed 2015		Not listed
Felis caracal ?	Caracal ?	Remains of prey 2015		Not listed
Procavia capensis	Rock dassie	Observed		LC
Suricata suricatta	Meerkat	Observed 2015		LC
Aethomys namaquensis	Namaqua rock mouse			Not listed
Hystrix africaeaustralis	Porcupine	Foraging evidence 2015 and 2017		LC
Antidorcas marsupalis	Springbok	Observed		LC
Raphicerus campestris	Steenbok			LC
Cynictis penicillata	Yellow mongoose	Observed		LC
Reptiles				
Ptenopus spp	Barking gecko			LC
Naja nivea	Cape cobra			Not listed
Chondrodactylus angulifer	Giant ground gecko			LC
Cordylus spp	Girdled lizard		Protected	*C cataphractus* ; - VU
Psammobates tentorius veroxii	Karoo tent tortoise	Observed		LC
Geochelone pardalis	Leopard tortoise	Observed		Not listed
Bitis arietans	Puff adder			Not listed
Agama makarikarica	Spiny agama			Not listed
Amphibians				
Tomopterna cryptotis	Tremolo sand frog			LC
Invertebrates				
Locustana pardalina	Brown locust	Observed		Not listed
Pterinochilus spp	Baboon spider		Protected	Not listed
Seothyra spp	Buckspoor spider			Not listed
Family Vespidae	Various wasps	Observed		
Opistophthalmus spp	Burrowing scorpions?	Burrow entrance	Protected	Not listed
Parabuthus spp	Parabuthid scorpion			Not listed
Family Hodotermitidae	Termite			Not listed

TOPS – Threatened or Protected Species (GN R151 of the National Environmental Management: Biodiversity Act (Act 10 of 2004))
IUCN – International Union of Conservation Networks
* LC = Least concern; NT = Near threatened; VU = Vulnerable; EN = Endangered
CR = Critically Endangered; EW = Extinct in the wild; NE = not evaluated; DD = data deficient

1.3.4 Habitat Sensitivity

Given the nature of the area as described above, those areas that may be considered to be of ecological significance within the site have been mapped and presented at a spatial level (Figure 15). Figure 15 below identifies that

1. Skeerhok Alternative 1 lies proximal to the N' Rougas se Loop drainage feature, which has also been identified as an ESA (Figure 5). At points, the powerline corridor will traverse drainage features directly associated with the N' Rougas se Loop.
2. Skeerhok Alternative 2 , is positioned distally from all drainage features and other eco-morphological features of significance.
3. Skeerhok Alternative 3, which lies to the south will also traverse drainage features associated with the Rugseer River catchment and a semi-natural wetland feature associated with this system.

It follows from the above that Skeerhok Alternative 1 Route traverses areas of moderate to high ecological sensitivity at a localized and landscape scale, while Skeerhok Alternative 3 traverses locally significant ecological features. The Skeerhok Alternative 2 is thus considered to be the most appropriate ecologically based, route option to be employed for the establishment of the 132 kV powerline and associated infrastructure between the PV facilities and the Nieuwehoop substation. Where individual specimens or minor topographic features may be identified within the corridor route of Skeerhok Alternative 2, planning and design can allow for the avoidance of such features, or alternatively in the case of some botanical species, these specimens may be relocated if required.

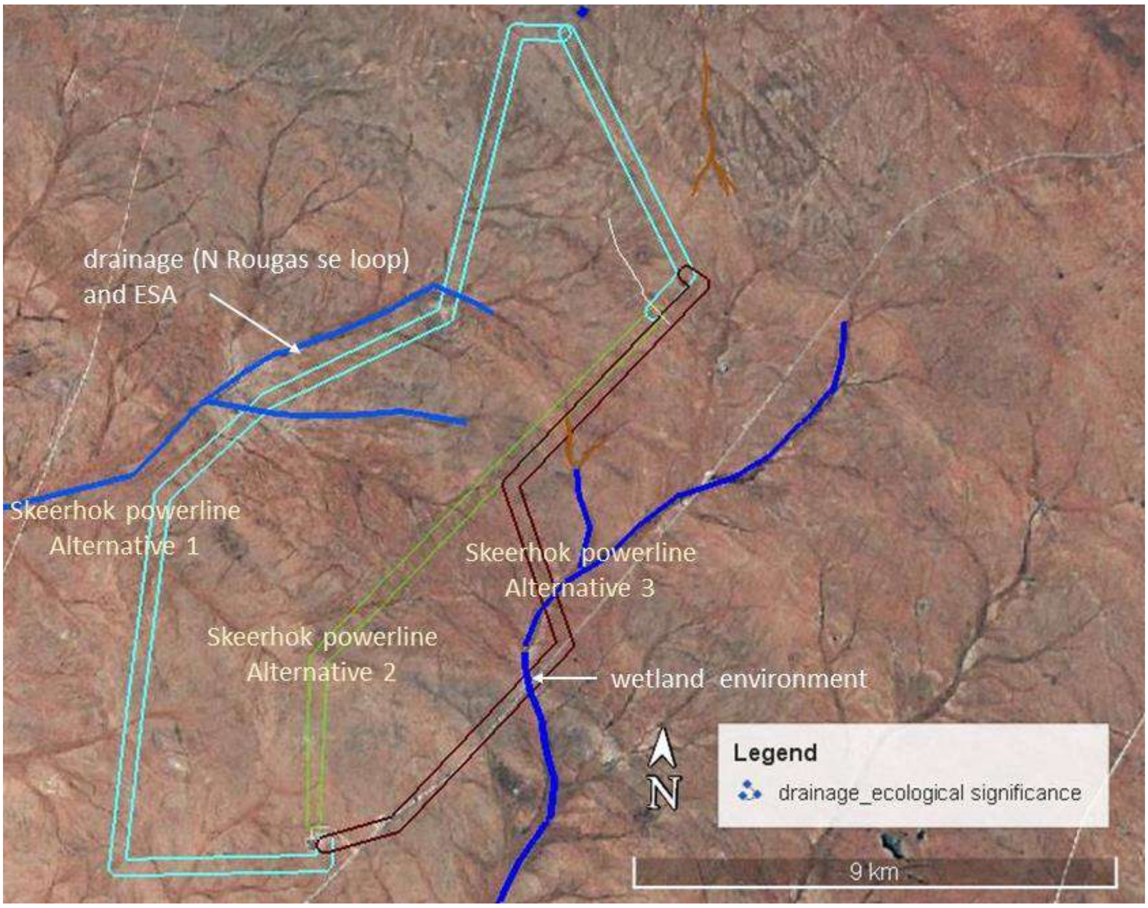

Figure 13. Map indicating position of drainage features proximal or within proposed powerline corridors. These drainage features are considered to be of moderate ecological "sensitivity". Note route option 2 does not impinge upon these drainage features.

Having stated that Skeerhok Alternative 2 is the preferred or recommended corridor to be utilised, the opportunity to utilise either Skeerhok Alternatives 1 and 3 remains, given that;

- Skeerhok Alternative 1 will lie adjacent or proximal to an existing powerline route, where a similar land use regimen has arisen in the past and remains in situ. It can be considered that this corridor option will serve to confine any further impacts to an existing corridor where such transformation has already arisen.
- Skeerhok Alternative 3 will lie adjacent and parallel to the Sishen-Saldanha rail line, but will traverse the identified drainage line and wetland feature. Prudent siting of towers and mitigation measures may assist in reducing the abovementioned impacts.

It is evident that either of these options may be pursued if, on account of other factors, Skeerhok Alternative 2 is not utilised. Appropriate mitigation measures will have to be employed if these options are pursued.

1.4. APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The proposed establishment of a 132 kV powerline along the study routes is considered to elicit a requirement for compliance with the following legislation.

1. The National Environmental Management: Biodiversity Act (Act 10 of 2004)
2. The National Water Act (Act 36 of 1998)
3. The National Forest Act (Act 84 of 1998)
4. The Northern Cape Nature Conservation Act (Act 9 of 2009)
5. The Conservation of Agricultural Resources Act (Act 43 of 1983)

The potential applicability of the abovementioned acts to the subject site is provided below:

1. The 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 powerline development, taking place in the identified Bushmanland Arid Grassland environment, 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 Tables 1 and 2, 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.

2. The National Water Act (Act 36 of 1998)

The National Water Act controls activities in and around water resources, as well as the general management of water resources, including abstraction of groundwater and disposal of water. Authorisation for changes in land use, up to 500 m from a defined water resource / wetland system will require an application for a Water Use Licence from the Department of Water and Sanitation (Section 21 (c) and (i), of the Act). A Water Use Licence will not be required in respect of the establishment of a powerline within the Skeerhok Alternative 2.

3. 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". Listed species that may be encountered in the area include *Boscia albitrunca* and possibly *Acacia erioloba*. Neither of these species were identified as falling within the proposed Skeerhok Alternative 2 corridor.

It is unlikely that an application for the "clearing of a natural forest", as defined within the Act, will be required on the route in question.

4. The Northern Cape Conservation Act.

The Northern Cape Conservation Act under its pertinent regulation, governs the disturbance of species listed in Tables 2 and 3 above, or possibly other species not yet identified on route. A permit from the Provincial Department of Environment and Nature Conservation will be required in order to disturb or translocate such species

Invasive plant species that should be removed or maintained only under certain commercial situations are identified in terms of the Conservation of Agricultural Resources Act (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.

As the proposed Skeerhok Alternative 2 (and indeed Alternatives 1 and 3) does not lie within protected areas, nor within 5 kilometres of a protected area, nor within 10 kilometres of a World Heritage site and does not form part of a CBA, the various regulations within the National Environmental Management Act and the NEM Protected Areas Act are not applicable to this site. It is also noted that the corridor does not fall within any expansion area in terms of a conservation strategy for the Northern Cape.

1.5. IDENTIFICATION OF KEY ISSUES

1.5.1. Identification of Potential Impacts

1.5.2.1 Construction Phase

The following potential impacts during the Construction Phase can be summarised as follows:

1. Alteration of habitat structure and composition in and around towers and possibly through the stringing phase of the project;
2. Changes in the geomorphological state of drainage lines;
3. The disturbance of fauna and loss of vegetation/habitat through anthropogenic activities, disturbance of refugia and general change in habitat;
4. Disturbance of vegetation, in particular habitat associations as a consequence of the establishment of the proposed towers of the transmission line;
5. Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure, primarily the establishment of the proposed concrete or steel towers along the transmission line route, which require some level of excavation and the placement of concrete foundations;
6. Alteration of surface water quality on account of construction activities that lead to change in water chemistry;
7. Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points; and
8. Exotic weed invasion.

1.5.2.2 Operation Phase

The following potential impacts during the Operational Phase can be summarised:

1. Exotic weed invasion as a consequence of low level but regular and continued disturbance of habitat along the powerline route.

1.5.2.3 Decommissioning Phase

Such alterations and changes will be dependent upon the expectant post-decommissioning land use. However, abandonment of the line route within the corridor would probably see:

1. A reversion back to the present seral stage, where continued grazing by livestock and herbivory by game will arise.
2. A reversion of present faunal population states within the subject route
3. Minor and subtle changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment.
4. Exotic weed invasion as a consequence of abandonment of route and cessation of any weed control measures that may be in place during the operational stage

1.5.2.4 Cumulative Impacts

Cumulative impacts arising from the implementation of this project and other land use changes in the region are likely to exhibit the following:

- The alteration of habitat structure and composition over an extensive and wide area where an increase in powerlines arise;
- Increased change in the geomorphological state of drainage lines on account of long term and extensive change in the nature of the catchment; and

- Exotic weed invasion as a consequence of regular and continued disturbance across an extensive area of the transmission line route.

The cumulative impacts assessed in this specialist study consider certain developments that occur with a 30 km radius of the proposed project, as shown in Section D of the BA Report.

1.6. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

The assessment of the proposed development of electrical infrastructure corridors (including an overhead transmission line) linking the proposed Skeerhok PV facilities near Kenhardt to the Eskom Nieuwehoop Substation shows that the proposed routes will traverse primarily uniform, level land with limited impact on habitat of high ecological significance. Drainage features should be avoided and this can be done through the prudent placement of the proposed towers along the transmission line routes - avoiding drainage lines and related features. The potential negative impacts that may arise as a consequence of the establishment of the proposed powerlines are given further consideration below, with possible mitigation measures being proposed.

Construction Phase:

1.6.1. Alteration of habitat structure and composition in and around towers and possibly through the stringing phase of the project

During the construction phase, clearance of vegetation and the concomitant ousting or disturbance of fauna may arise. While vegetation cover is sparse and generally intermittent along the proposed corridor line routes, some clearance will be necessary. Direct, indirect and cumulative impacts expected to arise as a result of the transmission line are identified below:

Direct Impacts

- Loss of "*less resilient*" plant species and replacement with more *robust* species leading to a change in habitat form and structure around the proposed towers.
- Introduction of exotic vegetation or the invasion of disturbed areas by exotic vegetation through either a physical vector (e.g. machinery, vehicles etc.) or more "natural" dispersion vectors (e.g. wind, avian dispersion).
- The temporary ousting of fauna through disturbance and human presence. Species are likely to return in the short term following the conclusion of construction.

Indirect Impacts

- Some exotic weed invasion may be considered an indirect impact as disturbance levels increase at the proposed tower points, with invasion of other points arising from around the proposed towers.

Cumulative Impacts

- Presently existing powerlines are evident around the Nieuwehoop substation and new lines are being constructed. It is evident that an increase in powerline construction will increase the level of habitat change, where this may arise. However, such change should be short term, if mitigation and management measures are implemented at the end of the construction process.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent (i.e. along the proposed route of the transmission line). The impact is rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability are respectively rated as substantial and very likely. The reversibility and irreplaceability of the impact are both rated as low.

Significance of Impact without Mitigation **Moderate**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. A pre-construction site walk-through should be undertaken shortly before commencement of construction and preferably in or around February to March, in order to identify any additional plant specimens of significance that may be evident on route. Such specimens may be relocated/removed (i.e. search and rescue) or avoided (with the relevant permits and approvals in place) prior to the commencement of construction.

2. The detailed design and confirmation of the proposed tower positions along the proposed powerline route should assist with the avoidance of specific vegetation associes and forms.

3. An initial pre-construction clearance of all exotic vegetation on route should be undertaken to reduce the possibility of further exotic weed invasion. Continued exotic weed control measures should be implemented during the construction phase encapsulated in an alien eradication plan.

Significance of the impact with Mitigation **Very Low**

1.6.2. Changes in the geomorphological state of drainage lines

No drainage features lie within the powerline corridor of Skeerhok Alternative 2, while some drainage features may be encountered along Skeerhok Alternative Powerline Routes 1 and 3. The most proximal drainage feature, that associated with the Rugseer River to the south lies approximately 800 m from the recommended corridor. (Skeerhok Alternative 3). It follows that impacts on drainage features must be considered to be unlikely and may only arise during the construction phase of the project, when access to the construction sites of towers is required and the traversing of drainage features may arise. In the case of the two alternative routes (1 and 3), the selection of appropriate access routes and the placement of towers will reduce the impact on drainage lines. Impacts on these features is thus considered to be very low.

Direct Impacts

- The inadvertent traversing of drainage lines by vehicles and labour during construction may see some alteration of embankments and beds. Minor variation in the flow regimen within smaller drainage features, may arise.

Indirect Impacts

- Shifts in habitat form and structure as plant – water relations change on account of minor variations in the surface water flow regime and disturbance of vegetation along the line route within the corridor.

Cumulative Impacts

- Sustained changes in the upper drainage pattern and watershed as a consequence of the establishment of structures and their management will see minor changes in the major drainage lines. This will be compounded further downstream in the various larger systems such as Wolfkopseloop and Hartbees Rivier, particularly if other, similar developments within the same catchment arise.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent (i.e. along the proposed route of the transmission line). The impact is rated with a medium-term duration (i.e. the impact and risk will occur for 1 – 10 years). The consequence and probability are respectively rated as moderate and likely. The reversibility of the impact is rated as high and irreplaceability of the impact is rated as low.

Significance of Impact without Mitigation **Low**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Ensuring that construction activities do not impinge upon riverine features.
2. The undertaking of construction outside of the higher rainfall periods
3. High levels of site management during construction.
4. Ensure site stabilization around towers immediately following construction.

Significance of the impact with Mitigation **Very Low**

1.6.3 The disturbance of fauna and loss of vegetation/habitat through anthropogenic activities, disturbance of refugia and general change in habitat;

With increased disturbance on site during the construction phase, faunal populations and faunal ethos will change. Species will be ousted from the region due to such disturbance, while other species may favour such disturbance and relocate to site or at least proximal to site. Direct, indirect and cumulative impacts expected to arise as a result of the transmission line are identified below:

Direct Impacts

- Movement of populations presently utilizing habitat along route will be affected by construction. Outward migration will arise, at least on a temporary basis depending upon the nature and intensity of ongoing disturbance during operational phases.
- In ward migration of some species may arise as a consequence of the loss of present faunal populations (replacement) or because other factors favour those species (e.g. increased perching points etc).

Indirect Impacts

- Populations of select species will change – populations favoured by activities will benefit, those negatively affected may decline.

Cumulative Impacts

- As habitat changes in respect of the presence of powerlines and other infrastructure, the movement of faunal populations into other areas may give rise to a “knock on” effect where intra and inter specific conflict may arise

- Intra and inter specific conflict and increasing or decreasing species-specific populations will give rise to possible changes in habitat form and structure at a regional scale.

  The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent (i.e. along the proposed route of the power line). The impact is rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability are respectively rated as substantial and very likely. The reversibility and irreplaceability of the impact are both rated as low.

  Significance of Impact without Mitigation **Low to Moderate**

  Mitigation

  Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. A pre-construction site walk-through should be undertaken shortly before commencement of construction in order to identify any important faunal communities that may have relocated to the line route. The specific impact of construction on these species should be noted and the possibility of relocation of species may be considered
2. The maintenance of points of refugia, where they arise within corridor; avoidance of incursions into areas of possible refugia and sound site management will improve the likelihood of maintaining local faunal populations within the subject area.

Significance of the impact with Mitigation **Low**

1.6.4 Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure, primarily the establishment of the proposed concrete or steel towers along the transmission line route, which require some level of excavation and the placement of concrete foundations;

Minor isolated changes in topography and habitat form and structure will give rise to localized changes in the nature of lands around towers and/ or in close proximity to towers.

Direct Impacts

- Changes in vegetation community around and in close proximity to towers, brought about by direct disturbance of habitat during construction and changes in soil water and related dynamics

Indirect Impacts

- Ousting or recruitment of fauna associated with habitat and in response to change in habitat form and structure
- Possible change in localized factors such as soil water relations or increased propensity towards erosion of soils.

Cumulative Impacts

- As powerlines serving the Nieuwehoop substation increase, changes in surface hydrology and plant communities will arise – these changes may be primarily be incipient at first but may be expansive and generally latent on a longer temporal basis.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent (i.e. along the proposed route of the transmission line). The impact is rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability are respectively rated as substantial and very likely. The reversibility and irreplaceability of the impact are both rated as low.

Significance of Impact without Mitigation **Low**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Avoid excessive sculpting of areas along the line route and the unnecessary clearance of vegetation. .

2. Prevent undue surface run off from tower bases during and following construction.

Significance of the impact with Mitigation **Very Low**

1.6.5 Alteration of surface water quality on account of construction activities that lead to change in water chemistry;

With the construction phase use of materials in, for example the wet trades (cement/concrete) as well as spillages may change surface water chemistry if these materials find their way into water courses etc.
:

Direct Impacts

- Minor change to water chemistry at surface and possibly sub surface depending upon the nature of the material within the environment..

Indirect Impacts

- Contamination of soils and local water resources may change ecological dynamics within these systems.

Cumulative Impacts

- Increasing chemical contamination events may serve to affect water quality at a broader level which may include surface and groundwater resources.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent (i.e. along the proposed route of the transmission line). The impact is rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability are respectively rated as low and likely on account of the low level use of possible contaminants on site and the nature of the surrounding environment. The reversibility and irreplaceability of the impact are both rated as low

Significance of Impact without Mitigation **Low**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Maintenance of all wet trade applications to cordoned areas around the working site – in particular the pouring of concrete etc.

2. Ensure that towers and other structures are placed distally from watercourses and drainage features during final design..

3. Ensure that spill responses and containment methods are employed on site to redress any liquid spills or similar incidents.
.

Significance of the impact with Mitigation Very Low

1.6.6 Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points

During the construction phase, there may be the requirement to excavate and remove soils while other soils may also need to be imported clearance. Such changes to the soil profiles and nature of surface soils has direct, indirect and cumulative impacts arising on the surrounding environment:

Direct Impacts

- Changes in soil chemistry and surface hydrology will affect plant communities in and around site of transformation as well as possibly sites proximal to these areas.
- Change in the plasticity and percolation of soils will affect surface and sub surface hydrology at a localized level.

Indirect Impacts

- Changes in soil form and structure will give rise to alteration of the prevailing and proximal habitat as plant water relations change and perhaps soil chemistry is altered.

Cumulative Impacts

- Spatially expansive changes in the edaphiucs of the region will cumulatively lead to regular altered habitat forms across the landscape, as seral processes change to accommodate differing factors brought on by changing edaphics.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent (i.e. along the proposed route of the transmission line). The impact is rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability are respectively rated as substantial and very likely. The reversibility and irreplaceability of the impact are both rated as low.

Significance of Impact without Mitigation Low

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Confine working areas to around tower basis
2. The avoidance of unnecessary excavations and importing of soils
3. Ensure that good housekeeping is in place during the construction phase, limiting excavation and soil imports.
4. Soil stockpiles are to be cordoned and erosion control instituted.

Significance of the impact with Mitigation **Very Low**

1.6.3. Exotic Weed Invasion

Increases in the prevalence of exotic and invasive plants (e.g. *Datura ferox*) is highly probable. Such species are driven by the disturbance of land, often through sustained levels of excavation and the removal of competitive plant species.

Direct Impacts

- Increased levels of exotic plants within or around site. Concomitant invasion of neighbouring areas may arise.

Indirect Impacts

- Shifts in habitat form and structure as species associations change.

Cumulative Impacts

- Large scale presence of exotic and invasive species alters ecological process within the wider region.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a local spatial extent. The impact is rated with a short-term duration (i.e. the impact and risk will occur for less than one year). The consequence and probability are respectively rated as slight and likely. The reversibility of the impact is rated as high and irreplaceability of the impact is rated as low.

Significance of Impact without Mitigation **Very Low**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Regular monitoring through visual inspection and redress of exotic weeds in and around site, particularly during construction.
2. Avoidance of excessive earthworks and sculpting of land
3. Erosion control measures to be implemented to stabilize

Significance of the impact with Mitigation **Very Low**

Operational Phase

1.6.6. Exotic Weed Invasion

Increases in the prevalence of exotic and invasive plants (e.g. *Datura ferox*) is highly probable often after the construction phase has concluded and possibly up to 5 years after such date, while ongoing, low level disturbance may give rise to ongoing exotic plant establishment.

Direct Impacts

- Increased levels of exotic plants within or around line route. Concomitant invasion of neighbouring areas may arise.

Indirect Impacts

- Shifts in habitat form and structure as species associations change.

Cumulative Impacts

- Large scale presence of exotic and invasive species alter ecological process within the wider region.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a local spatial extent. The impact is rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability are respectively rated as slight and likely. The reversibility of the impact is rated as moderate and irreplaceability of the impact is rated as low.

Significance of Impact without Mitigation **Low**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Implement intermittent but regular weed control initiatives, as well as regular visual monitoring and redress of exotic weeds in and around site, particularly the summer period.

Significance of the impact with mitigation **Very Low**

Decommissioning Phase

1.6.7. Removal of overhead transmission lines, as well as subtle changes in habitat are likely to result in the alteration of avian behavior following the loss of roosts and perches.

Direct Impacts

In a manner similar to the construction of additional points of purchase for in particular, raptors, it is evident that the loss of such areas will have a concomitant shift in faunal populations (particularly prey species) back to a population status akin to that presently encountered.

Indirect Impacts

Subtle changes in avian populations in and around the site may evident, depending upon other factors in the region, including the placement of other points of purchase in neighbouring areas

Cumulative Impacts

- As the establishment and loss of points of purchase are generally unpredictable, it is likely that cumulative impacts will remain indeterminate.

The status of this impact is rated as positive and direct and indirect in nature. The direct impact is rated with a local spatial extent. The impact is rated with a long-term duration (i.e. the impact and risk will occur in perpetuity or until the status quo changes once again. The consequence and probability are respectively rated as slight and likely. The reversibility of the impact is rated as moderate and irreplaceability of the impact is rated as low.

Significance of impact without Mitigation **Very Low**

Mitigation

1. None identified.

Significance of impact with Mitigation **Very Low**

1.6.8 A reversion back to the present seral stage, where continued grazing by livestock and herbivory by game will arise

As the towers and cables are removed, and management and related activities cease along the line route, secondary vegetation will arise on site, presenting an early successionary stage of habitat. This impact is conditional to the nature of the surrounding land use at this time and may be considered a positive impact from an ecological perspective under conditional circumstances..

Direct Impacts

Secondary habitat and reduced anthropogenic disturbance will see improved habitat form, which will give rise to changes in faunal behavior. Secondary vegetation forms may dominate at select points (e.g. Salsola spp). .

Indirect Impacts

Changes in habitat form and structure will see change in faunal populations.

Significance of Impact without Mitigation **Very Low**

Mitigation

- Monitoring and management of vegetation, particularly addressing exotic weed invasion if this arises (see below)

Significance of the impact with mitigation **Very Low**

1.6.9 A reversion of present faunal population states within the subject route

Conditional to all other factors being equal, the present faunal populations and diversity are likely to exploit the secondary habitat associated with the former powerlines. This impact is conditional to the nature of the surrounding land use at this time and may be considered a positive impact from an ecological perspective under conditional circumstances

Direct Impacts

Increasing secondary habitat should see change in the faunal composition of the area as some species are favoured over others.

Significance of Impact without Mitigation **Very Low**

Mitigation

None proposed

Significance of the impact with mitigation **Very Low**

1.6.10 Minor and subtle changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment

Change in the local topography and possible changes in vegetation cover may see generally latent but subtle changes in the local hydrological regime. This impact is conditional to the nature of the surrounding land use at this time and may be considered a positive impact from an ecological perspective under conditional circumstances

Direct impacts

Minor variations in drainage features and surface water run off may arise around and within the corridors

Significance of Impact without Mitigation **Very Low**

Mitigation

None proposed

Significance of the impact with mitigation **Very Low**

1.6.8 Exotic Weed Invasion

Increases in the prevalence of exotic and invasive plants (e.g. *Datura ferox*) is highly probable following the decommissioning of the powerlines. Such disturbance can be of a short period, with invasive weed impacts arising for periods in excess of 5 years.

Direct Impacts

- Increased levels of exotic plants within or around site. Concomitant invasion of neighbouring areas may arise.

Indirect Impacts

- Shifts in habitat form and structure as species associations change.

Cumulative Impacts

- Large scale presence of exotic and invasive species alter ecological process within the wider region.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a local spatial extent. The impact is rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability are respectively rated as slight and likely. The reversibility of the impact is rated as moderate and irreplaceability of the impact is rated as low.

Significance of Impact without Mitigation **Low**

Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Implement intermittent but regular weed control initiatives for a period that spans at least two growing seasons.

2. Ensure the stabilization of site, once decommissioning and removal of infrastructure has arisen.

Significance of the impact with mitigation **Very Low**

1.7. IMPACT ASSESSMENT SUMMARY

Table 1 1 Direct, Indirect and Cumulative impacts assessment summary table for the Construction Phase

Construction Phase													
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/ Managemen t	With Mitigation/ Management (Residual Impact/ Risk)		

Alteration of habitat structure and composition in and around towers and possibly through the stringing phase of the project	Habitat and species loss	Negative	Site Specific (i.e. along the transmission line route)	Long-Term	Substantial	Very likely	Low	Low	Detailed design and incorporation of habitat and features into the routing of the proposed transmission line. Undertake plant rescue operations Implement exotic weed control Conduct a game sweep of the proposed transmission line route Carry out the maintenance of vegetation and avoidance of the "blading" or clearance. A second assessment of the route should be undertaken in or around February to March in order to identify any additional plant specimens of significance that may be evident on route. Such specimens may be relocated/removed (i.e. search and rescue) or avoided (with the relevant permits and approvals in place) prior to the commencement of construction. The detailed design and confirmation of the proposed tower positions along the proposed powerline route should assist with the avoidance of specific vegetation associes and forms.	Moderate	Very Low	5	High

Construction Phase													
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)**		
									Identification and avoidance of the two Aloe associes identified. An initial pre-construction clearance of all exotic vegetation on route should be undertaken to reduce the possibility of further exotic weed invasion. Continued exotic weed control measures should be implemented during the construction phase that aligns with an exotic vegetation management plan				
Changes in the geomorphological state of drainage lines	Habitat change through changes in topographic drivers	Negative	Site Specific (i.e. along the transmission line route)	Medium-Term	Moderate	Low	High	Low	Undertaking and completion of earthworks outside of the high rainfall period (if possible). Maintenance of a high level of housekeeping on route of the proposed transmission line during the construction phase. Inspection of drainage features immediately outside of the footprint of the proposed transmission line and undertake removal of solid waste and litter on a regular basis.	Low	Very low	5	Medium

Construction Phase													
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/ Managemen t	With Mitigation/ Management (Residual Impact/ Risk)		
The disturbance of fauna and loss of vegetation/habitat through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat change and change in species distribution	Negative	Local	Short term	Slight	Likely	High	Low	1. A pre-construction site walk-through should be undertaken shortly before commencement of construction in order to identify any important faunal communities that may have relocated to the line route2. The maintenance of points of refugia, where they arise within corridor; avoidance of incursions into areas of possible refugia and sound site management	Low to moderate	Low	4	Medium
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure, primarily the establishment of the proposed concrete or steel towers along the transmission line route, which require some level of excavation and the placement of concrete foundations	Habitat change and change in species distribution	Negative	Local	Short term	Slight	Likely	High	Low		Low	Very low	5	Low

Construction Phase													
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)**		
Increases in the prevalence of exotic and invasive plants	Water quality change and general pollution of resource	Negative	Local	Short term	Slight	Likely	High	Low	Exclusion of major drainage lines from the proposed development footprint. Avoidance of significant sculpting of land and maintenance of the general topography of the proposed transmission line route. Placement of energy dissipaters if identified around tower footings within minor drainage lines to reduce velocity of flow through such features and consequential disturbance Undertake regular visual monitoring and redress of exotic weeds in and around site, particularly during construction.	Low	Very low	4	High

Table 1-2 Direct, indirect and cumulative impact assessment summary table for the Operation Phase

Operation Phase													
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: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Increases in the prevalence of exotic and invasive plants	Habitat change	Negative	Local	Long term	Slight	Likely	Moderate	Low	Implement intermittent but regular weed control initiatives	Very Low	Very Low	5	High

Table 1-3 Direct impact assessment summary table for the Decommissioning Phase

Operation Phase													
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)		
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Removal of overhead transmission lines, as well as subtle changes in habitat are likely to result in the alteration of avian behavior in and around the route	Habitat and species change	Positive	Local	Long-Term	Slight to moderate	Likely	Moderate	Low	None identified	Very Low	Very Low	5	High
A reversion back to the present seral stage, where continued grazing by livestock and herbivory by game will arise	Habitat and species change	Positive	Local	Long-Term	Slight	Likely	Moderate	Low	None identified	Very Low	Very Low	5	High
A reversion of present faunal population states within the subject route	Faunal population change or change in distribution	Positive		Long-Term	Slight	Likely	Moderate	Low	None identified	Very Low	Very Low	5	High
Minor and subtle changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment	Hydro-geomorphological change	Positive / Negative	Local	Long-Term	Slight	Likely	Moderate	Low	None identified	Very Low	Very Low	5	High

Operation Phase													
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)		
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Exotic Weed Invasion	Habitat change	Negative	Local	Long-Term	Slight	Likely	Moderate	Low	None identified	Very Low	Very Low	5	High

1.8. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Utilising the above information, the following broad issues are considered within the Environmental Management Programme that would be associated with the proposed powerline.

Pre-Construction Phase:

- Pre-construction evaluation and possible plant rescue operations;
- Identification of the proposed tower positions and design to be utilised along line route;
- Identification of laydown areas, roadways etc. along route and evaluation of affected points within route, particularly in respect of floral and faunal presence.
- Permitting requirements in terms of the Northern Cape Conservation Act if identified as a requirement.

Construction Phase:

- Induction and interaction within management on ecological aspects;
- Route inspection and sweep of any fauna within the construction area;
- Monitoring of construction activities and operations, including species presence within the proposed transmission line route, mortalities and sitings;
- Maintenance of vegetation and avoidance of unnecessary clearance of route;
- Exotic weed management; and
- Erosion control measures to be implemented where applicable.

Post Construction Phase

- Vegetation management along route – consideration of redress methods of growth and habitat form around towers if required;
- Exotic weed management: and
- Erosion control measures if required along the proposed transmission line route.

1.9. CONCLUSION AND RECOMMENDATIONS

Given the above information, it is evident that with the judicious placement of the proposed transmission line towers and the use of the proposed corridor route as envisaged, that little negative ecological ramifications will arise, with the *proviso* that the proposed mitigation measures are implemented. Skeerhok Alternative Powerline Routes 1 and 3 do not show any significant features that would preclude their use, however given the information at hand Skeerhok Alternative Powerline route 2 is recommended from a terrestrial ecological perspective.

Evidently, the proposed Skeerhok Alternative 2:

- Will avoid the necessity to traverse any drainage features including minor dendritic drainage lines
- Traverses primarily graminoid and low scrub habitat and generally allows for the avoidance of larger woody species.
- Avoids any areas of considered ecological value.

Sound planning and management in respect of the powerline establishment would include:

- Avoidance of excessive clearance of vegetation within the proposed transmission line corridor, particularly around towers;
- Management of exotic weed invasion that may arise; this is discussed in the EMPr of the BA Report and should be incorporated into a final programme for vegetation management.
- General land management practices to avoid excessive erosion, dust emissions and possible sources of pollution to ground and surface water resources.

There is in our opinion no necessity for a Water Use License in respect of the proposed powerline at this point however this will be determined by the Department of Water and Sanitation. The presented powerline routing options are not evidently a water use per se and will not directly affect watercourses and water resources on condition that the above measures are implemented. It is our opinion that with a preference for the selection of Skeerhok Powerline Alternative 2, any of the three alternative routes, subject to final design and adherence to the above recommendations, may be authorised.

1.10. REFERENCES

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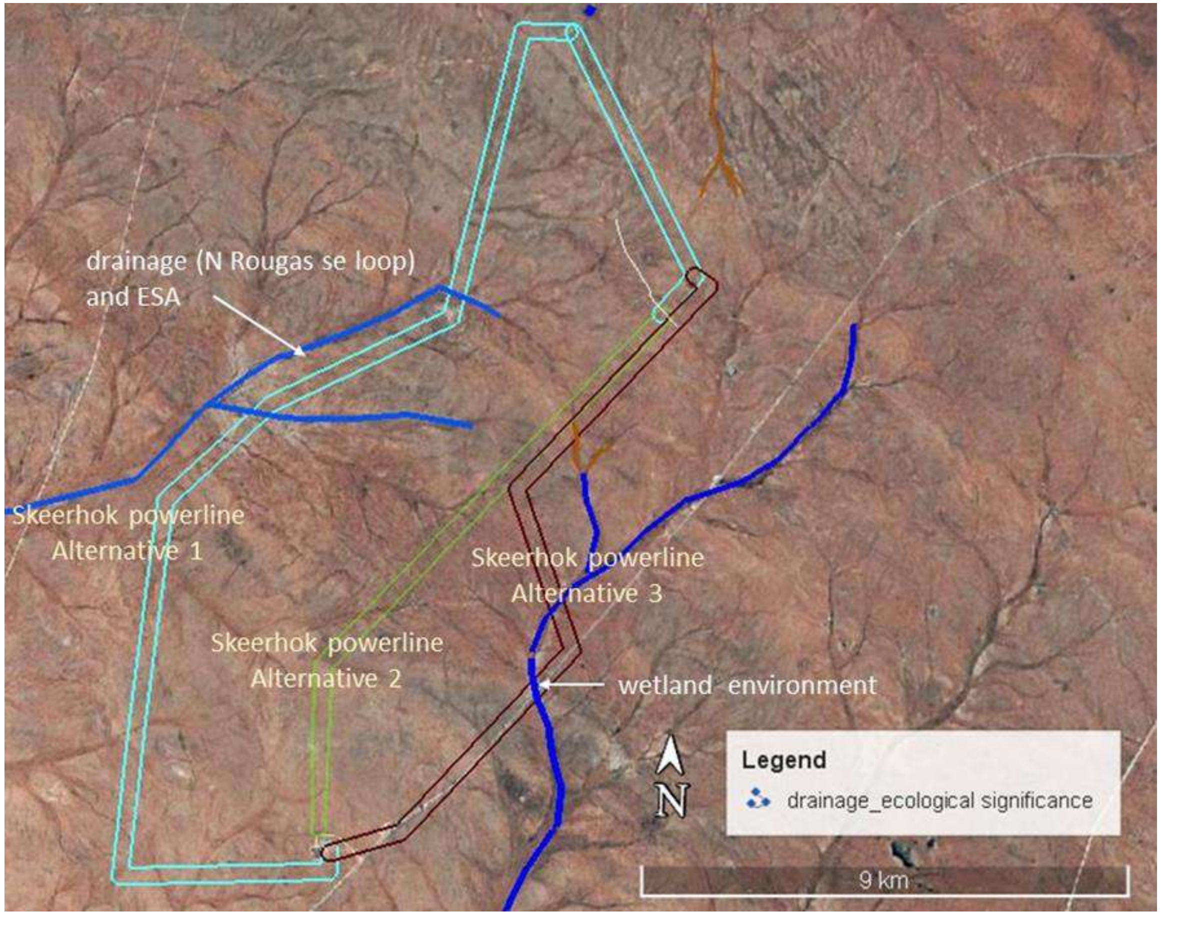
1.11. APPENDICES

1.12. SENSITIVITY MAPPING OVERLAYS OF CORRIDOR



Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

APPENDIX E3:

Avifauna

SKEERHOK GRID CONNECTION 132KV OVERHEAD POWER LINE

AVIFAUNAL IMPACT ASSESSMENT

BASIC ASSESSMENT

February 2018

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EXECUTIVE SUMMARY

This report evaluates the likely impact on birds of a proposed overhead 132kV power line near Kenhardt in the Northern Cape. The power line is required to connect a proposed solar photovoltaic facility (Skeerhok PV 1, 2 & 3) to the existing Eskom grid at the Nieuwehoop Substation. As described below, the preferred route (route 2) is 18km.

This arid area is home to several large terrestrial bird and raptor species, the most important of which are Ludwig's Bustard *Neotis ludwigii*, Kori Bustard *Ardeotis kori*, Secretarybird *Sagittarius serpentarius*, Karoo Korhaan *Eupodotis vigorsii,* Verreaux's Eagle *Aquila verreauxii* and Martial Eagle *Polemaetus bellicosus*. In addition to being classified as threatened regionally and in some cases globally, most of these species are facing significant threats to their survival from existing impacts in the arid parts of South Africa. In addition, this area is home to an assemblage of arid zone adapted smaller bird species including larks, sparrow-larks, chats and others. Most important of these from a conservation perspective are Red Lark *Calendulauda burra* and Sclater's Lark *Spizocorys sclateri*, both of which are listed as regionally threatened species (Vulnerable and Near-threatened respectively), have very restricted ranges and have been recorded in the broader area within which the study area is situated. Stark's Lark *Spizocorys starki* is also an important endemic present in the area, and Burchell's Courser *Cursorius rufus* (Vulnerable) is a nomadic species which occurs in the broader area.

For the purposes of this study we conducted 2 specialist site visits, in May 2017 and January 2018. In addition, 3 seasons of on-site bird monitoring was conducted for the proposed PV facilities and this data is relevant to the power line study area. For the purposes of a power line assessment, we believe the level of data collection on site to be excellent in this case. Overall, our avifaunal studies on the broader site have made the following findings:

- Our surveys on site took place in a slightly above average rainfall year (165.0mm in 2017 c.f. 147.8mm p.a. mean since 1960). This means that our data should be representative of typical conditions on site.
- The proposed Skeerhok site is already relatively impacted by linear infrastructure including roads, railway line, and transmission and distribution power lines.
- There are no Important Bird & Biodiversity Areas close to the proposed site.
- Walked transects on site recorded 29 small passerine bird species in total. Twenty of these species are either endemic or near endemic to southern Africa, which is a very high level of endemism. Whilst the most abundant species on site were all common species, and important endemic, Stark's Lark *Spizocorys starki* was also recorded in relatively high abundance on site. No regionally Red Listed species were recorded on site by this method.

These smaller species would typically be affected through habitat destruction and disturbance if a new power line were built.

- Driven transects on site recorded 6 priority species. Two were small passerines, Red Lark *Certhilauda burra* (Vulnerable -1 individual), and Double-banded Courser *Rhinoptilus africanus*. The 4 remaining species were: Kori Bustard *Ardeotis kori* (Near-threatened), Ludwig's Bustard *Neotis ludwigii* (Endangered), and Northern Black Korhaan *Afrotis afraoides*. Three of these species are regionally Red Listed (Taylor *et al,* 2015) as indicated above. These larger species are susceptible to collision on overhead power lines such as the one planned, in addition to habitat destruction and disturbance.
- Martial Eagle *Polemaetus bellicosus* (Endangered) was recorded several times off site, approximately 9km to the west. Although these birds are suspected to breed somewhere in that area (we did not locate a nest) this is too far from the proposed site to be of concern. Large eagle such as this are typically vulnerable to electrocution on overhead power lines if the pylon design is not safe.
- A total of 57 bird species were recorded on site during our monitoring programme by all methods and incidentally. Thirty of these are endemic or near-endemic. This included 5 regionally Red Listed species, the 4 mentioned above already and Karoo Korhaan *Eupodotis vigorsii* (Near-threatened). Sclater's Lark *Spizocorys sclateri* and Burchell's Courser *Cursorius rufus* were not recorded on site during this programme, but are considered likely to visit the site occasionally when conditions are right.
- Considering the bird and habitat data collected on site we conclude that the following species will be most at risk if the proposed power line goes ahead: Ludwig's Bustard; Kori Bustard; Karoo Korhaan; Martial Eagle; Red Lark; Sclater's Lark; and Stark's Lark. There are many more endemic but not Red Listed species which will also be of concern, but we feel the above suite of species serves as a good surrogate for those more common species in terms of impact assessment and management.

Our assessment of the significance of the impacts on avifauna on site is as follows:

- Habitat destruction during the construction and operational phase will be of LOW significance.
- Disturbance of birds during the construction and operational phase will be of LOW significance.
- Bird collision on the power line during the operational phase will be of HIGH significance, mitigated to LOW.
- Electrocution of birds on the power line during the operational phase will be of HIGH significance, mitigated to VERY LOW.
- Nesting of birds on the infrastructure once operational will be of LOW significance.

Mitigation for inclusion in the EIR/EMPr

The following mitigation measures are recommended:

- Crossing of rocky outcrops, water courses, drainage lines, streams and wetlands by vehicles and machinery should be avoided.
- Existing roads should be used as far as possible for access to the servitude, even where these are less convenient and direct than creating new roads.
- All staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted. No extra wide turning of vehicles off the existing servitude roads should be permitted.
- A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed.
- The optimal route for the new power line should be selected to mitigate for bird collisions (and other impacts to a lesser extent). We recommend that Alternative 2 be selected. Alternative 3 is also acceptable. We advise against the use of Transmission line 1, although it is not fatally flawed.
- The power line should be fitted with the best available (at the time of construction) anti bird collision line marking devices in order to make the overhead cables more visible to birds. More specifically:
  - Devices should be fitted on the entire length of the power line as collision risk is high all along the alignment for nomadic species such as Ludwig's Bustard.
  - Devices should be fitted on the earth wire/s.
  - On each span, the full span should be fitted with marking devices (i.e. not only the middle 60% as done previously by Eskom). Research has shown that collisions occur even close to pylons (Shaw, 2013).
  - Light and dark colour devices should be alternated so as to provide contrast against both dark and light backgrounds.
  - These devices should be fitted as soon as the earth wires are strung as collision risk begins immediately, not only once the line is commissioned and live.
  - The power line owner will be responsible for ensuring that the marking devices remain in place and effective on the power line for its' full lifespan. Any device failures must be rectified immediately by replacement with new devices.
- The power line should be monitored through patrolling its full length at least 4 times per year to measure the impacts on birds and the durability of line marking devices.
- The proposed tower/pylon structure has not been decided in detail. It will however be either concrete or steel monopole. It is critically important that sufficient clearance be

allowed between phase-phase and phase-earth hardware on the structure. For large eagles these clearances should be a minimum of 1.8m.

- In addition the standard Eskom Bird Perch must be installed on every pylon top to provide safe perching substrate for large birds well above the dangerous hardware.
- For the impact of the birds nesting on the power line/substation, we recommend nest management on a case by case basis under the supervision of an avifaunal specialist, and in conformance with all relevant national and provincial legislation.
- We recommend that the operational phase EMP include provision for application to the provincial authority for permits for any necessary nest management should the need arise during the operational phase.

Environmental impact statement

The Skeerhok Grid connection site is important habitat for an assemblage of arid zone bird species, many of which are endemic. The transformation of natural habitat for the proposed power line and substation is however of LOW significance given how little natural habitat will be affected. Collision of birds with the overhead cables and electrocution of birds perched on the pylons is of HIGH significance, mitigated to LOW. All other impacts are of LOW significance. We recommend that the power line and substation be authorised, provided that the recommendations of this report are implemented.

Cumulative impact statement

The proposed Skeerhok Grid connection power line will result in a bird collision risk of HIGH significance pre-mitigation. In addition to the proposed power line an approximate 110km of new power line will be constructed within a 30km radius. In our view this means that the cumulative significance of power line bird collisions will be HIGH. If each project applies mitigation as we have recommended for the current assessment, this significance can be reduced to MODERATE.

Contents

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

SKEERHOK PV GRID CONNECTION POWER LINE

Specialist:	WILDSKIES ECOLOGICAL SERVICES		
Contact person:	JON SMALLIE		
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Professional affiliation(s) (if any)	SACNASP		

Project Consultant:	CSIR		
Contact person:	KELLY STROEBEL		
Postal address:			
Postal code:		Cell:	
Telephone:	0218882432	Fax:	
E-mail:	KSTROEBEL@CSIR.CO.ZA		

4.2 The specialist appointed in terms of the Regulations_

I, J SMALLIE, declare that --

General declaration:

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

Signature of the specialist:

WILDSKIES ECOLOGICAL SERVICES

Name of company (if applicable):

6 FEBRUARY 2018

Date:

Requirements of Appendix 6 – GN R326 of NEMA EIA Regulations as amended (7 April 2017)	Where 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 5-6, Appendix 4
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Pages 5-6
c) an indication of the scope of, and the purpose for which, the report was prepared; (ca) an indication of the quality and age of base data used for the specialist report; (cb) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Page 21-24 Page 21-24 Page 26-
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Page 21-24
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Pages 21-24
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternatives;	Page 47
g) an identification of any areas to be avoided, including buffers;	Page 47
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;	Page 47
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Page 21-24
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Page 39
k) any mitigation measures for inclusion in the EMPr;	Page 39
l) any conditions for inclusion in the environmental authorisation;	Page 39
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Page 48
n) a reasoned opinion- i. whether the proposed activity, activities or portions thereof should be authorised; (ia) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity 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;	Page 48
o) a description of any consultation process that was undertaken during the	Page 21-24

course of preparing the specialist report;	
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Page 21-24
q) any other information requested by the competent authority.	Page 21-24
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

1. INTRODUCTION

1.1 Background to the current study

juwi Renewable Energies (juwi) plans to develop 3 new solar photovoltaic energy facilities to the north-east of Kenhardt in the Northern Cape, called Skeerhok PV1, 2 and 3. WildSkies Ecological Services (Pty) Ltd has conducted avifaunal impact assessments for these 3 proposed projects, including pre-construction bird monitoring on site under contract to juwi. A 132kv overhead grid connection power line will be required to integrate the facilities into the existing Eskom grid at the Nieuwehoop Substation. Juwi has contracted the CSIR to conduct the necessary Basic Assessment for the proposed facility and WildSkies to conduct the avifaunal Basic Assessment.

The specialist conducted site visits in May 2017 and January 2018. The 3 seasons of pre-construction bird monitoring (4 days on site each) were conducted during July and November 2017, and January 2018 and the data collected through this programme is also relevant to the current Basic Assessment.

1.2 Terms of reference

The typical terms of reference for a study of this nature are as follows:

- Provide status of bird habitats and identification of all ecologically sensitive areas
- Identification of endangered species and their locations
- Identify conservation worthy areas and how the proposed development can avoid them;
- Identify potential impacts and mitigation measures of the proposed infrastructure on the avifauna
- Classification of each impact according to methods as outlined by the client (see Appendix 1)
- Recommendation of the best management measures to mitigate any risk.
- Identification of any monitoring required during operational phase.

1.3. Description of the proposed development

The following project description was supplied to us by the CSIR.

juwi is proposing to develop three 100 MW Solar Energy Facilities (SEFs) within the same geographical area on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult Farm 120 close to Kenhardt in the Northern Cape. Separate full Scoping and EIA Processes are being undertaken for these proposed SEFs and are referred to as Skeerhok PV 1 (DEA Reference Number:

14/12/16/3/3/2/1033), Skeerhok PV 2 (DEA Reference Number: 14/12/16/3/3/2/1034) and Skeerhok PV 3 (DEA Reference Number: 14/12/16/3/3/2/1035).

The development of the transmission line and associated electrical infrastructure is proposed to connect the proposed SEFs to the national grid via the Eskom Nieuwehoop Substation. Following the construction phase, the proposed transmission line and associated electrical infrastructure will either be transferred into the ownership of Eskom or remain in the ownership of juwi. The proposed development of the transmission line and associated electrical infrastructure is subject to a separate Basic Assessment (BA) process (this Report).

The proposed transmission line and associated infrastructure will include the following:

- **A 132 kV transmission line** with concrete foundations and steel tower structures (i.e. pylons). The line will consist of either self-supporting suspension structures or guyed monopoles and a maximum height of 32 m. The span lengths are estimated to range between 200 m and 300 m. The servitude for the 132 kV power line will be 52 m wide. Associated electrical infrastructure at the Eskom Nieuwehoop Substation will be constructed in order to ensure that the substation is capable of receiving the additional electricity that is generated by the proposed Skeerhok PV facilities. This infrastructure includes, but is not limited to, feeders, Busbars, transformer bays and extension to the platform at the Eskom Nieuwehoop Substation.
- **An on-site substation** (with a capacity of 22/33 kV to 132 kV). The on-site substation building is expected to extend approximately 30 m in height, with a maximum footprint of 1 hectare. It is important to note that all high voltage infrastructure leading up to the Point of Connection (i.e. Skeerhok PV facilities' section of the proposed collector/on-site substation) have been considered within the three EIA Processes (i.e. for Skeerhok PV 1. PV 2 and PV 3). High voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed collector/on-site substation) up to the line bay at the Eskom Nieuwehoop Substation may be handed over to Eskom and has been assessed separately as part of this BA Process (i.e. Skeerhok Alternative 1, 2 and 3 – Transmission Lines).
- **For powerline maintenance existing service and access roads** will be utilised as much as possible for maintenance purposes. Where no existing access is present, due to the low traffic anticipated it will be provided in be in the form of jeep tracks, as opposed to formalised roads. For sections that will require use of the Transnet service road, discussions have been initiated and held with Transnet and the Project Applicant regarding the potential use of the Transnet Service Road and associated specific requirements. Transnet have informed the Project Applicant of their requirements that need to be met should the Transnet Service Road be used to gain access to the site. These requirements will be considered in the design where required, and the details of the agreement will be finalised outside of this BA Process.

As part of this BA, three connectivity alternatives are considered, namely:

1. Skeerhok Alternative 1 – Transmission Line
2. Skeerhok Alternative 2 – Transmission Line
3. Skeerhok Alternative 3 – Transmission Line

A description of each alternative is summarised in Table 1 and shown in Figure 1 below.

Table 1. The Skeerhok Alternatives – Transmission Line descriptions

	Skeerhok Alternative 1	Skeerhok Alternative 2 (preferred alternative)	Skeerhok Alternative 3
Line length	30 km	18 km	19 km
Farm portions affected	Portion 0 of Smutshoek Farm 395; Portion 9 of Gemsbok Bult Farm 120; Portion 5 of Gemsbok Bult Farm 120; Portion 3 of Gemsbok Bult Farm 120; Portion 1 of N'Rougas Zuid Farm 121; Portion 3 of Onder Rugzeer Farm 168; Portion 0 of Boven Rugzeer Farm 169.	Portion 0 of Smutshoek Farm 395; Portion 3 of Gemsbok Bult Farm 120; Portion 9 Gemsbok Bult Farm 120; Portion 5 of Gemsbok Bult Farm 120	Portion 0 of Smutshoek Farm 395; Portion 9 of Gemsbok Bult Farm 120; Portion 3 of Gemsbok Bult Farm 120; Portion 5 of Gemsbok Bult Farm 120
Foundation	Concrete	Concrete	Concrete
Pylon	Steel tower	Steel tower	Steel tower
Tower type	self-supporting suspension structures or guyed monopoles	self-supporting suspension structures or guyed monopoles	self-supporting suspension structures or guyed monopoles
Height	32 m	32 m	32 m
Span length	200 – 300 m	200 – 300 m	200 – 300 m
Servitude width	40 m	40 m	40 m

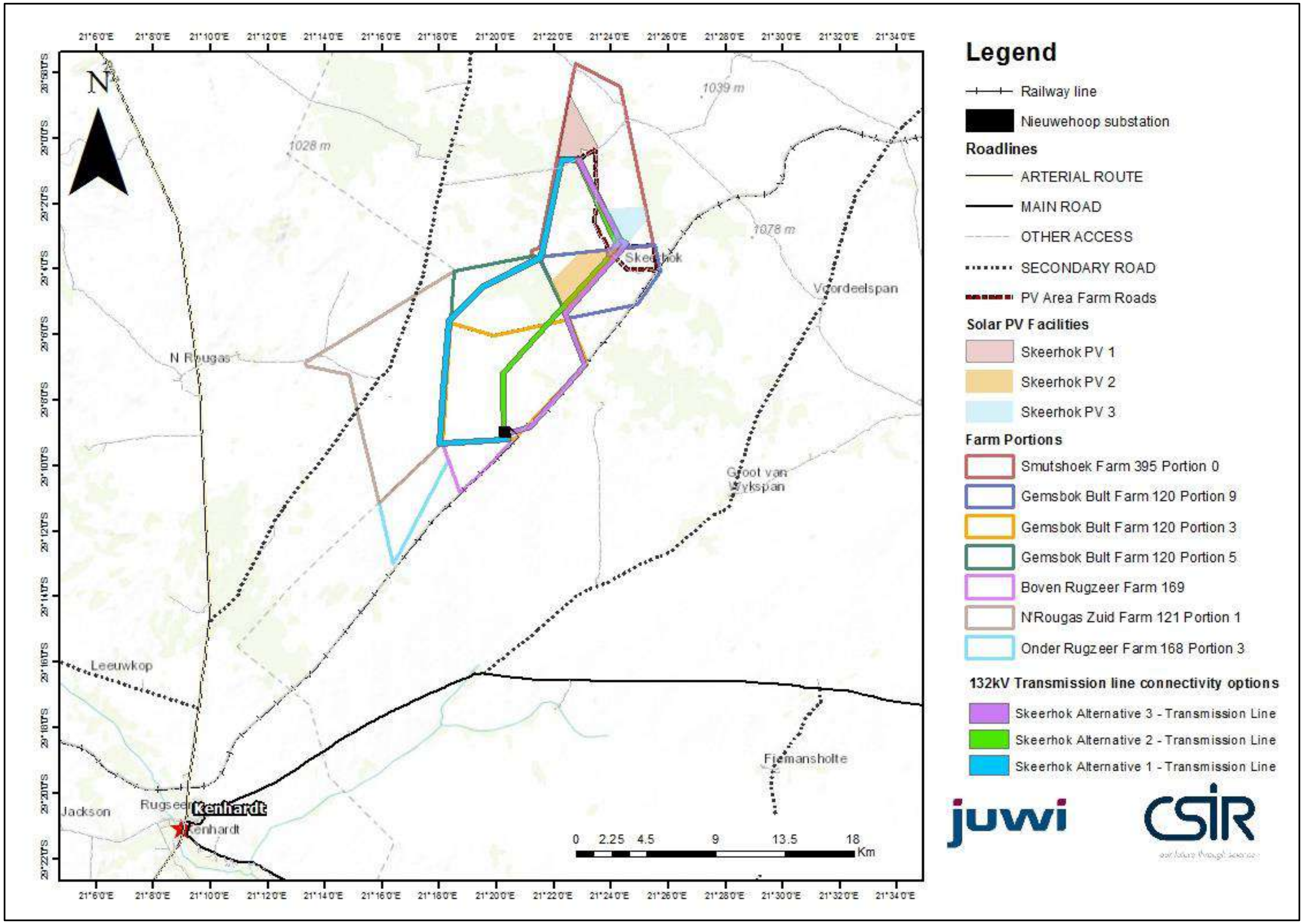

Figure 1. Locality map of the 3 power line options (Skeerhok Line 2 being the preferred alternative) (supplied by CSIR).

Each of these alternative connectivity options are proposed within a 300 m wide electrical infrastructure corridor. These corridors were considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities will be avoided in the final siting and location of the proposed transmission line. Based on the findings of the specialist studies, an environmental sensitivity map has been produced (and included in Appendix E of the BA Report, as well as the Environmental Management Programme (EMPr) included in Appendix C of the BA Report). This map shows the sensitivities on site (terrestrial, aquatic, and sensitive heritage features) within the corridors that were identified.

The main factors that determined preferred connectivity option are:

- The most cost-effective route and distance between all three SEFs to the Nieuwehoop Substation; and
- Runs adjacent to an existing Eskom servitude for a portion of the length
- Planning and design to allow for the avoidance of sensitive features identified within the corridors.

Based on the above, the preferred routing identified for this project is Skeerhok Alternative 2 – Transmission Line. It is important to note that should the routing change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout or revisions to the layout occurring within the boundaries of the corridor 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 corridor and have identified sensitivities, which have been avoided in the siting of the proposed infrastructure. The corridor is considered to be a “box” in which the project components can be constructed at whichever location (within the boundary of the corridor) without requiring an additional assessment or change in impact significance. Any changes to the layout within the boundaries of the corridor following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

1.4. Background to bird interactions with overhead power lines

Because of its size and prominence, electrical infrastructure constitutes an important interface between wildlife and man. Wildlife interactions with power lines are almost all negative, with the two main problems caused by electrocution of birds (and other animals) and birds colliding with power lines (Ledger & Annegarn 1981, APLIC 1994, Bevanger 1998, Kruger 1999, van Rooyen & Ledger 1999, Lehman *et al.* 2007, Jenkins *et al.* 2010, Shaw *et al*. 2010, Prinsen *et al.* 2011, APLIC 2012, Shaw 2013). Other issues are nesting of birds on infrastructure and electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure (van Rooyen & Ledger 1999) (not relevant on distribution lines such as those proposed), and disturbance and habitat destruction during construction and maintenance activities (e.g. Silva *et al.* 2010, Raab *et al.* 2011a).

1.4.1. Bird electrocutions

Electrocution of birds on overhead lines is an important cause of unnatural mortality of raptors and storks, and has been a focus of much attention in Europe, USA and South Africa (APLIC 1994, Alonso & Alonso 1999, van Rooyen & Ledger 1999, Lehman 2001, Lehman *et al.* 2007). Electrocution can occur when a bird is perched or attempts to perch on an electrical structure and causes a short circuit by physically bridging the air gap between live components and/or live and earthed components. Electrocution of birds is possible on 132kV power lines such as those proposed, depending on the pylon structure to be used. As per Table 1, the only Red Listed species that could occur in this area and be susceptible to this impact is probably the Martial Eagle. Various non Red Listed species will however be susceptible.

1.4.2. Bird collisions

Collision with power lines is a well-known conservation problem for many birds and for some species can be a significant source of mortality (Bevanger 1998, Erickson *et al.* 2005, Drewitt & Langston 2008, Shaw *et al.* 2010, Jenkins *et al.* 2011). The reasons for collisions are complex, with each case involving a variety of biological, topographical, meteorological and technical factors (Bevanger 1994). Although all birds have the potential to be affected by collisions, those most heavily impacted are generally large, flocking species which fly often, with waterfowl, gamebirds, cranes, bustards and storks usually among the most frequently reported casualties (Bevanger 1998, Janss 2000, Jenkins *et al.* 2010). The large body size of such species mean that they have limited manoeuvrability in the air and are less able to take necessary evasive action to avoid colliding with power lines (Bevanger 1998).

In South Africa, incidentally discovered mortality incidents reported by Eskom staff, conservationists and the general public are collated in the Central Incident Register, which is maintained by the Eskom-Endangered Wildlife Trust Strategic Partnership. These data, together with those from more systematic power line surveys near De Aar (Anderson 2002), in the Overberg (Shaw *et al.* 2010) and across the Karoo (Jenkins *et al.* 2011, Shaw 2013) highlight the high levels of large terrestrial bird mortality caused by existing power lines in this country. Particularly affected are Red-listed birds including cranes, bustards, storks, Secretarybirds, flamingos and vultures, which are generally long-lived and slow to reproduce (Shaw 2013). These species have not evolved to cope with high adult mortality, with the result that consistent mortality in this age group over an extended period could seriously affect a population’s ability to sustain itself in the long or even medium term. The cumulative effects of collisions together with other anthropogenic threats to these species (e.g. habitat destruction, disturbance) are unknown over the long term.

Mitigating bird collisions with power lines typically involves the installation of line marking devices on the cables in order to make them more visible to approaching birds. Worldwide, a variety of marking devices are used, but very few have been adequately field-tested (Jenkins *et al.* 2010). Great uncertainty remains about which are best, as they vary enormously in effectiveness between species and in different conditions (van

Rooyen & Ledger 1999, Anderson 2002). Generally though, marking seems to be fairly effective, with a recent meta-analysis showing a 78% decrease in mortality rates on marked lines (Barrientos *et al.* 2011).

1.4.3. Habitat destruction

During the construction phase and maintenance of power lines some habitat destruction and alteration inevitably takes place. This happens with the construction of access roads and the clearing of servitudes. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors, and to minimise the risk of fire under the line which can result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude, both through modification of habitat and disturbance caused by human activity.

1.4.4. Disturbance of birds

The construction and operational activities can impact on birds through disturbance, particularly during bird breeding activities. Particular project activities of concern include blasting, drilling, heavy earth moving general vehicular movement and any other activities which result in noise or increased human activity in an area. Disturbance of non-breeding birds may simply require them to move further away or adjust their activities during the disturbance. This may be either temporary or permanent. Disturbance of breeding birds may result in lower breeding productivity, failed breeding in the relevant season, and temporary or permanent abandonment of a breeding site. All of these reduce the recruitment of young birds to the population and can have significant implications for Red Listed species in particular, many of which are slow to reach breeding age and breed in small numbers.

1.4.5. Nesting

Raptors, large eagles, crows, Hadeda Ibises *Bostrychia hagedash* and Egyptian Geese *Alopochen aegyptiaca* have learnt to nest on transmission towers, and this has allowed them to breed in areas of the country where breeding would not previously have been possible due to limited nesting substrates (van Rooyen & Ledger 1999, de Goede & Jenkins 2001). This has probably resulted in a range expansion for some of these species, and large eagles such as Tawny, Martial and Verreaux's are now quite common inhabitants of transmission towers in the Karoo (e.g. de Goede &Jenkins 2001). Cape Vultures *Gyps africanus* and White-backed Vultures have also taken to roosting on power lines in certain areas in large numbers, while Lappet-faced Vultures are also known to use power lines as roosts, especially in areas where large trees are scarce (J. Smallie pers.obs.). At face value this appears a positive contribution that power lines can make to these species. However the situation is more complex in that nesting on the tower places the adults and young at much greater risk of collision with the overhead cables than would otherwise be the case. Due to the nuisance factor of having these nests on their infrastructure, Eskom also sometimes wishes to remove nests in order to manage the risk of faulting, with negative effects for the birds if not correctly handled.

Nesting of most bird species, in particular the larger ones such as eagles is far less common on the smaller 132kV power line such as those proposed. Medium size species such as Lanner Falcon and kestrels could however nest on the pylons.

1.5. Relevant legislation

Various sets of legislation and policy frameworks are relevant to this specialist study and development, including the following:

- The Convention on Biological Diversity is dedicated to promoting sustainable development. The Convention recognises that biological diversity is about more than plants, animals and micro-organisms and their ecosystems. It is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. It is an international convention signed by 150 leaders at the Rio 1992 Earth Summit, and South Africa is a signatory.
- An important principle encompassed by the CBD is the precautionary principle, which essentially states that where serious threats to the environment exist, lack of full scientific certainty should not be used a reason for delaying management of these risks. The burden of proof that the impact will not occur lies with the proponent of the activity posing the threat.
- The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include 117 (as of 1 June 2012) Parties from Africa, Central and South America, Asia, Europe and Oceania. South Africa is a signatory.
- The African-Eurasian Waterbird Agreement: the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) is the largest of its kind developed so far under the CMS. The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, herons, storks, rails, ibises, spoonbills, flamingos, ducks, swans, geese, cranes, waders, gulls, terns, tropic birds, auks, frigate birds and even the South African penguins. The agreement covers 119 countries from Europe, parts of Asia and Canada, the Middle East and Africa.
- National Environmental Management – Biodiversity Act - Threatened or Protected Species list (TOPS): the following target species for this study are on the list: Kori Bustard, Ludwig’s Bustard, Black Stork, Martial Eagle (all Vulnerable).
- The Northern Cape Nature Conservation Act 9 of 2009 is relevant, and provides protection for most bird species, including Sociable Weaver.

1.6. Study methods

The following information sources were consulted for this study:

- Bird distribution data from the South African Bird Atlas Projects 1 and 2 were obtained to ascertain which bird species occur in the study area (Harrison *et al.* 1997; www.sabap2.adu.org.za; www.mybirdpatch.adu.org.za).
- The conservation status of all bird species occurring in the study area was determined using The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor, Peacock & Wanless, 2015) and the IUCN 2017 Red List.
- A description of the vegetation types occurring in the study area was obtained from The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford 2006).
- The Coordinated Avifaunal Road count project was consulted (Young *et al.* 2003), but no routes exist close to this study area.
- The Important Bird & Biodiversity Areas programme of BirdLife South Africa was consulted (Marnewick, Retief, Theron, Wright, & Anderson, 2015). There are no IBBA's close to the proposed facility.
- Several ecological or avifaunal impact assessment report for other proposed projects in the area were reviewed to obtain an understanding of avifaunal issues in the wider area (Pachnoda Consulting cc, 2015; SDP Ecological, 2016; Scherman Colloty & Associates cc, 2015).
- At the time of writing no comment or input had been received from Interested & Affected Parties or stakeholders.
- Data from the two specialist site visits in May 2017 and January 2018 was used.
- Data collected by the pre-construction bird monitoring programme for the 3 PV facilities was used. This monitoring was done according to the recent "Best Practice Guidelines: Birds and Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. (Jenkins, Ralston-Paton & Smit-Robinson, 2017).

The specialist field investigations followed the following methods:

1. General sampling of avifauna
    a. This was achieved through driving and walking as much as possible of the study area. All birds were recorded, and the landscape was periodically scanned with 10x25 binoculars for larger birds and raptors. During all stops a listening watch was also performed for calling birds. All bird species were recorded (Appendix 5), but particular attention was given to large terrestrial, raptor and Red Listed species. These are discussed in Section 2.4.

2. Sensitive species breeding survey
    a. During the above described time spent on site, all possible nesting substrate for raptors was surveyed using the same equipment as above. These areas included the few existing trees, and the existing power line infrastructure.
3. Assessment of micro habitats
    a. During field work all available different micro habitats available to avifauna, and any sensitive avifaunal features were photographed, mapped and described.
4. Assessment of alternative power line routes
    a. Whilst in the field any relevant factors to determining the optimal route for the proposed power line were investigated and noted.

Figure 3 shows the GPS field tracks from the specialist site visits relative to the proposed power line corridor.

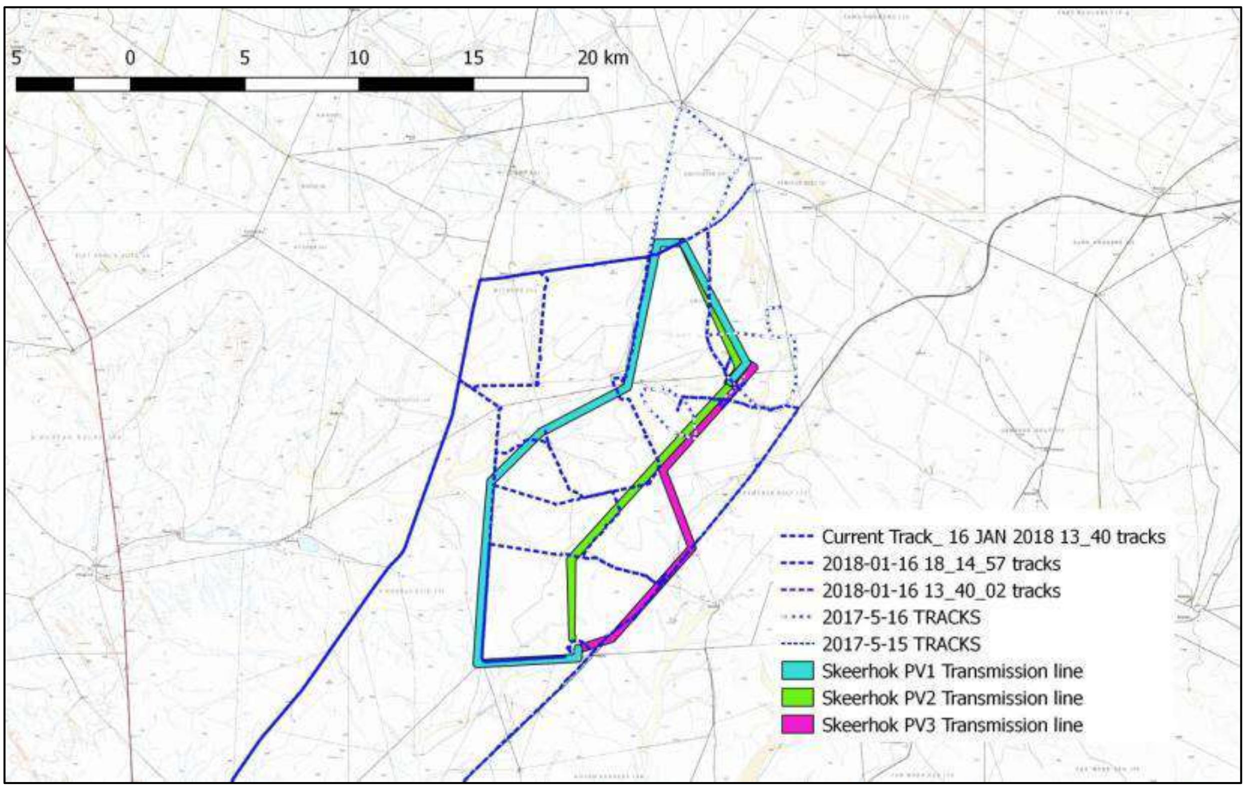

Figure 2. The proposed transmission line site layout & specialist field work GPS tracks.

The pre-construction bird monitoring on site for the PV facilities was conducted as follows:

» As per BirdLife guidelines (Regime 2) pre-construction bird monitoring to consist of 3 x 4 day site visits spread over approximately 6 months (July, November and late January). These site visits cover the winter, spring/early summer and mid-summer seasons. The mid-summer site visit took place after rainfall on site, and this is reflected in the bird species diversity and abundance increasing on site.

- Each site visit consisted of:
  - 12 Walked transects (each done once per site visit) to sample small passerine species. Small terrestrial birds are an important component of this programme. Given the large spatial scale of PV facilities, these smaller species may be particularly vulnerable to displacement and habitat level effects. Several regionally Red Listed or endemic small passerine species exist in the Bushmanland area. Sampling these smaller species is aimed at establishing indices of abundance for small terrestrial birds in the study area. These counts should be done when conditions are optimal. In this case this means the times when birds are most active and vocal, i.e. early mornings. Twelve walked transects (WT) of approximately 1 kilometre length each were established on the site and counted each season. Counting is done by walking slowly along the transect centre line and recording all birds seen or heard within 200m either side of the centre line. For more details see Jenkins *et al* (2017).
  - 3 Driven transects (each done twice per site visit) to sample large terrestrials and raptors. This is a very similar data collection technique to that above, the aim being to establish indices of abundance for large terrestrial species and raptors. These species are relatively easily detected from a vehicle, hence vehicle based (VT) transects are conducted in order to determine the number of birds of relevant species in the study area. Detection of these large species is less dependent on their activity levels and calls, so these counts can be done later in the day. Three VT's were established on suitable roads on and near the site, ranging between 5.1 and 9.5km in length and totalling 20.1km. These transects are each counted twice on each site visit. Counting is done by driving slowly along the road (<40km/hr) and scanning to detect any large birds within 2km either side of the transect. The vehicle is also stopped periodically and observer scans with binoculars from a standing position. For more detail on exact methods of conducting Vehicle transects see Jenkins *et al* (2017).
  - The broader area within which the site is located was surveyed for any large sensitive species breeding sites on each site visit. During the first specialist site visit a Martial Eagle 'territory' was suspected, so pre-construction monitoring was used to investigate this further.
  - All incidental (i.e. not the product of any formal data collection method) observations of priority bird species were recorded.
  - Surveys were conducted of any existing power lines on site for nests, collision & electrocution fatalities. These were done by driving and walking on the servitude and scanning up to 50m either side of the centre line, and on pole/pylon tops.

The layout of the pre-construction bird monitoring activities on site is shown in Figure 4.

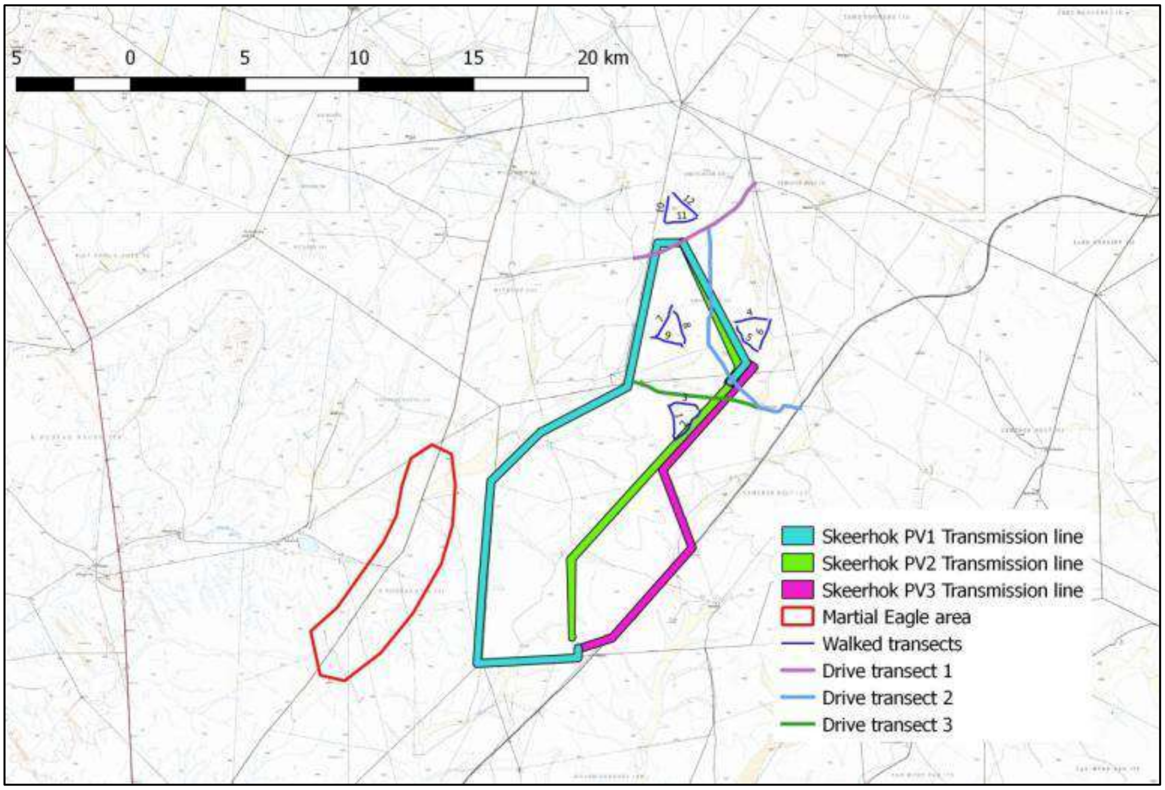

Figure 3. The layout of bird monitoring on the Skeerhok PV facilities and power line corridors.

1.7. Limitations & assumptions

For the purposes of this study we need to assume that conditions on site during our surveys were representative of general conditions on site, and those conditions likely to exist during the construction and operational phase of the proposed project. Given that our surveys have spanned a period of approximately 9 months (6 months minimum being required by best practice – Jenkins *et al,* 2017) and the operational lifespan of the proposed facility is likely to be at least 20 years, accurate representation is a challenge. We have chosen to examine rainfall data to shed more light on this aspect, since we believe rainfall to be the major driver of ecological and avifaunal conditions on site. We obtained annual rainfall data from the South African Weather Service for the Kenhardt area. This is displayed in Figure 5. The mean annual rainfall recorded from 1960 to 2017 (inclusive) was 147.8mm per annum. In 2017 (the year of our survey efforts) a total of 165.0mm was recorded. Rainfall in our survey year was therefore higher than average. This gives us some confidence in our findings being representative of conditions on site. If the survey year had been particularly dry this could have been cause to question the data collected on site.

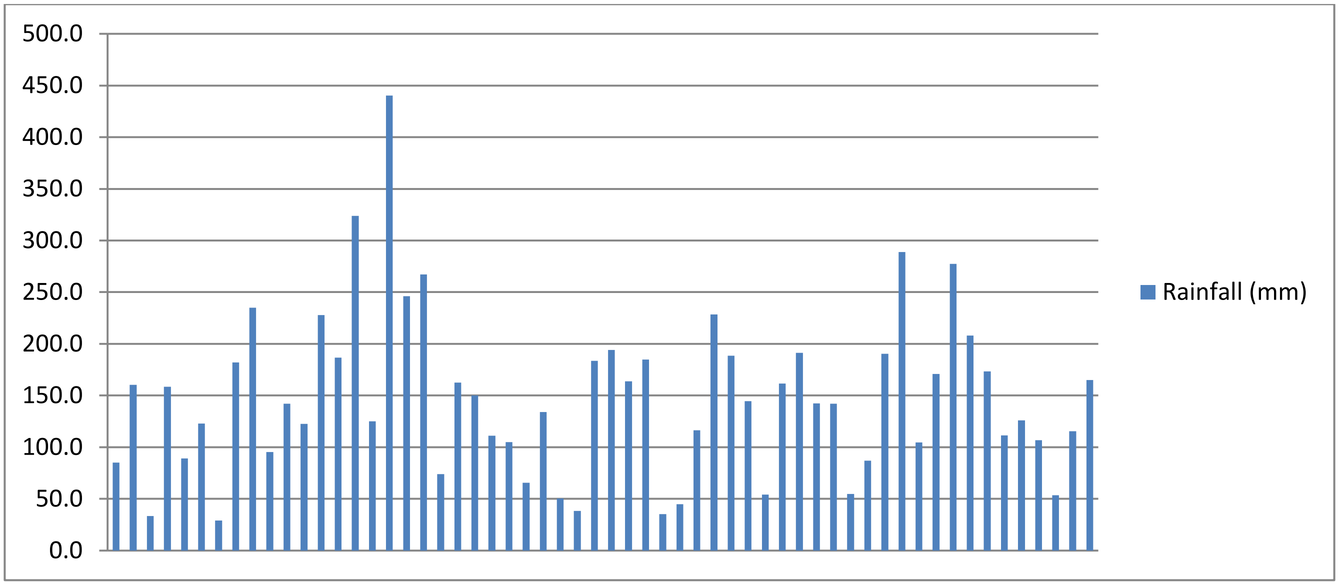

Figure 4. Annual rainfall at Kenhardt from 1960 to 2017 (South African Weather Service).

Certain days we spent on site were extremely high temperature and strong winds, which makes it more difficult to detect small birds since their calls cannot be heard and they typically shelter in the available shade. This may mean that bird abundance recorded on these days is slightly lower than it should be.

2. DESCRIPTION OF BASELINE CONDITIONS

2.1 Vegetation description

According to Mucina and Rutherford (2006), the vegetation on site is mostly “Bushmanland Arid Grassland” (see Figure 6). This is a short, sparse vegetation type, well suited to small passerine and large terrestrial bird species. Within this vegetation type, four micro habitats exist for birds: grassy and shrubby plains, drainage lines, dams and rocky outcrops. In addition the areas immediately surrounding livestock watering points are an important and distinct micro habitat, typically with an increased abundance and diversity of avifauna in response to the availability of water and different vegetation. These micro habitats are pictured in Appendix 4.

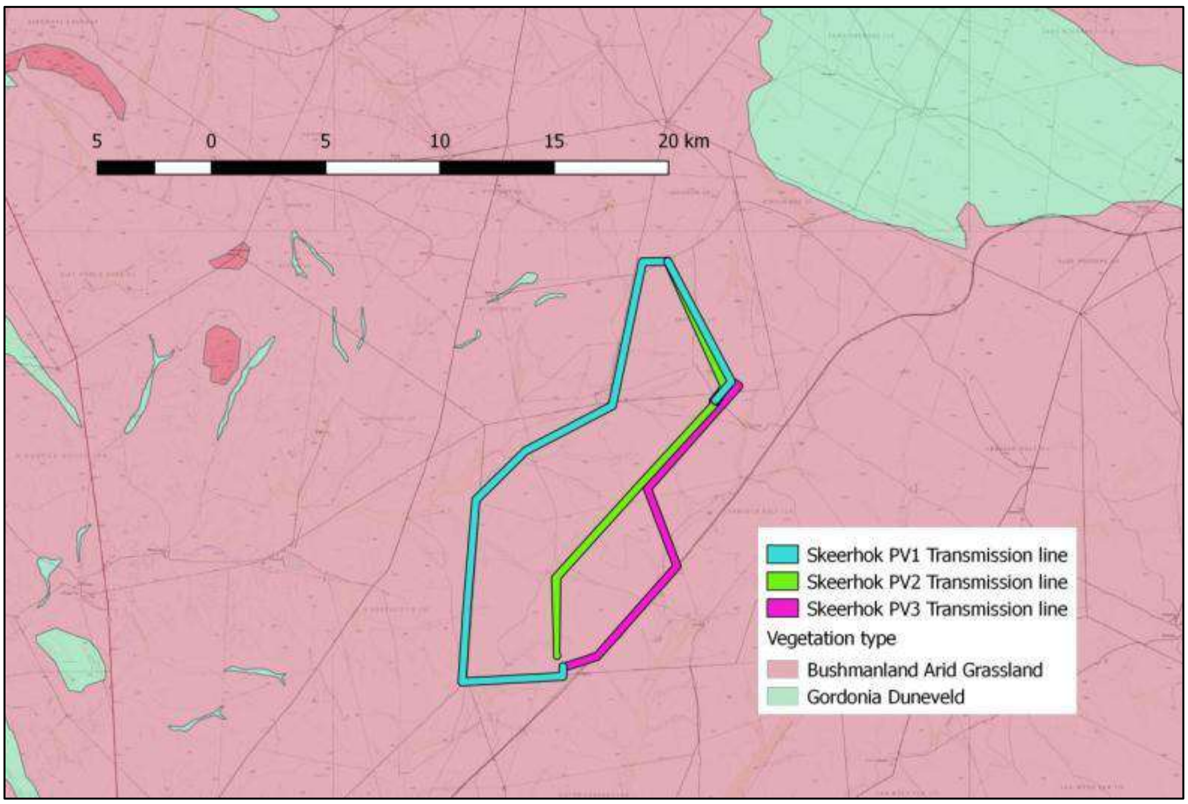

Figure 5. Vegetation classification at the proposed grid connection power line site (Mucina & Rutherford 2005).

2.2. Existing anthropogenic features

Although the proposed site is relatively remote, there are several significant existing infrastructures in the area. The site lies between two more or less parallel district gravel roads: the Kenhardt Louisvale road; and the Transnet road. To the immediate east of the Transnet gravel road site lies the Sishen Saldanha railway line, with associated maintenance buildings and communication towers. On the site itself, two new 400kV transmission power lines are currently in the final stages of construction. Several lower voltage distribution power lines exist in the landscape. As a result of these various activities, disturbance levels are relatively high on site for such a remote area, and the landscape is already relatively impacted on, particularly by overhead power lines.

2.3 Avifaunal community on site

2.3.1. Southern African Bird Atlas Project data

The first and second Southern African Bird Atlas Projects (Harrison *et al*, 1997; & www.sabap2.adu.org.za) recorded a combined total of approximately 199 bird species in the broader area (30-40km radius) within which the site falls (see Appendix 3). These are the species which could occur on the proposed site if suitable habitat and conditions occur on site. They have not however all been confirmed on the site itself. Our own specialist site visits and pre-construction bird monitoring data confirms this for each species (see Section 2.3.4 & Appendix 3).

Fourteen of the 199 species which could occur on site are considered regionally Red List species (Taylor *et al*, 2015): **Ludwig's Bustard *Neotis ludwigii*** and **Martial Eagle *Polemaetus bellicosus*** are 'Endangered'; Burchell's Courser *Cursorius rufus*, Verreaux's Eagle *Aquila verreauxii*, Lanner Falcon *Falco biarmicus*, **Red Lark *Calendulauda burra*,** Secretarybird *Sagittarius serpentarius*, and Black Stork *Ciconia nigra* are 'Vulnerable'; and **Kori Bustard *Ardeotis kori*, Karoo Korhaan *Eupodotis vigorsi*i**, Sclater's Lark *Spizocorys sclateri,* Greater Flamingo *Phoenicopterus ruber*, Abdim's Stork *Ciconia abdimii* and African Rock Pipit *Anthus crenatus* are 'Near-threatened. Those species recorded on or near to the site by our surveys are shown in bold above and again in Appendix 3.

Most of the above species either have large territories (e.g. Martial Eagle- approximately 113km² breeding territory – van Eeden *et al*, 2017) or are nomadic, ranging widely across the landscape, normally in response to rainfall and food availability (e.g. Ludwig's Bustard, Sclater's Lark). Red Lark is a possible exception to this, having a slightly more sedentary ecology as far as we understand at present (although local movement in relation to conditions cannot be ruled out).

This means that most of these species can be expected to utilise the proposed site occasionally but not necessarily be resident on it. This is discussed more in Section 2.4.

2.3.2. Important Bird & Biodiversity Area data

No IBBA'S exist close to the proposed site (Marnewick *et al*, 2015).

2.3.3. Specialist site visit data

We conducted a one day site visit to the area in May 2017 and a two day visit in January 2018. Amongst other species (see Appendix 5 for the full dataset), during these site visits we recorded two regionally Red Listed species on site: Karoo Korhaan (recorded multiple times, mostly in pairs); and Ludwig's Bustard (several birds seen flying in the south of the site). We also recorded two separate adult Martial Eagles *Polemaetus bellicosus* several times approximately 2.5km west of the Skeerhok Alternative 1 corridor. The repeated sightings do indicate that this may be a breeding territory, presumably with a nest somewhere in the area to the west.

2.3.4. Pre-construction bird monitoring data

In accordance with the BirdLife SA Best Practice Guidelines (Jenkins *et al*, 2017), pre-construction bird monitoring was conducted over 3 site visits in a 6 month period (July 2017 to late January 2018). Each site visit consisted of 4 days on site, conducting walked transects (to sample small passerines); driven transects (to sample large terrestrials and raptors); incidental observations of all priority species; power line surveys and breeding site surveys.

Small passerine bird data

Table 2 presents the small passerine bird data collected by walked transects on site across the 3 seasons. A total of 29 bird species were recorded by this method across the 3 seasons, with a peak in species richness in winter (21 species), followed by late summer (18) and early summer (12). None of the 29 species are regionally Red Listed. However there is a very high level of endemism amongst these species, with 6 southern African endemics and 14 Near-endemics. The most abundant species was Lark-like Bunting *Emeriza impetuani* (a near-endemic), followed by Common Swift *Apus apus* and Sociable Weaver *Philetairus socius* (an endemic). Other important species recorded on site include: Stark's Lark *Spizocorys starki* (a near-endemic which was abundant on site in all 3 seasons); Black-eared Sparrowlark *Eremopterix australis* (an endemic recorded in winter and late summer); and Grey-backed Sparrowlark *Eremopterix verticalis* (a near-endemic recorded in winter and late summer).

Red Lark *Certhilauda burra,* Sclater's Lark *Spizocorys sclateri*, and Burchell's Courser *Cursorius rufus* (all regionally Red Listed and in the case of the larks endemics) were not recorded on site by this method. Red Lark was recorded once on site (1 individual) by drive transects. Sclater's Lark and Burchell's Courser were not recorded on site by any methods.

Table 2. Summary small passerine bird species data collected by walked transects across 3 seasons.

			Total			Winter			Early summer			Mid-summer		
	Transect length		48.12			16.04			16.04			16.04		
	# species		29			21			12			18		
Common name	Scientific name	Regional Red List or Endemic	birds	rec	birds/km	birds	rec	birds /km	birds	rec	birds/km	birds	rec	birds/km
Lark-like Bunting	*Emberiza impetuani*	NE	544	38	11.31	502	22	31.30	1	1	0.06	41	15	2.56
Common Swift	*Apus apus*		244	4	5.07							244	4	15.21
Sociable Weaver	*Philetairus socius*	E	242	5	5.03	153	3	9.54				89	2	5.55
Stark's Lark	*Spizocorys starki*	NE	220	55	4.57	34	10	2.12	113	34	7.04	73	11	4.55
Spike-Heeled Lark	*Chersomanes albofasciata*	NE	135	46	2.81	80	25	4.99	23	8	1.43	32	13	2.00
Black-eared Sparrow-Lark	*Eremopterix australis*	E	133	5	2.76	67	2	4.18				66	3	4.11
Rufous-eared Warbler	*Malcorus pectoralis*		48	37	1.00	21	15	1.31	13	9	0.81	14	13	0.87
Namaqua Sandgrouse	*Pterocles namaqua*	NE	33	5	0.69	24	3	1.50				9	2	0.56
Grey-backed Sparrow-Lark	*Eremopterix verticalis*	NE	30	4	0.62	19	1	1.18				11	3	0.69
Cape Sparrow	*Passer melanurus*	NE	26	9	0.54	12	4	0.75				14	5	0.87
Scaly-Feathered Finch	*Sporopipes squamifrons*	NE	20	2	0.42	20	2	1.25						
Chat Flycatcher	*Bradornis infuscatus*	NE	18	16	0.37				11	9	0.69	7	7	0.44
Sabota Lark	*Calendulauda sabota*	NE	18	17	0.37	3	2	0.19	1	1	0.06	14	14	0.87
Yellow Canary	*Crithagra flaviventris*	NE	15	6	0.31	11	5	0.69				4	1	0.25
Ant-Eating Chat	*Myrmecocichla formicivora*	E	11	8	0.23	6	4	0.37	3	2	0.19	2	2	0.12
Large-billed Lark	*Galerida magnirostris*	E	10	9	0.21	4	3	0.25	3	3	0.19	3	3	0.19
Red-Capped Lark	*Calandrella cinerea*		7	5	0.15	7	5	0.44						
Namaqua Dove	*Oena capensis*		6	1	0.12				6	1	0.37			
Speckled Pigeon	*Columba guinea*		5	1	0.10	5	1	0.31						
Tractrac Chat	*Cercomela tractrac*	NE	5	4	0.10	5	4	0.31						
Cape Penduline Tit	*Anthoscopus minutus*	NE	4	2	0.08	2	1	0.12	2	1	0.12			
Eastern Clapper-Lark	*Mirafra fasciolata*	NE	3	3	0.06							3	3	0.17
Bokmakierie	*Telophorus zeylonus*	NE	2	2	0.04	2	2	0.12						
Double-banded Courser	*Rhinoptilus africanus*		2	1	0.04				2	1	0.12			
Karoo Long-billed Lark	*Certhilauda subcoronata*	E	2	2	0.04				2	2	0.12			

Capped Wheatear	*Oenanthe pileata*		1	1	0.02							1	1	0.06
Karoo Scrub-Robin	*Erythropygia coryphaeus*	E	1	1	0.02							1	1	0.06
Southern Grey-Headed Sparrow	*Passer diffusus*		1	1	0.02	1	1	0.06						
White-Browed Sparrow-Weaver	*Plocepasser mahali*		1	1	0.02	1	1	0.06						

NE = Near-endemic; E = Endemic. Rec = # records.

Table 3. Summary large terrestrial and raptor species data collected by driven transects across 3 seasons.

			Total			Winter			Early summer			Mid- summer		
		Transect length	120.6			40.2			40.2			40.2		
		# species	6			2			2			5		
Common name	Scientific name	Regional Red List or endemic	birds	rec	birds/ km	birds	rec	birds/ km	birds	rec	birds/ km	birds	rec	birds/ km
Northern Black Korhaan	*Afrotis afraoides*	E	17	13	0.14	2	2	0.05	9	5	0.22	6	6	0.15
Red Lark	*Calendulauda burra*	VU, E	1	1	0.01	1	1	0.02						
Double-banded Courser	*Rhinoptilus africanus*	NT	4	2	0.03				3	1	0.07	1	1	0.02
Kori Bustard	*Ardeotis kori*	NT	1	1	0.01							1	1	0.02
Ludwig's Bustard	*Neotis ludwigii*	EN, NE	2	2	0.02							2	2	0.05
Southern Pale Chanting Goshawk	*Melierax canorus*		1	1	0.01							1	1	0.02

E = Endemic; VU = Vulnerable; NT = Near-threatened; EN = Endangered; NE = Near-endemic. Rec = # records

Table 4. Summary data for incidental observations of priority species.

			Winter		Early summer		Mid-summer	
Common name	Scientific name	Regional Red List or endemic	Birds	Rec	Birds	Rec	Birds	Rec
Ludwig's Bustard	*Neotis ludwigii*	EN, NE	2	2			4	1
Martial Eagle	*Polemaetus bellicosus*	EN	3	2				
Northern Black Korhaan	*Afrotis afraoides*	E	1	1	1	1	3	3
Pale Chanting Goshawk	*Melierax canorus*	NE	1	1	2	1	2	2

Large terrestrial and raptor data

Table 3 presents a summary of the data collected by this method. A total of 6 species were recorded by this method, 2 in winter, 2 in early summer and 5 in mid-summer. One of the 6 species, Red Lark is not typically recorded by this method (drive transects not being well suited to small species), but is included here as it is a priority species for this site and was not recorded by any other method. Four of the 6 species are regionally Red Listed: Red Lark is Vulnerable; Kori Bustard *Ardeotis kori* and Double-banded Courser *Rhinoptilus africanus* are Near-threatened; and Ludwig's Bustard *Neotis ludwigii* is Endangered. These 3 species are also endemic or near-endemic, and one additional species, the Northern Black Korhaan *Afrotis afraoides* is endemic but not Red Listed.

Incidental observations of priority species

Table 4 presents summary incidental observation data. Four priority species were recorded by this method: Ludwig's Bustard (Endangered, Near-endemic); Martial Eagle (Endangered); Northern Black Korhaan (Endemic); and Pale Chanting Goshawk (Near-endemic).

Existing power line surveys

The existing distribution power lines were surveyed as far as possible whilst on site. Several Sociable Weaver nests were found. On top of one such nest we suspected a Pale Chanting Goshawk could be nesting, but this was later determined not to be the case. We recorded no bird collision or electrocution fatalities under the existing lines during this period. It is noted that two new transmission power lines were under construction during this monitoring period but were not surveyed as access was prohibited due the nature of the construction activities.

Breeding site surveys

During the winter survey the suspected Martial Eagle breeding territory (See Figure 7) was visited 4 times. On one occasion a single adult was recorded perched and on a second visit the two adults were recorded, one carrying prey (meerkat). The area was visited 6 times during early summer with no records of Martial Eagles. The mid-summer survey recorded on adult once flying in the area out of 4 visits to the area. A farm worker informed our team that the eagles are seen more frequently further to the west. Although this would require further confirmation, this may indicate that this pair of eagles resides more to the west, which would mean their nest is a considerable distance from the proposed power line corridors (at least 5km) and not at risk if the development goes ahead. This is however a significant factor to consider in comparing the 3 power line corridors. The further the new power line is from the Martial Eagle area the better in our view. This is described in more detail in Section 4.

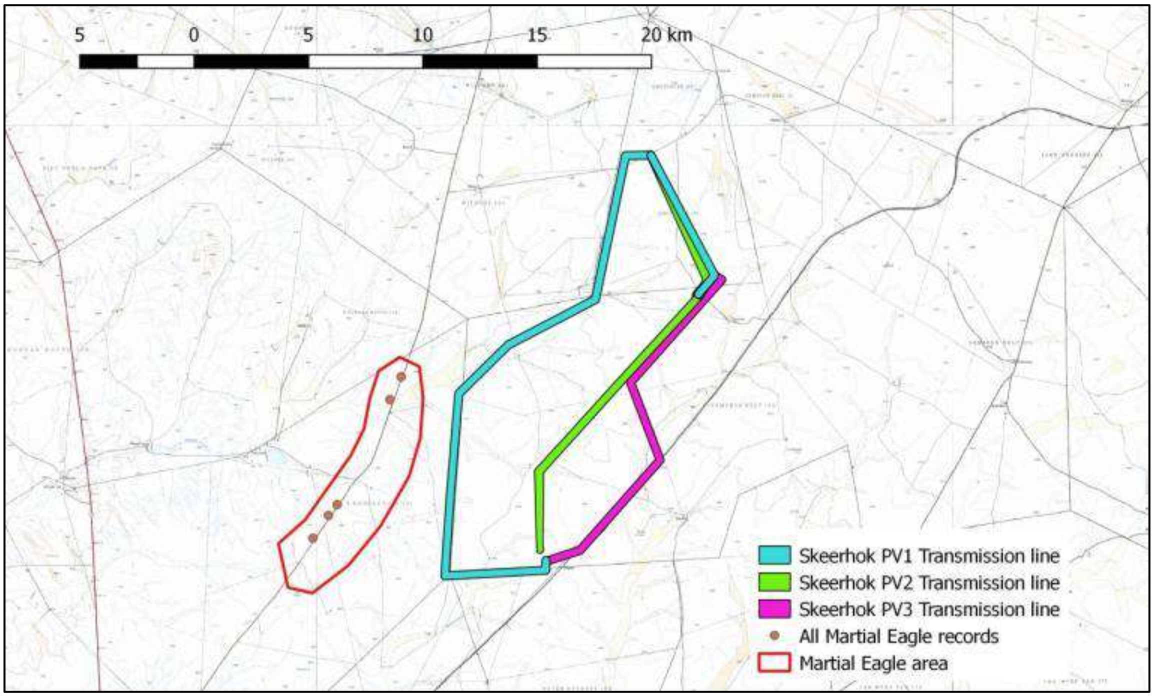

Figure 6. The suspected Martial Eagle territory relative to the proposed power line corridors.

Overall species list

Our work on site compiled a comprehensive list of bird species recorded by all methods and incidentally. A total of 57 species were recorded on site: 43 in winter; 29 in early summer; and 41 in mid-summer (Appendix 2). Thirty of these species are endemic or near-endemic to southern Africa. Two regionally Endangered (Martial Eagle and Ludwig's Bustard) and two Vulnerable (Kori Bustard and Red Lark) were recorded.

Location of priority species records

Figure 8 presents the location of all priority species records (collected by incidental observations, driven transects, and focal site surveys). Importantly, the time spent by observers is not equal in all parts of the site, so aggregation of records should not be interpreted to imply greater sensitivity. All these records are considered relevant since these birds move around, and a bird recorded several kilometres off the site itself could easily be found on site the following day (for example). It is important to stress that Martial Eagle was only recorded in an area approximately 2.5km west of the Skeerhok Alternative 1 corridor. This is not far for a bird like this to travel, but the clumping of records in the area shown in Figure 8 and total absence of records on or closer to site does indicate a preference for that area by the birds.

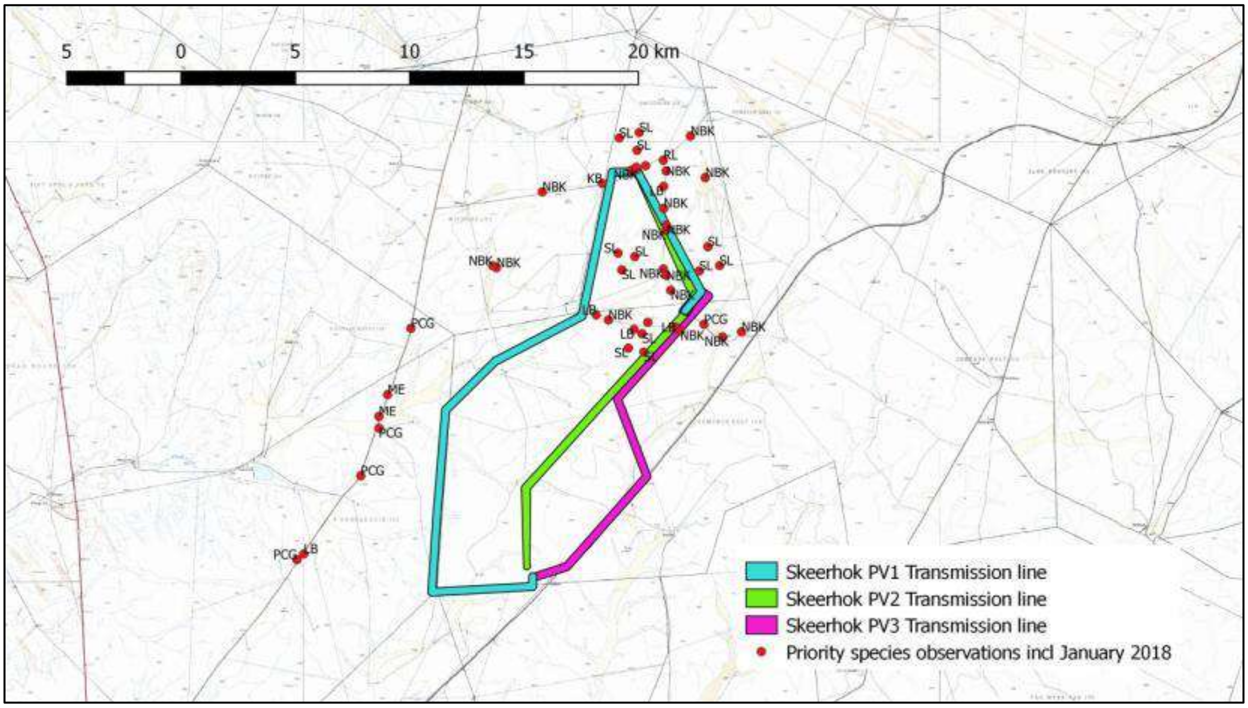

Figure 7. Location of all priority species records across all monitoring methods. LB – Ludwig's Bustard; PCG - Pale Chanting Goshawk; ME – Martial Eagle; NBK – Northern Black Korhaan; KB – Kori Bustard; SL – Stark's Lark.

2.4 Priority bird species for this site

The following is a summary of the relevance of the proposed site for the priority bird species:

2.4.1. Large terrestrial species

These physically large species are likely to be affected to some extent by disturbance and habitat destruction. They are also vulnerable to collision with overhead power lines.

Ludwig's Bustard

Ludwig's Bustard is a wide-ranging bird endemic to the south-western region of Africa (Hockey *et al.* 2005). This species was listed as globally Endangered in 2010 because of potentially unsustainable power line collision mortality, exacerbated by the rapidly expanding power grid (Jenkins *et al.* 2011, BirdLife International 2013). Ludwig's Bustards are both partially nomadic and migratory (Allan 1994, Shaw 2013), with a large proportion of the population moving west in the winter months to the Succulent Karoo. In the arid and semi-arid Karoo environment, bustards are also thought to move in response to rainfall, so the presence and abundance of bustards in any one area are not predictable. Therefore, collisions are also largely unpredictable, and vary greatly between seasons and years (Shaw 2013). While there is no evidence yet of population-level declines resulting from collision mortality, detailed range-wide power line surveys estimate that tens of thousands of bustards (from a total South African population of approximately 114,000 birds) die annually on the existing power grid in this country, which is of grave concern given that they are likely to be long-lived and slow to reproduce. It seems likely that there will be a threshold power line load at which population declines will become apparent, but it is not possible to accurately predict what this will be, and such effects will probably only be noticed when it is too late to do anything about it (Shaw 2013).

Therefore, extreme caution is necessary in the planning of any new infrastructure and in particular power lines in the range of this species.

In our view, Ludwig's Bustard could be an occasional visitor to the site, sometimes in groups if conditions are favourable. The impacts of habitat destruction and disturbance caused by the proposed power line on this species will be of low significance (since the species ranges so widely). The risk of collision of this species with overhead power lines is high and can be mitigated to moderate.

Kori Bustard

Kori Bustards are classified as regionally Near-threatened (Taylor *et al* 2015), with an estimated population of 2,000 – 5,000 birds in South Africa (Hockey *et al.* 2005). There are also worries for the population consequences of power line mortality for this species, given that some 14% of the population is estimated to die annually on Karoo transmission lines alone (Shaw 2013). Kori Bustards in the arid areas are thought to be locally nomadic (Hockey *et al.* 2005) and thus likely suffer greater collision rates than more sedentary populations in other areas (e.g. the Kalahari; Senyatso 2011).

Kori Bustard could visit the site occasionally, singly or in pairs. The impacts of habitat destruction and disturbance caused by the facility on this species will be of low significance. The risk of collision of this species with overhead power lines is high and can be mitigated to low.

Secretarybird

This species is classified as regionally Vulnerable (Taylor *et al* 2015), and has recently been up-listed to globally Vulnerable on the basis of population declines (BirdLife International 2013). While there is no current population estimate in South Africa, there has been a reduction of sightings in the areas it previously occupied (SABAP 2 c.f. SABAP 1 data). This is probably mainly due to habitat loss, but power line collisions may also be a significant factor. The physical attributes of Secretarybirds mean that they are highly vulnerable to collision, and data from Karoo transmission lines (Shaw 2013) and the Central Incident Register (Eskom-EWT 2012) indicate that these birds do indeed collide across their range. However, as the population is sparsely distributed it is probably underrepresented in available collision data, and further research would be necessary to better understand potential population impacts of this source of unnatural mortality.

Secretarybird could utilise the site and may breed in the wider area, although we did not find any nests. We were informed by the landowner that Secretarybirds are no longer present in this area. We however believe that the species could visit the site occasionally. At this stage we believe the main risk to this species will be collision with overhead power lines, probably of high significance.

Black Stork

Black Stork is classified as Vulnerable and has experienced a population decline (Taylor *et al,* 2015). This species will be mostly confined to larger river valleys and gorges, and we do not expect it to be a regular visitor to the current study area.

We do not anticipate this species to utilise the site, and risk to the species will consequently be low.

Karoo Korhaan

Karoo Korhaan has recently been upgraded to Near-threatened (Taylor *et al* 2015). As a sedentary species, they seem to be less susceptible to collision than the larger, more mobile bustards, but they are still frequently recorded as collision victims in the Karoo, which is their stronghold (Shaw 2013). There is some evidence that Karoo Korhaans are not as abundant as previously thought (Shaw 2013), so additional mortality caused by the proposed grid connection power line is of concern.

In our opinion this species is likely to utilise the site frequently (several pairs of birds). Destruction of habitat will be of low significance. This species will also be susceptible to collision with overhead power lines. We judge this risk to be of moderate significance.

2.4.2. Raptors

Martial Eagle

The Martial Eagle is classified as globally Near-threatened, and regionally Endangered (Taylor *et al* 2015, BirdLife International 2013). This species is well known to have adapted to using Eskom transmission line towers for perching, roosting and nesting. We recorded the species in the broader area 5 times, but not on the site itself. We were unable to locate any breeding site for the species, although it seems likely to be further west of where we recorded it.

In our view, the impact of habitat destruction on this species will be of low significance, on account of its large range relative to the size of the proposed development, the fact that it was not recorded on site, and that habitat of this type is not limited in this area. Collision and electrocution on the overhead power lines are risks to the adult birds, and more so the juveniles produced by breeding.

Verreaux's Eagle

Verreaux's Eagle is classified as regionally Vulnerable. It occurs in the broader area. This is a species that typically uses mountainous areas or at least rocky areas on account of its need for cliffs to breed on, and the habitat of its' primary prey species Rock Hyrax. This species has also learnt to nest on Eskom pylons (which opens up new areas of the country for use by the species, away from mountains), so this cannot be ruled out in this area in the future, although we did not find any such nest. We anticipate that this species could occasionally forage over the site.

Based on current information we do not believe this species is at risk on the proposed site.

Lanner Falcon

The Lanner Falcon is classed as Vulnerable and the species does seem to be in decline (Taylor *et al,* 2015). This species is susceptible to collision with overhead cables such as power lines, and also has a tendency to nest on power line structures, which could bring it into close proximity of the proposed power line.

We did not record this species on site but believe that it probably does occur in the area, and could breed on the new Eskom transmission power lines once construction is complete or on the proposed grid connect 132kV line. This species will be at low risk from the proposed development.

2.4.3. Small terrestrial species

Burchell's Courser

Burchell's Courser is classified as Vulnerable by Taylor *et al* (2015). It is a nomadic species with an estimated regional population of <10 000 birds. It has undergone a significant reduction in population size in recent decades. This species will most likely be found on the open plains in the study area, often in the most sparse vegetation. Habitat loss is a key threat for this species, although its nomadic nature means that it would most likely move to better habitat elsewhere if disturbed or displaced from a particular site.

We did not record this species on site, but conclude that it could use the site at times. This species will be susceptible to habitat loss as a result of construction of the power line/substation. If the species breeds on site then it would be at risk of disturbance.

Red Lark

Bushmanland is renowned for its high diversity and abundance of larks, many of which are endemic to southern Africa (Hockey *et al.* 2005). Up to 14 lark species can be seen in this area. Red Lark is listed as Vulnerable (Taylor *et al*, 2015), and has been recorded in the broader area by the SABAP project. It is a habitat specialist, utilising the red sand dunes and adjacent plains.

We recorded a single Red Lark on site during the pre-construction bird monitoring. We are also aware that the species has been recorded elsewhere in the wider area (Pachnoda Consulting cc, 2015). It is possible that a small population of this species are resident in the area. The risk to this species will in our view be of low significance.

Sclater's Lark

Sclater's Lark is an endemic species classified as Near-threatened by Taylor *et al* (2015). It is mostly found on stony arid plains, often associated with quartz gravel. This is a nomadic species, which moves around in response to rainfall and food availability. It has been recorded in this area by the SABAP project previously. We did not record it on site, but expect that it could utilise the site at times when conditions are right.

We conclude that this species could occur on site at times. Destruction of habitat and disturbance will be of low significance for this species.

Stark's Lark

Stark's Lark is a near-endemic species, not Red Listed. It is nomadic, moving in response to rainfall. Its preferred habitat is arid and semi-arid open plans particularly on calcrete. We recorded large numbers of the species on site through all 3 seasons. Due to this species' endemic status and the fact that it is not well represented in protected areas, this is a priority species for this site.

We conclude that this species will be affected by habitat destruction at a low significance level if the preferred alternative power line and substation is built.

3. EVALUATION OF IMPACTS

The various potential impacts that could occur as a result of the proposed facility have been identified and discussed below and rated formally in Table 5 according to criteria supplied by the CSIR (Appendix 1).

3.1. Habitat destruction associated with the construction of the power line

During the construction and maintenance phases of this proposed power line and the on-site substation, a certain amount of habitat destruction and alteration will take place. Based on our experience at other similar power lines in similar habitat we believe that each pylon/tower will result in a small amount of vegetation clearing for the base/foundation, and that the servitude road will be not be scraped clear but simply driven gradually by vehicles until a 'jeep track' exists. In addition, existing roads will be used as far as possible. The on-site substation will take up an area of approximately 1 hectare. The effect on the ground surface will be fairly small. We have judged the significance of this impact to be LOW.

Mitigation

Since this impact is already rated as LOW significance, we recommend only the following general good practice mitigation measures:

- Crossing of rocky outcrops, water courses, drainage lines, streams and wetlands by vehicles and machinery should be avoided.
- Existing roads should be used as far as possible for access to the servitude, even where these are less convenient and direct than creating new roads.
- All staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted. No extra wide turning of vehicles off the existing servitude roads should be permitted.

3.2. Disturbance of birds & displacement effects

Disturbance of avifauna during the construction (and thereafter during maintenance and operational and decommissioning) of the power line could occur. Disturbance of breeding birds is typically of greatest concern. In this regard any breeding sites of sensitive bird species would be the most important. For this aspect a much larger area than the site itself is considered since disturbance effects could be relevant for several kilometres.

We have not identified any such breeding sites at this stage. We conclude the significance of this impact to be LOW at present. This could however change between now and construction of the power line as priority birds may move into the area and nest. In such a treeless landscape, the recent construction of the two new 400kV transmission lines in particular presents a sudden increase in nesting substrate for tree nesting bird species close to the proposed corridor for this grid connection power line.

Mitigation

- A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed.

3.3. Bird collisions with power line

This is the most significant risk to avifauna of the new proposed power line. Species most at risk include Ludwig's and Kori Bustard, the korhaans and Secetarybird. We judge the significance of this impact to be HIGH. This can be mitigated to LOW significance as described below.

Mitigation

- The most important mitigation measure is to select the optimal route for the new power line. This has been discussed more in Section 4. We recommend that either Transmission line 2 or 3 be selected. We advise against the use of Transmission line 1, although it is not fatally flawed.
- The power line should be fitted with the best available (at the time of construction) anti bird collision line marking devices in order to make the overhead cables more visible to birds. More specifically:
    - Devices should be fitted on the entire length of the power line as collision risk is high all along the alignment for nomadic species such as Ludwig's Bustard.
    - Devices should be fitted on the earth wire/s.
    - On each span, the full span should be fitted with marking devices (i.e. not only the middle 60% as done previously by Eskom). Research has shown that collisions occur even close to pylons (Shaw, 2013).
    - Light and dark colour devices should be alternated so as to provide contrast against both dark and light backgrounds.
    - These devices should be fitted as soon as the earth wires are strung as collision risk begins immediately, not only once the line is commissioned and live.
    - The power line owner will be responsible for ensuring that the marking devices remain in place and effective on the power line for its' full lifespan. Any device failures must be rectified immediately by replacement with new devices.

- The power line should be monitored through patrolling its full length at least 4 times per year to measure the impacts on birds and the durability of line marking devices.

3.4. Electrocution of birds on power line & in on-site substation

The impact of bird electrocution on the power line will be particularly relevant to large eagles, such as Martial Eagle, which we know to be present in the broader area. The significance of this impact is HIGH pre-mitigation but this can be easily mitigated to LOW significance as described below. Within the on-site substation bird electrocution is also possible. However it is typically the common species which frequent substation yards and there are many places on the hardware which pose an electrocution risk. We prefer to manage this on a case specific basis if and when problems arise once the facility is operational.

Mitigation

- The proposed tower/pylon structure has not been decided in detail. It will however be either concrete or steel monopole. It is critically important that sufficient clearance be allowed between phase-phase and phase-earth hardware on the structure. For large eagles these clearances should be a minimum of 1.8m.
- In addition the standard Eskom Bird Perch must be installed on every pylon top to provide safe perching substrate for large birds well above the dangerous hardware.

3.5. Nesting of birds on power lines

Certain species, in particular Sociable Weaver, crows, and possibly medium sized raptors such as Greater Kestrel *Falco rupicoloides* and Lanner Falcon are likely to use some of the power line/substation infrastructure for nesting. At face value this is a positive impact for birds and has been rated as LOW significance. However, nesting typically brings birds into conflict with infrastructure management as they may make maintenance difficult for staff, and also poses a fire risk since nests present abundant fuel for fires. This will require management on site, preferably through the operational Environmental Management Plan (EMP). As with electrocutions in substation yards, the exact location of this impact is very difficult to predict at this stage and should be managed as and when it occurs, in consultation with a bird specialist and in compliance with all relevant legislation.

Mitigation

- For the impact of the birds nesting on the power line/substation, we recommend nest management on a case by case basis under the supervision of an avifaunal specialist, and in conformance with all relevant national and provincial legislation.

- We recommend that the operational phase EMP include provision for application to the provincial authority for permits for any necessary nest management should the need arise during the operational phase.

Table 5. Impact assessment ratings.

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment	Mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation	With mitigation		
CONSTRUCTION PHASE													
Clearing of vegetation	**Habitat loss/alteration**	Negative	Site	Permanent	Slight	Definite	Low	Moderate	See Section 3.1	Low	Low	3	High
General construction activities	**Disturbance**	Negative	Local	Short term	Slight	Probable	High	Moderate	See Section 3.2	Low	Low	4	Medium
OPERATIONAL PHASE													
Operation of facility	**Bird collision with power line**	Negative	National	Long term	Severe	Probable	Non reversible	High	See Section 3.3	High	Low	1	High
	Bird electrocution on power line	Negative	National	Long term	Severe	Probable	Non reversible	High	See Section 3.4	High	Very low	2	High
	Bird nesting on power line	Negative	National	Long term	Slight	Probable	High	Low	See Section 3.5	Low	Low	5	Low
DECOMMISSIONING PHASE													
Decommissioning activities	**Disturbance**	Negative	Local	Short term	Slight	Probable	High	Moderate	See Section 3.2	Low	Low	6	Medium

3.7 Cumulative effects of development on avifauna in this area

Figure 8, Table 6 and Appendix 3 present the known relevant projects within a 30km radius of the proposed power line (information supplied by CSIR). There are 15 solar PV projects in this radius and at least 5 power lines, including the 2 x 400kV lines already under construction.

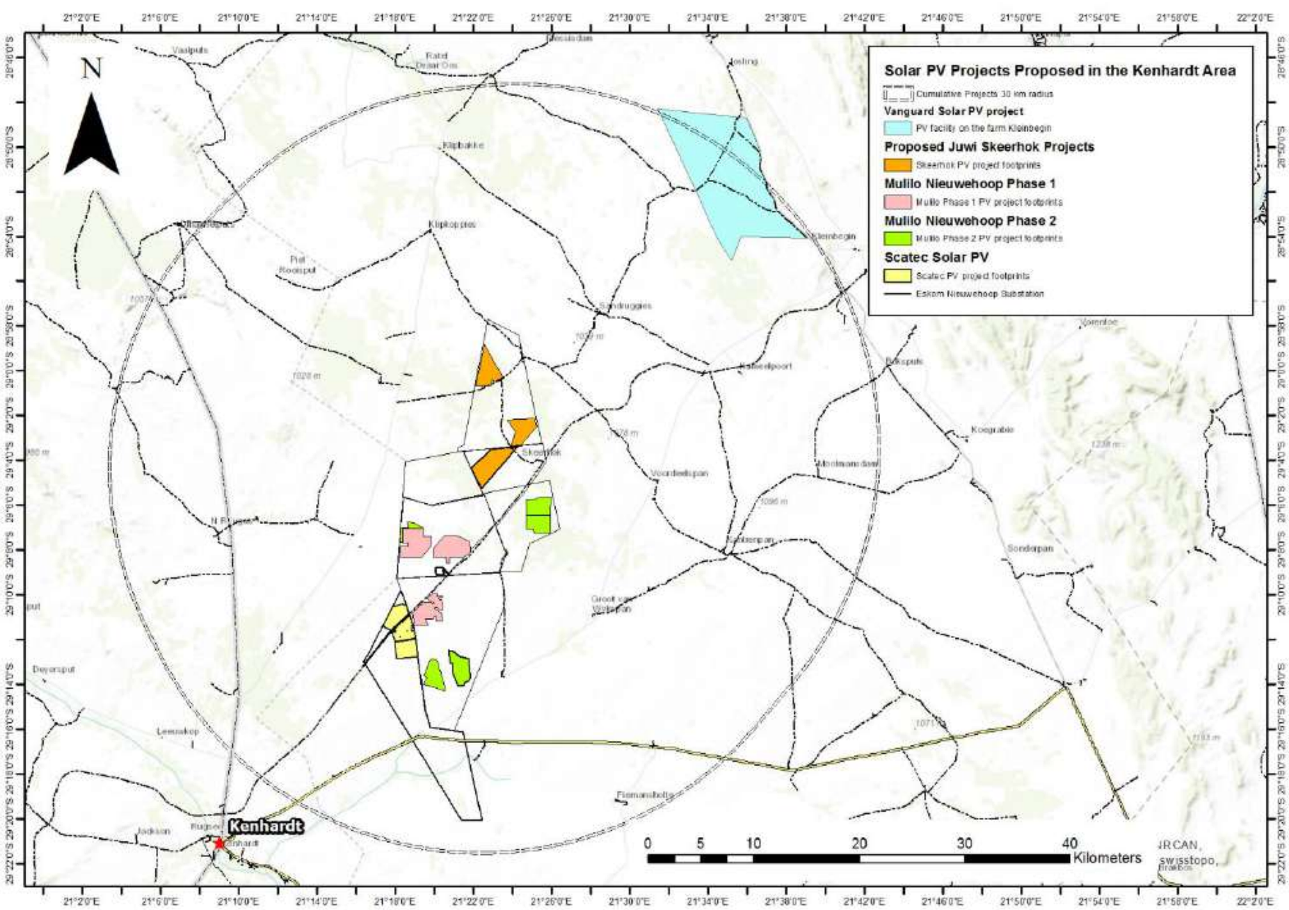

Figure 8. Projects identified by the CSIR within a 30km radius of the proposed power line.

The cumulative impacts have been assessed below, according to the guidance offered by the DEA (DEAT (2004) Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7, Department of Environmental Affairs and Tourism (DEAT), Pretoria) and IFC guidelines (Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets"(International Finance Corporation) on this matter.

Specifically, the steps undertaken in the cumulative impact assessment section of the study were as follows:

- Define and assess the impacts of the Skeerhok Grid Connection project. *See Section 3.1 to 3.7*

- Identify and obtain details for all operational and authorised overhead power lines and solar energy facilities (within 20km radius of Skeerhok Grid connection activities). *See Figure 8, Table 6 & Appendix 3.*
- Identify impacts of the proposed Skeerhok Grid connection project which are also likely or already exist at the other projects. *All of the impacts described in Section 3.1 to 3.7 will occur on the other power line projects. The most important one of these impacts is that of bird collision with the overhead cables. We have therefore used bird collision as the focus impact for the cumulative impact assessment. Bird collision is likely to be most significant for a suite of large terrestrial nomadic species such as Ludwig's and Kori Bustard, korhaans, and Secretarybird.*
- Where possible obtain reports and data for other projects. *This has been done as far as possible. In most cases specialist avifaunal studies were not done. Ecological reports considered avifauna but not comprehensively.*
- As far as possible quantify the effect of all projects on key bird species local populations (defined and estimated). *We have assumed that for each cluster of PV facilities (With the same name) a 15km grid connection will be required, and that the Nieuwehoop-Solar Integration Substation 1 and 2 400kV lines will each be 30km length through the relevant 20km radius circle (Figure 8). See Table 6 for these figures.*
- Express the likely impacts associated with the Skeerhok Grid connection project as a proportion of the overall impacts on key species. *This analysis is presented in Table 6. The Skeerhok Grid connection will represent 14% of the total bird collision risk across all proposed power lines. Note that this estimate is extremely crude because we do not have access to details on all grid connection power line and have been forced to make several assumptions.*
- A reasoned overall opinion will be expressed on the suitability of the proposed development against the above background. This will include a cumulative impact assessment statement. *This has been presented below Table 6.*
- The decision making process with respect to the above will be clearly documented in the report. *This section.*
- Identified cumulative impacts must be clearly defined and where possible the size of the identified impact quantified and indicated. *See above and Table 6.*
- Detailed process flow and proof must be provided to indicate how the specialists' recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. *This section.*
- The cumulative impacts significance rating must also inform the need and desirability of the proposed development. *This has been addressed with the Cumulative Impacts Statement.*
- A cumulative impact environmental statement on whether the proposed development must proceed. *See below Table 6.*

Table 6. Summary information for the proposed power lines within 30km of the Skeerhok project.

Project	Voltage	Approximate power line length (km)	Proportion of total proposed power line
Gemsbok PV1, PV2. PV3, PV5, PV6	132	15	11.6%
Boven PV1, PV3	132	15	11.6%
Kenhardt PV1, PV2, PV3	132	15	11.6%
Skeerhok PV1, PV2, PV3	132	18	14.0%
Nieuwehoop Substation 400kV loop ins	400	6	4.7%
Upington Solar Park-Nieuwehoop 400kV	400	30	23.3%
Ferrum Nieuwehoop 400kV	400	30	23.3%
Total		129	

Cumulative Impact Statement

The proposed Skeerhok Grid connection power line will result in a bird collision risk of HIGH significance pre-mitigation. In addition to the proposed power line an approximate 110km of new power line will be constructed within a 30km radius. In our view this means that the cumulative significance of power line bird collisions will be HIGH. If each project applies mitigation as we have recommended for the current assessment, this significance can be reduced to MODERATE.

4. COMPARISON OF ALTERNATIVES

Three alternative corridors are presented for assessment (see Section 1.3). Skeerhok Alternative 1 is the westernmost route of approximately 30km in length. Skeerhok Alternative 2 is the central route and is approximately 18km long. Skeerhok Alternative 3 is the easternmost route of approximately 19km length. Skeerhok Alternative 2 is the preferred route identified to date based on various technical, financial and environmental factors.

Our findings with regards to the comparison of alternatives are as follows:

- *Length of power line.* In general longer power lines result in more impacts on birds if all other factors are equal. In this study area this is particularly true due to the uniformity of habitat. The shorter routes are therefore preferred from an avifaunal perspective. Whilst there is little difference in length between Alternatives 2 and 3, whilst Alternative 1 is 50% longer than the two of them. On the basis of this factor we recommend against the use of Alternative 1.
- *Sensitive avifaunal features*. The most significant avifaunal feature distinguishing the 3 alternatives is the identification of the Martial Eagle territory described elsewhere in this report. Whilst we did not locate the nest, most records of eagles are to the west of the site. This means that Alternative 1 (2.5km) is significantly closer to that area than 2 (6.8km) and 3 (9.8km). On the basis of this factor we recommend against the use of Alternative 1.
- *Length of line adjacent to existing power lines*. Placing multiple power lines adjacent to each other provides partial mitigation for bird collision since there are more overhead cables to be seen (APLIC 1994, 2012). In addition, placing power lines adjacent to each other also normally reduces the need for new access and maintenance roads with the consequent habitat destruction. The three alternatives all run adjacent to the newly constructed 400kV lines for some portion of their route. Alternative 1 runs approximately 6.6km next to Upington Solar Park -Nieuwehoop 400kV. Alternative 2 runs for approximately 6.2km next to Ferrum-Nieuwehoop 400kV and 5.8km next to Upington Solar Park-Nieuwehoop 400kV. Alternative 3 runs approximately 6.2km next to Ferrum-Nieuwehoop 400kV and approximately 4.4km next to another 400kv line close to Nieuwehoop Substation. On the basis of this factor then our preference is for Alternative 2.

Overall, our preference from an avifaunal perspective is for **Alternative 2** to be selected.

5. AVIFAUNAL CONSTRAINTS OR SENSITIVITY MAPPING

The sensitive features for avifauna on and near the proposed site are as follows:

1. Major drainage lines, water courses, streams, wetlands. These will be used as flight paths by various bird species and also typically contain more woody vegetation thereby providing a different micro habitat and attracting more diverse bird species.

2. Farm dams. These areas provide almost the only source of surface water in this arid environment and so will attract birds. They also typically result in more woody vegetation.

3. Livestock watering points. These areas attract a greater abundance and diversity of species and should be avoided by the new infrastructure.

4. Major rocky outcrops. These areas attract a different assemblage of small bird species and should be avoided as far as possible.

It is not possible nor is it necessary to avoid these above areas with the power line, but we recommend that pylons should not be placed in these areas, and access to these areas by staff, vehicles and machinery should be kept to an absolute minimum.

These areas have been more accurately delineated by the ecologist on the project, so we have not delineated them ourselves. Please refer to the Ecological Specialist study for further information.

6. OPERATIONAL PHASE (POST CONSTRUCTION) BIRD MONITORING FRAMEWORK

We recommend that the grid connection power line be monitored as part of the post construction monitoring of the proposed PV facilities as follows:

- The full power line should be driven or walked at least 4 times per year.
- An area extending out to 50m either side of the power line centre line should be scanned for any bird carcasses. Any such carcasses should be carefully documented and kept frozen on site.
- All pylon/tower tops should be scanned for bird nests. Where nests are found they should be observed to determine which species are breeding. Priority species nests should be photographed and breeding status recorded.
- If any significant findings are made these should be reported on.

7. CONCLUSION

For the purposes of this study we conducted 2 specialist site visits, in May 2017 and January 2018. In addition, 3 seasons of on-site bird monitoring was conducted for the proposed PV facilities and this data is relevant to the power line study area. For the purposes of a power line assessment, we believe the level of data collection on site to be excellent in this case. Overall, our avifaunal studies on the broader site have made the following findings:

- Our surveys on site took place in a slightly above average rainfall year (165.0mm in 2017 c.f. 147.8mm p.a. mean since 1960). This means that our data should be representative of typical conditions on site.
- The proposed Skeerhok site is already relatively impacted by linear infrastructure including roads, railway line, and transmission and distribution power lines.
- There are no Important Bird & Biodiversity Areas close to the proposed site.
- Walked transects on site recorded 29 small passerine bird species in total. Twenty of these species are either endemic or near endemic to southern Africa, which is a very high level of endemism. Whilst the most abundant species on site were all common species, and important endemic, Stark's Lark *Spizocorys starki* was also recorded in relatively high abundance on site. No regionally Red Listed species were recorded on site by this method. These smaller species would typically be affected through habitat destruction and disturbance if a new power line were built.
- Driven transects on site recorded 6 priority species. Two were small passerines, Red Lark *Certhilauda burra* (Vulnerable -1 individual), and Double-banded Courser *Rhinoptilus africanus*. The 4 remaining species were: Kori Bustard *Ardeotis kori* (Near-threatened), Ludwig's Bustard *Neotis ludwigii* (Endangered), and Northern Black Korhaan *Afrotis afraoides*. Three of these species are regionally Red Listed (Taylor *et al,* 2015) as indicated above. These larger species are susceptible to collision on overhead power lines such as the one planned, in addition to habitat destruction and disturbance.
- Martial Eagle *Polemaetus bellicosus* (Endangered) was recorded several times off site, approximately 9km to the west. Although these birds are suspected to breed somewhere in that area (we did not locate a nest) this is too far from the proposed site to be of concern. Large eagle such as this are typically vulnerable to electrocution on overhead power lines if the pylon design is not safe.
- A total of 57 bird species were recorded on site during our monitoring programme by all methods and incidentally. Thirty of these are endemic or near-endemic. This included 5 regionally Red Listed species, the 4 mentioned above already and Karoo Korhaan *Eupodotis vigorsii* (Near-threatened). Sclater's Lark *Spizocorys sclateri* and Burchell's Courser *Cursorius rufus* were not recorded on site during this programme, but are considered likely to visit the site occasionally when conditions are right.
- Considering the bird and habitat data collected on site we conclude that the following species will be most at risk if the proposed power line goes ahead: Ludwig's Bustard; Kori Bustard; Karoo Korhaan; Martial Eagle; Red Lark; Sclater's Lark; and Stark's Lark. There are many more endemic but not Red

Listed species which will also be of concern, but we feel the above suite of species serves as a good surrogate for those more common species in terms of impact assessment and management.

Our assessment of the significance of the impacts on avifauna on site is as follows:

- Habitat destruction during the construction and operational phase will be of LOW significance.
- Disturbance of birds during the construction and operational phase will be of LOW significance.
- Bird collision on the power line during the operational phase will be of HIGH significance, mitigated to LOW.
- Electrocution of birds on the power line during the operational phase will be of HIGH significance, mitigated to VERY LOW.
- Nesting of birds on the infrastructure once operational will be of LOW significance.

Mitigation for inclusion in the EIR/EMPr

The following mitigation measures are recommended:

- Crossing of rocky outcrops, water courses, drainage lines, streams and wetlands by vehicles and machinery should be avoided.
- Existing roads should be used as far as possible for access to the servitude, even where these are less convenient and direct than creating new roads.
- All staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted. No extra wide turning of vehicles off the existing servitude roads should be permitted.
- A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed.
- The optimal route for the new power line should be selected to mitigate for bird collisions (and other impacts to a lesser extent). We recommend the selection of Alternative 2. Alternative 3 is also acceptable. We advise strongly against the use of Transmission line 1.
- The power line should be fitted with the best available (at the time of construction) anti bird collision line marking devices in order to make the overhead cables more visible to birds. More specifically:
    - Devices should be fitted on the entire length of the power line as collision risk is high all along the alignment for nomadic species such as Ludwig's Bustard.
    - Devices should be fitted on the earth wire/s.

- On each span, the full span should be fitted with marking devices (i.e. not only the middle 60% as done previously by Eskom). Research has shown that collisions occur even close to pylons (Shaw, 2013).
- Light and dark colour devices should be alternated so as to provide contrast against both dark and light backgrounds.
- These devices should be fitted as soon as the earth wires are strung as collision risk begins immediately, not only once the line is commissioned and live.
- The power line owner will be responsible for ensuring that the marking devices remain in place and effective on the power line for its' full lifespan. Any device failures must be rectified immediately by replacement with new devices.

» The power line should be monitored through patrolling its full length at least 4 times per year to measure the impacts on birds and the durability of line marking devices.

» The proposed tower/pylon structure has not been decided in detail. It will however be either concrete or steel monopole. It is critically important that sufficient clearance be allowed between phase-phase and phase-earth hardware on the structure. For large eagles these clearances should be a minimum of 1.8m.

» In addition the standard Eskom Bird Perch must be installed on every pylon top to provide safe perching substrate for large birds well above the dangerous hardware.

» For the impact of the birds nesting on the power line/substation, we recommend nest management on a case by case basis under the supervision of an avifaunal specialist, and in conformance with all relevant national and provincial legislation.

» We recommend that the operational phase EMP include provision for application to the provincial authority for permits for any necessary nest management should the need arise during the operational phase.

Environmental impact statement

The preferred route for the power line from an avifaunal perspective is Alternative 2. We recommend against the use of Alternative 1, although it is not fatally flawed. The Skeerhok Grid connection site is important habitat for an assemblage of arid zone bird species, many of which are endemic. The transformation of natural habitat for the proposed power line and substation is however of LOW significance given how little natural habitat will be affected. Collision of birds with the overhead cables and electrocution of birds perched on the pylons is of HIGH significance, mitigated to LOW. All other impacts are of LOW significance. We recommend that the power line and substation be authorised, provided that the recommendations of this report are implemented.

Cumulative impact statement

The proposed Skeerhok Grid connection power line will result in a bird collision risk of HIGH significance pre-mitigation. In addition to the proposed power line an approximate 110km of new power line will be constructed within a 20km radius. In our view this means that the cumulative significance of power line bird collisions will be HIGH. If each project applies mitigation as we have recommended for the current assessment, this significance can be reduced to MODERATE.

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APPENDIX 1. CRITERIA AGAINST WHICH IMPACTS ARE ASSESSED (SUPPLIED BY CSIR)

The identification of potential impacts and risks should include impacts that may occur during the construction, operational and decommissioning phases of the activity. The assessment of impacts is to include 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 activity is well understood so that the impacts associated with the activity can be understood. The process of identification and assessment of impacts will include:

- Determine the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determine future changes to the environment that will occur if the activity does not proceed;
- 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.

As per DEA *Guideline 5: Assessment of Alternatives and Impacts* the following methodology is to be applied to the prediction and assessment of impacts. Potential impacts should be 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.

- **Nature of impact** - this reviews the type of effect that a proposed activity will have on the environment and should include “what will be affected and how?”

- **Spatial extent** – The size of the area that will be affected by the risk/impact:
    - Site;
    - 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 risk/impact will be experienced:
    - Very short term (instantaneous);

- Short term (less than 1 year);
- Medium term (1 to 10 years);
- Long term (the impact 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)).

- **Reversibility of impacts -**
  - High reversibility of impacts (impact is highly reversible at end of project life, i.e. this is the most favourable assessment for the environment. For example, the nuisance factor caused by noise impacts associated with the operational phase of an exporting terminal can be considered to be highly reversible at the end of the project life);
  - 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. The impact is permanent. For example, the loss of a palaeontological resource on the site caused by building foundations could be non-reversible).

- **Irreplaceability of resource loss caused by impacts –**
  - High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment. For example, if the project will destroy unique wetland systems, these may be irreplaceable);
  - 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 will further be assessed in terms of the following:

- **Probability** – The probability of the impact occurring:
  - Improbable (little or no chance of occurring);
  - Probable (<50% chance of occurring);
  - Highly probable (50 – 90% chance of occurring); or
  - Definite (>90% chance of occurring regardless of prevention measures).

- **Consequence**–The anticipated severity of the 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).

- **Significance** – To determine the significance of an identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure 1 below). The 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, very high) against a predefined set of criteria (as shown in Figure 1 below).

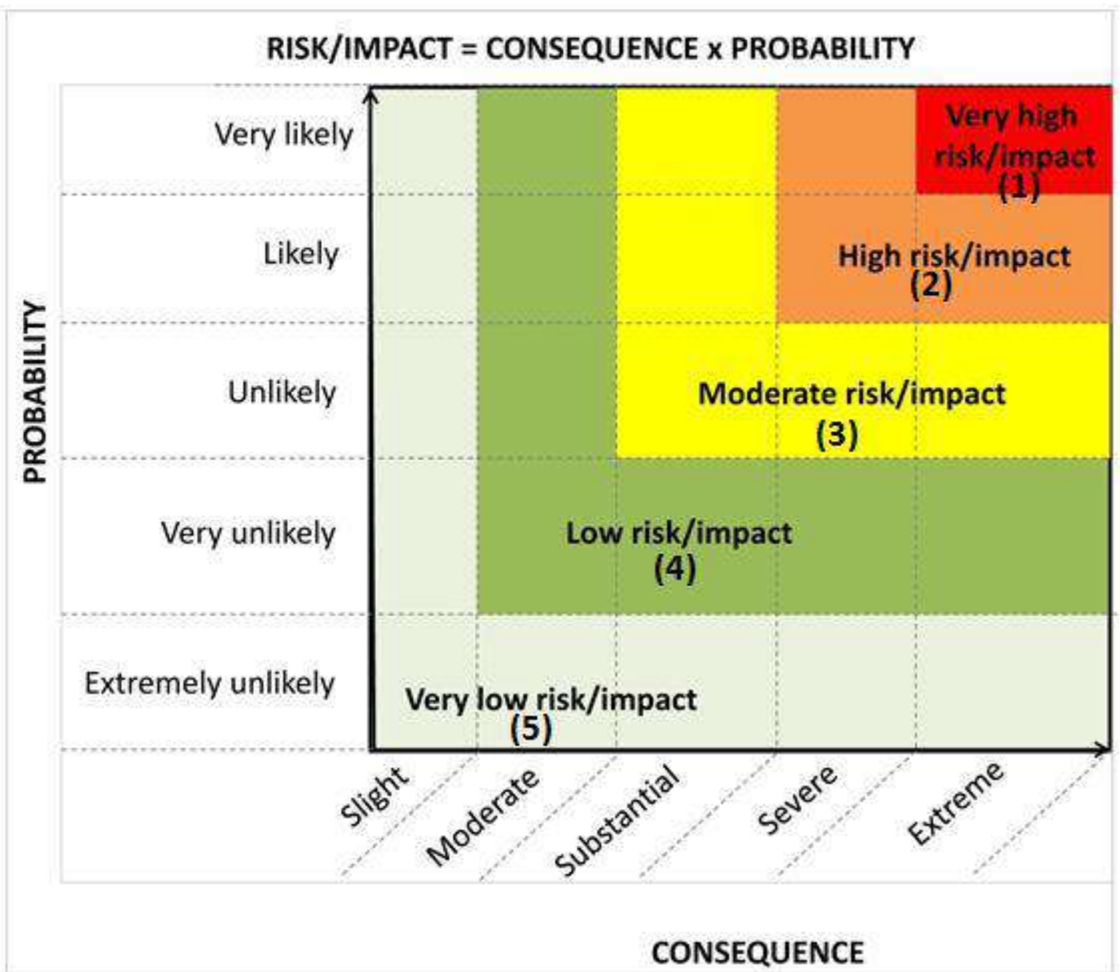


Figure 1: Guide to assessing risk/impact significance as a result of consequence and probability.

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

The above assessment must be described in the text (with clear explanation provided on the rationale for the allocation of significance ratings) and summarised in an impact assessment Table in a similar manner as shown in the example below (Table 1).

With the implementation of mitigation measures, the residual impacts/risks must be ranked as follows in terms of significance:

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

- **Status** - Whether the impact on the overall environment (social, biophysical and economic) will be:
  - Positive - environment overall will benefit from the impact;
  - Negative - environment overall will be adversely affected by the impact; or
  - Neutral - environment overall will not be affected.

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

Impacts will then be collated into an EMPr and these will include the following:

- Management actions and monitoring of the impacts;

- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts; and
- Positive impacts will be identified and enhanced where possible.

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

- Impacts will be evaluated for the construction, operational and decommissioning phases of the development. The assessment of impacts for the decommissioning phase will be 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;
- The impact evaluation will, where possible, take 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; and
- The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.
- Impacts should be assessed for all layouts and project components.
- **IMPORTANT NOTE FROM THE CSIR**: Impacts should be described both before and after the proposed mitigation and management measures have been implemented. The assessment of the potential impact "before mitigation" should take into consideration all management actions that are already part of the project design (which are a given). The assessment of the potential impact "after mitigation" should take into consideration any additional management actions proposed by the specialist, to minimise negative or enhance positive impacts.

APPENDIX 2. BIRD SPECIES RECORDED IN THE BROADER STUDY AREA BY THE SABAP 1 & SABAP 2 PROJECTS; & CONFIRMED BY ON SITE PRE-CONSTRUCTION BIRD MONITORING.

'1' denotes presence, not abundance

E – Endemic, NE – near-endemic

EN – Endangered; VU – Vulnerable; NT – Near-threatened

Regional Red List – Taylor *et al*, 2015

SABAP1 – recorded by this project

SABAP2 – recorded by this project

Winter, Early Summer, Mid-summer – recorded in these seasons

Common name	Scientific name	Regional Red List	Endemic/near	SABAP1	SABAP2	Winter	Early summer	Mid-summer
Avocet, Pied	*Recurvirostra avosetta*			1				
Barbet, Acacia Pied	*Tricholaema leucomelas*			1	1	1	1	1
Barbet, Crested	*Trachyphonus vaillantii*				1			
Batis, Pririt	*Batis pririt*			1	1			
Bee-eater, European	*Merops apiaster*			1	1			
Bee-eater, Swallow-tailed	*Merops hirundineus*			1	1			
Bishop, Southern Red	*Euplectes orix*			1	1			
Bokmakierie	*Telophorus zeylonus*		NE	1	1	1		
Brubru	*Nilaus afer*			1				
Bulbul, African Red-eyed	*Pycnonotus nigricans*		NE	1	1	1		1
Bunting, Cape	*Emberiza capensis*			1		1		1
Bunting, Cinnamon-breasted	*Emberiza tahapisi*				1			
Bunting, Lark-like	*Emberiza impetuani*		NE	1	1	1	1	1
Bustard, Kori	*Ardeotis kori*	VU		1	1			1
Bustard, Ludwig's	*Neotis ludwigii*	EN	NE	1	1	1		1
Buzzard, Jackal	*Buteo rufofuscus*			1				
Canary, Black-headed	*Serinus alario*			1	1			

Canary, Black-throated	*Crithagra atrogularis*			1	1	1		
Canary, White-throated	*Crithagra albogularis*			1	1			
Canary, Yellow	*Crithagra flaviventris*		NE	1	1	1	1	
Chat, Ant-eating	*Myrmecocichla formicivora*		E	1	1	1	1	1
Chat, Familiar	*Cercomela familiaris*			1	1	1		
Chat, Karoo	*Cercomela schlegelii*			1	1			
Chat, Sickle-winged	*Cercomela sinuata*			1	1			
Chat, Tractrac	*Cercomela tractrac*		NE	1	1	1	1	
Cisticola, Desert	*Cisticola aridulus*			1	1			
Cisticola, Grey-backed	*Cisticola subruficapilla*			1				
Coot, Red-knobbed	*Fulica cristata*			1				
Cormorant, Reed	*Phalacrocorax africanus*			1	1			
Cormorant, White-breasted	*Phalacrocorax carbo*			1	1			
Courser, Burchell's	*Cursorius rufus*			1	1			
Courser, Double-banded	*Rhinoptilus africanus*			1	1		1	1
Crombec, Long-billed	*Sylvietta rufescens*			1	1			
Crow, Pied	*Corvus albus*			1	1	1	1	1
Cuckoo, Diderick	*Chrysococcyx caprius*			1				
Cuckoo, Jacobin	*Clamator jacobinus*			1				
Darter, African	*Anhinga rufa*			1				
Dove, Laughing	*Streptopelia senegalensis*			1	1			1
Dove, Namaqua	*Oena capensis*			1	1	1	1	1
Dove, Red-eyed	*Streptopelia semitorquata*			1				
Dove, Rock	*Columba livia*			1				
Drongo, Fork-tailed	*Dicrurus adsimilis*			1	1			
Duck, Maccoa	*Oxyura maccoa*			1				
Duck, Yellow-billed	*Anas undulata*			1				
Eagle, Booted	*Aquila pennatus*			1				
Eagle, Martial	*Polemaetus bellicosus*	EN		1	1	1		1
Eagle, Verreaux's	*Aquila verreauxii*	VU		1	1			
Eagle-owl, Spotted	*Bubo africanus*			1	1			
Egret, Cattle	*Bubulcus ibis*			1				

Egret, Little	*Egretta garzetta*			1				
Eremomela, Yellow-bellied	*Eremomela icteropygialis*			1	1	1		
Falcon, Lanner	*Falco biarmicus*	VU		1	1			
Falcon, Pygmy	*Polihierax semitorquatus*			1	1	1		1
Finch, Red-headed	*Amadina erythrocephala*			1	1			
Finch, Scaly-feathered	*Sporopipes squamifrons*		NE	1	1	1		1
Fiscal, Common (Southern)	*Lanius collaris*			1	1	1	1	1
Fish-eagle, African	*Haliaeetus vocifer*			1	1			
Flamingo, Greater	*Phoenicopterus ruber*	NT		1				
Flycatcher, Chat	*Bradornis infuscatus*			1	1	1	1	1
Flycatcher, Fairy	*Stenostira scita*			1				
Flycatcher, Fiscal	*Sigelus silens*			1	1			
Flycatcher, Marico	*Bradornis mariquensis*				1			
Flycatcher, Spotted	*Muscicapa striata*			1				
Goose, Egyptian	*Alopochen aegyptiacus*			1	1			
Goose, Spur-winged	*Plectropterus gambensis*			1	1			
Goshawk, Pale Chanting	*Melierax canorus*		NE	1	1	1	1	1
Grebe, Black-necked	*Podiceps nigricollis*				1			
Grebe, Little	*Tachybaptus ruficollis*			1				
Greenshank, Common	*Tringa nebularia*			1	1			
Guineafowl, Helmeted	*Numida meleagris*			1	1			
Gull, Grey-headed	*Larus cirrocephalus*			1				
Hamerkop	*Scopus umbretta*			1				
Harrier, Montagu's	*Circus pygargus*			1				
Harrier-Hawk, African	*Polyboroides typus*			1				
Heron, Black-headed	*Ardea melanocephala*			1				
Heron, Goliath	*Ardea goliath*			1				
Heron, Grey	*Ardea cinerea*			1	1			
Hoopoe, African	*Upupa africana*			1				
Ibis, African Sacred	*Threskiornis aethiopicus*			1				
Ibis, Glossy	*Plegadis falcinellus*			1				
Ibis, Hadeda	*Bostrychia hagedash*				1			

Kestrel, Greater	*Falco rupicoloides*			1	1			
Kestrel, Lesser	*Falco naumanni*				1			
Kestrel, Rock	*Falco rupicolus*			1	1		1	1
Kite, Black	*Milvus migrans*			1				
Kite, Black-shouldered	*Elanus caeruleus*			1				
Kite, Yellow-billed	*Milvus aegyptius*			1				
Korhaan, Karoo	*Eupodotis vigorsii*			1	1			
Korhaan, Northern Black	*Afrotis afraoides*		NE		1	1	1	1
Lapwing, Blacksmith	*Vanellus armatus*			1	1			
Lapwing, Crowned	*Vanellus coronatus*			1	1	1	1	1
Lark, Eastern Clapper	*Mirafra fasciolata*		NE		1			1
Lark, Fawn-coloured	*Calendulauda africanoides*			1	1			
Lark, Karoo Long-billed	*Certhilauda subcoronata*		E	1	1	1	1	1
Lark, Large-billed	*Galerida magnirostris*		E	1		1	1	1
Lark, Long-billed	*Mirafra curvirostris*			1				
Lark, Red	*Calendulauda burra*	VU	NE		1	1		
Lark, Red-capped	*Calandrella cinerea*			1		1		
Lark, Sabota	*Calendulauda sabota*		NE	1	1	1	1	1
Lark, Sclater's	*Spizocorys sclateri*	NT		1	1			
Lark, Spike-heeled	*Chersomanes albofasciata*		NE	1	1	1	1	1
Lark, Stark's	*Spizocorys starki*		NE	1	1	1	1	1
Lovebird, Rosy-faced	*Agapornis roseicollis*			1				
Martin, Brown-throated	*Riparia paludicola*			1				
Martin, Rock	*Hirundo fuligula*			1	1			
Masked-weaver, Southern	*Ploceus velatus*			1	1			
Moorhen, Common	*Gallinula chloropus*			1				
Mousebird, Red-faced	*Urocolius indicus*			1	1			
Mousebird, White-backed	*Colius colius*		E	1	1		1	1
Nightjar, Rufous-cheeked	*Caprimulgus rufigena*			1	1			
Ostrich, Common	*Struthio camelus*			1	1			
Owl, Barn	*Tyto alba*			1	1			
Palm-swift, African	*Cypsiurus parvus*			1				

Penduline-tit, Cape	*Anthoscopus minutus*		NE	1	1	1	1	
Pigeon, Speckled	*Columba guinea*			1	1	1	1	
Pipit, African	*Anthus cinnamomeus*			1	1			1
Pipit, African Rock	*Anthus crenatus*			1				
Plover, Kittlitz's	*Charadrius pecuarius*			1	1			
Plover, Three-banded	*Charadrius tricollaris*			1	1			1
Pochard, Southern	*Netta erythrophthalma*			1				
Prinia, Black-chested	*Prinia flavicans*			1	1			
Prinia, Karoo	*Prinia maculosa*				1			
Quail, Common	*Coturnix coturnix*			1				
Quelea, Red-billed	*Quelea quelea*			1	1			
Reed-warbler, African	*Acrocephalus baeticatus*			1	1			
Robin-chat, Cape	*Cossypha caffra*			1				
Rock-thrush, Short-toed	*Monticola brevipes*			1				
Roller, Lilac-breasted	*Coracias caudatus*				1			
Ruff	*Philomachus pugnax*			1				
Sanderling	*Calidris alba*			1				
Sandgrouse, Namaqua	*Pterocles namaqua*		NE	1	1	1		1
Sandpiper, Common	*Actitis hypoleucos*			1	1			
Sandpiper, Curlew	*Calidris ferruginea*			1				
Sandpiper, Marsh	*Tringa stagnatilis*			1				
Sandpiper, Wood	*Tringa glareola*			1				
Scimitarbill, Common	*Rhinopomastus cyanomelas*			1	1			
Scops-owl, Southern White-faced	*Ptilopsus granti*			1				
Scrub-robin, Kalahari	*Cercotrichas paena*		NE	1	1	1	1	1
Scrub-robin, Karoo	*Cercotrichas coryphoeus*		E	1	1			1
Secretarybird	*Sagittarius serpentarius*	VU		1				
Shelduck, South African	*Tadorna cana*			1	1			
Shoveler, Cape	*Anas smithii*			1				
Shrike, Crimson-breasted	*Laniarius atrococcineus*		NE		1	1		
Shrike, Lesser Grey	*Lanius minor*			1	1			

Shrike, Red-backed	*Lanius collurio*			1				
Snake-eagle, Black-chested	*Circaetus pectoralis*			1				
Sparrow, Cape	*Passer melanurus*		E	1	1	1	1	1
Sparrow, House	*Passer domesticus*			1	1		1	
Sparrow, Southern Grey-headed	*Passer diffusus*				1	1		
Sparrow-weaver, White-browed	*Plocepasser mahali*			1	1	1		
Sparrowlark, Black-eared	*Eremopterix australis*		E	1	1	1		1
Sparrowlark, Grey-backed	*Eremopterix verticalis*		NE	1	1	1		1
Spoonbill, African	*Platalea alba*			1				
Starling, Cape Glossy	*Lamprotornis nitens*			1	1			
Starling, Pale-winged	*Onychognathus nabouroup*			1	1			
Starling, Wattled	*Creatophora cinerea*			1				
Stilt, Black-winged	*Himantopus himantopus*			1				
Stint, Little	*Calidris minuta*			1				
Stonechat, African	*Saxicola torquatus*			1				
Stork, Abdim's	*Ciconia abdimii*	NT		1				
Stork, Black	*Ciconia nigra*	VU		1				
Stork, White	*Ciconia ciconia*			1				
Sunbird, Dusky	*Cinnyris fuscus*		NE	1	1		1	
Sunbird, Southern Double-collared	*Cinnyris chalybeus*				1			
Swallow, Barn	*Hirundo rustica*			1	1			
Swallow, Greater Striped	*Hirundo cucullata*			1	1			
Swallow, Pearl-breasted	*Hirundo dimidiata*				1			
Swallow, White-throated	*Hirundo albigularis*			1				
Swamp-warbler, Lesser	*Acrocephalus gracilirostris*			1				
Swift, Alpine	*Tachymarptis melba*			1				
Swift, Bradfield's	*Apus bradfieldi*			1				
Swift, Common	*Apus apus*			1				1
Swift, Little	*Apus affinis*			1	1			
Swift, White-rumped	*Apus caffer*			1	1			1
Teal, Cape	*Anas capensis*			1	1			

Teal, Red-billed	*Anas erythrorhyncha*		1	1			
Tern, White-winged	*Chlidonias leucopterus*		1				
Thick-knee, Spotted	*Burhinus capensis*		1	1			
Thrush, Karoo	*Turdus smithi*		1	1			
Thrush, Olive	*Turdus olivaceus*		1				
Tit, Ashy	*Parus cinerascens*		1	1			
Tit, Grey	*Parus afer*			1			
Tit-babbler, Chestnut-vented	*Parisoma subcaeruleum*		1	1			
Tit-babbler, Layard's	*Parisoma layardi*		1				
Turtle-dove, Cape	*Streptopelia capicola*		1	1			1
Wagtail, Cape	*Motacilla capensis*		1	1			
Warbler, Cinnamon-breasted	*Euryptila subcinnamomea*		1				
Warbler, Namaqua	*Phragmacia substriata*		1				
Warbler, Rufous-eared	*Malcorus pectoralis*	E	1	1	1	1	1
Warbler, Willow	*Phylloscopus trochilus*		1	1			
Waxbill, Black-faced	*Estrilda erythronotos*			1			
Waxbill, Common	*Estrilda astrild*		1				
Weaver, Sociable	*Philetairus socius*	E	1	1	1	1	1
Wheatear, Capped	*Oenanthe pileata*		1	1	1	1	1
Wheatear, Mountain	*Oenanthe monticola*	NE	1	1	1		
White-eye, Cape	*Zosterops virens*		1	1			
White-eye, Orange River	*Zosterops pallidus*		1				
Whydah, Pin-tailed	*Vidua macroura*		1				
Woodpecker, Cardinal	*Dendropicos fuscescens*		1				

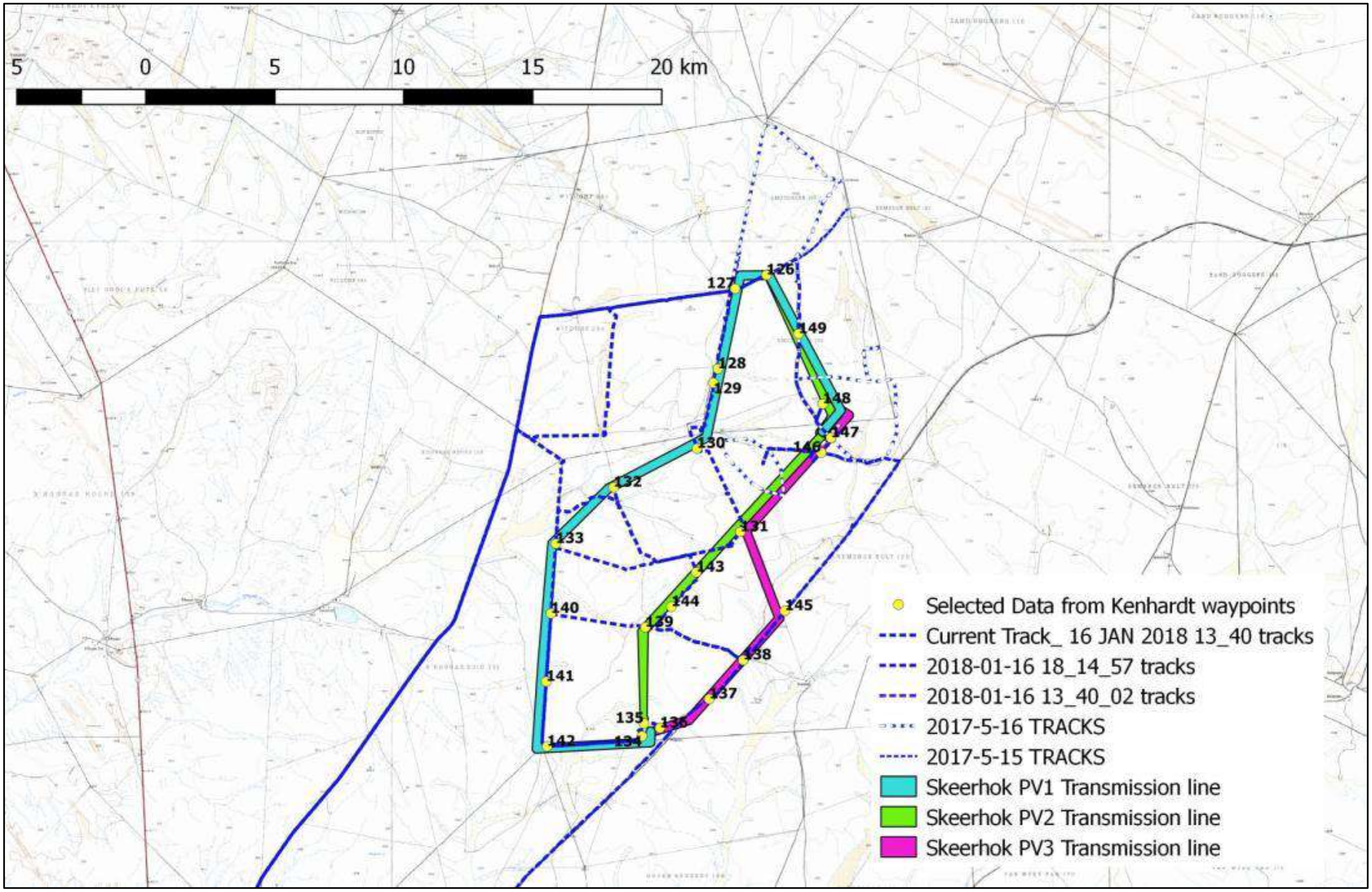
APPENDIX 3. PROJECTS PROPOSED IN THE VICINITY OF THE SKEERHOK PV 1 PROJECT (SUPPLIED BY CSIR).

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
Nieuwehoop 400/50 kV Substation loop in and loop out lines, Northern Cape Province.	Eskom Holdings SOC Limited	DEA Reference Number: 12/12/20/1166	Construction of the 400/50kV Nieuwehoop substation between the Garona and Aries substations, and 3km Loop In and Loop Out Lines.	The project received a positive EA on 21 February 2011. The substation has been constructed.
EIA, WULA and EMPr for the proposed Solar CSP Integration Project: Project 1 – Solar substation, 2 X 400 kV power lines from Aries to the solar substation and 400 kV power line from Nieuwehoop to the Solar substation.	Eskom Holdings SOC Limited	DEA Reference Number: 12/12/20/2606 NEAS Reference Number: DEA/EIA/0000785/2011	The proposed Solar Park Integration Project entails the construction of a substation at the Upington Solar Park, 400 kV transmission lines to the east and south of Upington to feed the electricity into Eskom's National Grid as well as the construction of a number of 132 kV power lines inter-linking the IPP solar plants with the Eskom Grid and distributing the power generated to Upington.	The project received a positive EA on 14 February 2014.
Proposed construction of Gemsbok PV1 75 MW Solar PV facility on the remaining extent of Portion 3 of the Farm Gemsbok Bult 120, Kenhardt, Northern Cape.	Mulilo Renewable Project Developments (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/710	Mulilo Renewable Project Developments (Pty) Ltd intends to develop a 75 MW Solar PV power generation project on the farm Gemsbok Bult (Remaining Extent of Portion 3 of Farm 120).	These projects have received Environmental Authorization on 09/11/2015
Proposed construction of Gemsbok PV2 75 MW Solar PV facility on the remaining extent of Portion 3 of the Farm Gemsbok Bult 120, Kenhardt, Northern Cape.	Mulilo Renewable Project Developments (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/711	Mulilo Renewable Project Developments (Pty) Ltd intends to develop a 75 MW Solar PV power generation project on the farm Gemsbok Bult (Remaining Extent of Portion 3 of Farm 120).	
Proposed construction of Boven PV1 75 MW Solar PV facility on the remaining extent of the Farm Boven Rugzeer 169, Kenhardt, Northern Cape.	Mulilo Renewable Project Developments (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/712	Mulilo Renewable Project Developments (Pty) Ltd intends to develop a 75 MW Solar PV power generation project on the farm Boven Rugzeer (Remaining Extent of Farm 169).	
Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape.	Scatec Solar	14/12/16/3/3/2/837	Scatec Solar intends to develop a 75 MW Solar PV power generation project on the remaining extent of Onder Rugzeer Farm 168.	These projects have received Environmental Authorization on 07/08/2017

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 2) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape.	Scatec Solar	14/12/16/3/3/2/838	Scatec Solar intends to develop a 75 MW Solar PV power generation project on the remaining extent of Onder Rugzeer Farm 168.	
Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape.	Scatec Solar	14/12/16/3/3/2/836	Scatec Solar intends to develop a 75 MW Solar PV power generation project on the remaining extent of Onder Rugzeer Farm 168.	
Proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 1) on the remaining extent of Onder Rugzeer Farm 168 and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	14/12/16/3/3/1/1547	Scatec Solar intends to develop a 132 KV transmission line extending from the proposed 75 MW Solar PV facility (Kenhardt PV 1) to the Eskom Nieuwehoop substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120.	These projects have received Environmental Authorization on 22/09/2017
Proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 2) on the remaining extent of Onder Rugzeer Farm 168, and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	14/12/16/3/3/1/1546	Scatec Solar intends to develop a 132 KV transmission line extending from the proposed 75 MW Solar PV facility (Kenhardt PV 2) to the Eskom Nieuwehoop substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120.	
Proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	14/12/16/3/3/1/1545	Scatec Solar intends to develop a 132 KV transmission line extending from the proposed 75 MW Solar PV facility (Kenhardt PV 3) to the Eskom Nieuwehoop substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120.	
Proposed development of a 75 MW Solar PV Facility (Boven Solar PV 3) on	Mulilo Renewable	14/12/16/3/3/2/846	Mulilo Renewable Project Developments (Pty) Ltd proposes to develop a 75 MW Solar PV power	Appeal process for these projects is

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
the remaining extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape.	Project Developments (Pty) Ltd		generation project on the Remaining extent of Boven Rugzeer Farm 169.	underway.
Proposed development of a 75 MW Solar PV Facility (Gemsbok Solar PV 5) on Portion 8 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Mulilo Renewable Project Developments (Pty) Ltd	14/12/16/3/3/2/843	Mulilo Renewable Project Developments (Pty) Ltd proposes to develop a 75 MW Solar PV power generation project on Portion 8 of Gemsbok Bult Farm 120.	
Proposed development of a 75 MW Solar PV Facility (Gemsbok Solar PV 6) on Portion 8 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Mulilo Renewable Project Developments (Pty) Ltd	14/12/16/3/3/2/846	Mulilo Renewable Project Developments (Pty) Ltd proposes to develop a 75 MW Solar PV power generation project on Portion 8 of Gemsbok Bult Farm 120.	
Proposed development of a 75 MW Solar PV Facility (Gemsbok Solar PV 3) on Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Mulilo Renewable Project Developments (Pty) Ltd	14/12/16/3/3/2/841	Mulilo Renewable Project Developments (Pty) Ltd proposes to develop a 75 MW Solar PV power generation project on Portion 3 of Gemsbok Bult Farm 120.	

APPENDIX 4. PHOTOGRAPHS (& LOCATION TAKEN) OF MICRO HABITATS AVAILABLE TO BIRDS ON THE SKEERHOK GRID CONNECTION SITE.

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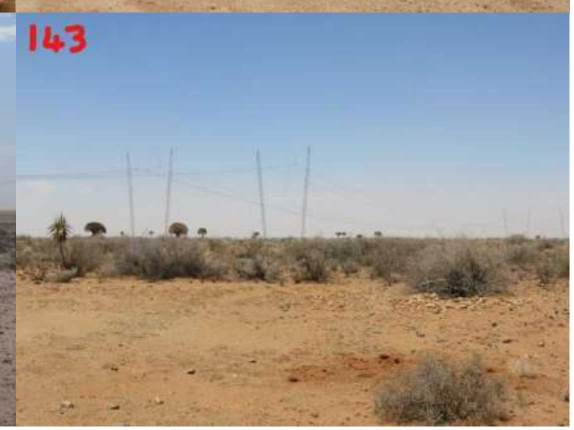
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APPENDIX 5. BIRD SPECIES RECORDED DURING SPECIALIST SITE VISITS.

Species recorded during May 2017

Species primary name	Species tertiary name	Date	Seen/Heard	Latitude	Longitude
Sociable Weaver	*Philetairus socius*	2017/05/15	Seen	-29.3341	21.15355
Blacksmith Lapwing	*Vanellus armatus*	2017/05/15	Seen	-29.3281	21.15404
Egyptian Goose	*Alopochen aegyptiaca*	2017/05/15	Seen	-29.3281	21.15404
South African Shelduck	*Tadorna cana*	2017/05/15	Seen	-29.3281	21.15404
Namaqua Sandgrouse	*Pterocles namaqua*	2017/05/15	Seen	-29.3292	21.16365
Chat Flycatcher	*Melaenornis infuscatus*	2017/05/15	Seen	-29.2105	21.28124
Northern Black Korhaan	*Afrotis afraoides*	2017/05/15	Seen	-29.0815	21.41528
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/15	Seen	-29.0671	21.41929
Laughing Dove	*Spilopelia senegalensis*	2017/05/15	Seen	-29.0673	21.41221
Sociable Weaver	*Philetairus socius*	2017/05/15	Seen	-29.0673	21.41221
Ant-eating Chat	*Myrmecocichla formicivora*	2017/05/15	Seen	-29.0596	21.4023
Sabota Lark	*Calendulauda sabota*	2017/05/15	Seen	-29.0576	21.39936
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/15	Seen	-29.0576	21.39936
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/15	Seen	-29.042	21.39043
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/15	Seen	-29.0154	21.39154
Pied Crow	*Corvus albus*	2017/05/15	Seen	-29.0127	21.39064
Scaly-feathered Finch	*Sporopipes squamifrons*	2017/05/15	Seen	-29.0126	21.39116
Rufous-eared Warbler	*Malcorus pectoralis*	2017/05/15	Seen	-29.0118	21.39111
Sabota Lark	*Calendulauda sabota*	2017/05/15	Seen	-29.0118	21.39112
Double-banded Courser	*Rhinoptilus africanus*	2017/05/15	Seen	-29.0061	21.39075
Kalahari Scrub Robin	*Cercotrichas paena*	2017/05/15	Seen	-29.0061	21.38994
Ant-eating Chat	*Myrmecocichla formicivora*	2017/05/15	Seen	-29.0082	21.38583
Chat Flycatcher	*Melaenornis infuscatus*	2017/05/15	Seen	-29.0094	21.38347
Familiar Chat	*Oenanthe familiaris*	2017/05/15	Seen	-29.0112	21.37891
Northern Black Korhaan	*Afrotis afraoides*	2017/05/15	Seen	-29.014	21.37266
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/15	Seen	-29.0142	21.36844
Sabota Lark	*Calendulauda sabota*	2017/05/15	Seen	-29.0099	21.36943
Double-banded Courser	*Rhinoptilus africanus*	2017/05/15	Seen	-29.0101	21.36934
Kalahari Scrub Robin	*Cercotrichas paena*	2017/05/15	Seen	-29.0037	21.37033
Northern Black Korhaan	*Afrotis afraoides*	2017/05/15	Seen	-28.9955	21.37231
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/15	Seen	-28.9974	21.37184
Kalahari Scrub Robin	*Cercotrichas paena*	2017/05/15	Seen	-28.9923	21.37305
Scaly-feathered Finch	*Sporopipes squamifrons*	2017/05/15	Seen	-28.9923	21.37305
Levaillant's Cisticola	*Cisticola tinniens*	2017/05/15	Seen	-28.9953	21.40409
Rufous-eared Warbler	*Malcorus pectoralis*	2017/05/15	Seen	-29.0159	21.3653
Martial Eagle	*Polemaetus bellicosus*	2017/05/15	Seen	-29.1427	21.24851
Karoo Korhaan	*Eupodotis vigorsii*	2017/05/15	Seen	-29.2088	21.19629
Martial Eagle	*Polemaetus bellicosus*	2017/05/16	Seen	-29.1351	21.25456
Pale Chanting Goshawk	*Melierax canorus*	2017/05/16	Seen	-29.0226	21.39147

Southern Fiscal	*Lanius collaris*	2017/05/16	Seen	-29.0645	21.40694
Sociable Weaver	*Philetairus socius*	2017/05/16	Seen	-29.0674	21.41016
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/16	Seen	-29.0672	21.4088
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0665	21.40584
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0641	21.38063
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0633	21.37963
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/16	Seen	-29.0633	21.37972
Ludwig's Bustard	*Neotis ludwigii*	2017/05/16	Seen	-29.0631	21.37821
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0623	21.37695
Namaqua Sandgrouse	*Pterocles namaqua*	2017/05/16	Seen	-29.0613	21.37537
Karoo Korhaan	*Eupodotis vigorsii*	2017/05/16	Seen	-29.0609	21.37304
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/16	Seen	-29.0606	21.37285
Namaqua Sandgrouse	*Pterocles namaqua*	2017/05/16	Seen	-29.0612	21.36759
Ludwig's Bustard	*Neotis ludwigii*	2017/05/16	Seen	-29.0612	21.36752
Rufous-eared Warbler	*Malcorus pectoralis*	2017/05/16	Seen	-29.0611	21.36694
Capped Wheatear	*Oenanthe pileata*	2017/05/16	Seen	-29.0661	21.36642
Karoo Korhaan	*Eupodotis vigorsii*	2017/05/16	Seen	-29.0673	21.36768
Sabota Lark	*Calendulauda sabota*	2017/05/16	Seen	-29.0688	21.36878
Pied Crow	*Corvus albus*	2017/05/16	Seen	-29.0704	21.37069
Sabota Lark	*Calendulauda sabota*	2017/05/16	Seen	-29.0772	21.38168
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0707	21.38534
Sabota Lark	*Calendulauda sabota*	2017/05/16	Seen	-29.0663	21.38254
Speckled Pigeon	*Columba guinea*	2017/05/16	Seen	-29.0683	21.37887
Chat Flycatcher	*Melaenornis infuscatus*	2017/05/16	Seen	-29.0644	21.39691
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0576	21.40428
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.06	21.42507
Sabota Lark	*Calendulauda sabota*	2017/05/16	Seen	-29.0585	21.42554
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/16	Seen	-29.0585	21.42554
Acacia Pied Barbet	*Tricholaema leucomelas*	2017/05/16	Seen	-29.0506	21.4249
Rufous-eared Warbler	*Malcorus pectoralis*	2017/05/16	Seen	-29.0506	21.42489
Ant-eating Chat	*Myrmecocichla formicivora*	2017/05/16	Seen	-29.0428	21.42149
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0428	21.42149
Ludwig's Bustard	*Neotis ludwigii*	2017/05/16	Seen	-29.0428	21.42149
Kalahari Scrub Robin	*Cercotrichas paena*	2017/05/16	Seen	-29.0428	21.42149
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0421	21.40589
Rufous-eared Warbler	*Malcorus pectoralis*	2017/05/16	Seen	-29.0422	21.39689
Capped Wheatear	*Oenanthe pileata*	2017/05/16	Seen	-29.0424	21.39195
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-29.0424	21.39192
Yellow Canary	*Crithagra flaviventris*	2017/05/16	Seen	-29.0038	21.39069
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-28.9927	21.3983
Spike-heeled Lark	*Chersomanes albofasciata*	2017/05/16	Seen	-28.9655	21.38241
Rufous-eared Warbler	*Malcorus pectoralis*	2017/05/16	Seen	-28.9653	21.3794
Northern Black Korhaan	*Afrotis afraoides*	2017/05/16	Seen	-28.9954	21.37228
Pale Chanting Goshawk	*Melierax canorus*	2017/05/16	Seen	-29.048	21.29529

Martial Eagle	*Polemaetus bellicosus*	2017/05/16	Seen	-29.131	21.25786

Species recorded during January 2018.

Species primary name	Species tertiary name	Date	Seen/Heard	Latitude	Longitude
Spike-heeled Lark	*Chersomanes albofasciata*	2018/01/17	Seen	-29.2428	21.25217
Pied Crow	*Corvus albus*	2018/01/17	Seen	-29.2636	21.2334
Sociable Weaver	*Philetairus socius*	2018/01/17	Seen	-29.292	21.19925
Capped Wheatear	*Oenanthe pileata*	2018/01/17	Seen	-29.1539	21.31553
Grey-backed Sparrow-Lark	*Eremopterix verticalis*	2018/01/17	Seen	-29.1543	21.30779
Fawn-coloured Lark	*Calendulauda africanoides*	2018/01/17	Seen	-29.1146	21.30813
Ant-eating Chat	*Myrmecocichla formicivora*	2018/01/17	Seen	-29.1153	21.31344
Pale Chanting Goshawk	*Melierax canorus*	2018/01/17	Seen	-29.1167	21.32405
Namaqua Sandgrouse	*Pterocles namaqua*	2018/01/16	Seen	-29.0918	21.30675
Spike-heeled Lark	*Chersomanes albofasciata*	2018/01/16	Seen	-29.0851	21.33094
Pied Crow	*Corvus albus*	2018/01/16	Seen	-29.085	21.33093
Ant-eating Chat	*Myrmecocichla formicivora*	2018/01/17	Seen	-29.1229	21.35652
Fawn-coloured Lark	*Calendulauda africanoides*	2018/01/17	Seen	-29.1241	21.36239
Sabota Lark	*Calendulauda sabota*	2018/01/17	Seen	-29.1248	21.36509
Spike-heeled Lark	*Chersomanes albofasciata*	2018/01/17	Seen	-29.1254	21.36706
Greater Kestrel	*Falco rupicoloides*	2018/01/17	Seen	-29.1499	21.33527
Grey-backed Sparrow-Lark	*Eremopterix verticalis*	2018/01/17	Seen	-29.1476	21.34089
Speckled Pigeon	*Columba guinea*	2018/01/16	Seen	-29.0942	21.3357
Sabota Lark	*Calendulauda sabota*	2018/01/16	Seen	-29.0945	21.36174
Ant-eating Chat	*Myrmecocichla formicivora*	2018/01/17	Seen	-29.0081	21.38602
Northern Black Korhaan	*Afrotis afraoides*	2018/01/17	Seen	-29.011	21.39104
Ant-eating Chat	*Myrmecocichla formicivora*	2018/01/17	Seen	-29.0521	21.39878
Pied Crow	*Corvus albus*	2018/01/17	Seen	-29.0684	21.37896
Fawn-coloured Lark	*Calendulauda africanoides*	2018/01/17	Seen	-29.0643	21.39236
Spike-heeled Lark	*Chersomanes albofasciata*	2018/01/17	Seen	-29.0646	21.39323
Spike-heeled Lark	*Chersomanes albofasciata*	2018/01/16	Seen	-29.0776	21.36623
Rock Kestrel	*Falco rupicolus*	2018/01/16	Seen	-29.0709	21.36328
Sabota Lark	*Calendulauda sabota*	2018/01/16	Seen	-29.061	21.35474
Namaqua Dove	*Oena capensis*	2018/01/16	Seen	-29.0429	21.36209
Sociable Weaver	*Philetairus socius*	2018/01/16	Seen	-29.023	21.36641
Spike-heeled Lark	*Chersomanes albofasciata*	2018/01/16	Seen	-29.0206	21.36643
Northern Black Korhaan	*Afrotis afraoides*	2018/01/16	Seen	-29.0108	21.37999
Spike-heeled Lark	*Chersomanes albofasciata*	2018/01/16	Seen	-29.0147	21.37107
Grey-backed Sparrow-Lark	*Eremopterix verticalis*	2018/01/16	Seen	-29.0278	21.3266
Northern Black Korhaan	*Afrotis afraoides*	2018/01/16	Seen	-29.0436	21.32508
Northern Black Korhaan	*Afrotis afraoides*	2018/01/16	Seen	-29.0436	21.32508
Ant-eating Chat	*Myrmecocichla formicivora*	2018/01/16	Seen	-29.0527	21.32423
Namaqua Sandgrouse	*Pterocles namaqua*	2018/01/16	Seen	-29.0753	21.3084
Spike-heeled Lark	*Chersomanes albofasciata*	2018/01/16	Seen	-29.0762	21.308

Grey-backed Sparrow-Lark	*Eremopterix verticalis*	2018/01/16	Seen	-29.0824	21.30745
Sabota Lark	*Calendulauda sabota*	2018/01/16	Seen	-29.0829	21.32975
Speckled Pigeon	*Columba guinea*	2018/01/16	Seen	-29.0214	21.3204
Pale Chanting Goshawk	*Melierax canorus*	2018/01/16	Seen	-29.1444	21.24711
Sociable Weaver	*Philetairus socius*	2018/01/16	Seen	-29.2048	21.19853
Pied Crow	*Corvus albus*	2018/01/16	Seen	-29.2082	21.19665
Greater Kestrel	*Falco rupicoloides*	2018/01/16	Seen	-29.2138	21.19339

APPENDIX 6. SPECIALIST CURRICULUM VITAE.

JONATHAN JAMES SMALLIE

WildSkies Ecological Services (2011/131435/07)

Curriculum Vitae

BACKGROUND

Date of birth:	20 October 1975
Qualifications:	BSC – Agriculture (Hons) (completed 1998)
	University of Natal – Pietermaritzburg
	MSC – Environmental Science (completed 2011)
	University of Witwaterstrand
Occupation:	Specialist avifaunal consultant
Profession registration:	South African Council for Natural Scientific Professions

CONTACT DETAILS

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Email: jon@wildskies.co.za

Postal: 36 Utrecht Avenue, Bonnie Doon, East London, 5210

PROFESSIONAL EXPERIENCE

Consulting Projects:

Post construction bird monitoring for wind energy facilities:

Dassieklip (Caledon) –initiated in April 2014; Dorper Wind Farm (Molteno) – initiated in July 2014; Jeffreys Bay Wind Farm – initiated in August 2014; Kouga Wind Farm – started Feb 2015; Cookhouse West Wind Farm – started March 2015; Grassridge Wind Farm – initiated in April 2015; Chaba Wind Farm – initiated December 2015; Amakhala Emoyeni 01 Wind Farm initiated August 2016; Gibson Bay Wind Farm – initiated March 2017; Nojoli Wind Farm initiated March 2017.

Pre-construction bird monitoring & EIA for wind energy facilities:

Golden Valley; Middleton; Dorper; Qumbu; Ncora; Nqamakhwe; Ndakana; Thomas River; Peddie; Mossel Bay; Hluhluwe; Richards Bay; Garob; Outeniqua; Castle; Wolf; Inyanda-Roodeplaat; Dassiesridge; Great Kei; Bayview; Grahamstown; Bakenskop; Umsobomvu; Stormberg; Zingesele; Oasis; Gunstfontein; Naumanii; Golden Valley Phase 2; Ngxwabangu; Hlobo; Woodstock; and Impofu wind energy facilities.

Other Electricity Generation projects:

Port of Nqura Power Barge EIA; Bonnievale Solar Energy Facility; Dealesville Solar Energy Facility; Rooipunt Solar Energy Facility; De Aar Solar Energy Facility; Noupoort Solar Energy Facility, Aggeneys Solar Energy Facility; Tugela Hydro-Electric Scheme; Eskom Concentrated Solar Power Plant; Bronkhorstspruit Solar Photovoltaic Plant; De Aar Solar Energy Facility; Paulputs Solar Energy Facility; Kenhardt Solar Energy Facility.

Overhead transmission power lines (>132 000 kilovolts):

Oranjemund Gromis 220kV; Perseus Gamma 765kV; Aries Kronos 765kV; Aries Helios 765kV; Perseus Kronos 765kV; Helios Juno 765kV; Borutho Nzelele 400kV; Foskor Merensky 275kV; Kimberley Strengthening; Mercury Perseus 400kV; Eros Neptune Grassridge 400kV; Kudu Juno 400kV; Garona Aries 400kV; Perseus Hydra 765Kv; Tabor Witkop 275kV; Tabor Spencer 400kV; Moropule Orapa 220kV (Botswana); Coega Electrification; Majuba Venus 765kV; Gamma Grassridge 765kV; Gourikwa Proteus 400KV; Koeberg Strengthening 400kV; Ariadne Eros 400kV; Hydra Gamma 765kV; Zizabona transmission - Botswana

Overhead distribution power lines (<132 000 kilovolts):

Kanoneiland 22KV; Hydra Gamma 765kV; Komani Manzana 132kV; Rockdale Middelburg 132kV; Irenedale 132 kV; Zandfontein 132kV; Venulu Makonde 132 kV; Spencer Makonde 132 kV; Dalkeith Jackal Creek 132Kv; Glen Austin 88kV; Bulgerivier 132kV; Ottawa Tongaat 132kV; Disselfontein 132kV; Voorspoed Mine 132kV; Wonderfontein 132kV; Kabokweni Hlau Hlau 132kV; Hazyview Kiepersol 132kV; Mayfern Delta 132kV; VAAL Vresap 88kV; Arthursview Modderkuil 88kV; Orapa, AK6, Lethakane substations and 66kV lines (Botswana); Dagbreek Hermon 66kV; Uitkoms Majuba 88kV; Pilanesberg Spitskop 132kV; Qumbu PG Bison 132kV; Louis Trichardt Venetia 132kV; Rockdale Middelburg Ferrochrome 132kV; New Continental Cement 132KV; Hillside 88kV; Marathon Delta 132kV; Malelane Boulder 132kV; Nondela Strengthening 132kV; Spitskop Northern Plats 132kV; West Acres Mataffin 132kV; Westgate Tarlton Kromdraai 132kV; Sappi Elliot Ugie 132kV; Melkhout Thyspunt 132kV; St Francis Bay 66kv

Risk Assessments on existing power lines:

Hydra-Droerivier 1,2 & 3 400kV; Hydra-Poseidon 1,2 400kV; Butterworth Ncora 66kV; Nieu-Bethesda 22kV; Maclear 22kV (Joelshoek Valley Project); Wodehouse 22kV (Dordrecht district); Burgersdorp Aliwal North Jamestown 22kV; Cradock 22kV; Colesberg area 22kV; Loxton self build 11kV; Kanoneiland 22kV; Stutterheim Municipality 22kV; Majuba-Venus 400kV; Chivelston-Mersey 400kV; Marathon-Prairie 275kV; Delphi-Neptune 400kV; Ingagane – Bloukrans 275kV; Ingagane – Danskraal 275kV; Danskraal – Bloukrans 275kV

Avifaunal "walk through" (EMP's):

Kappa Omega 765kv; Rockdale Marble Hall 400kv; Beta Delphi 400kV; Mercury Perseus 765kV; Perseus 765kV Substation; Beta Turn 765kV in lines; Spencer Tabor 400kV line; Kabokweni Hlau Hlau 132kV; Mayfern Delta 132Kv; Eros Mtata 400kV; Cennergi Grid connect 132kV; Melkhout Thyspunt 132kv.

Strategic Environmental Assessments for Master Electrification Plans:

Northern Johannesburg area; Southern KZN and Northern Eastern Cape; Northern Pretoria; Western Cape Peninsula

Other specialist studies:

Bird Impact Assessment for Lizzard Point Golf Estate – Vaaldam; Bird Impact Assessment for Lever Creek Estates housing development; Investigation into rotating Bird Flapper saga – Aberdeen 22Kv; Investigation of in excess of 80 separate incidents of bird mortalities on power line networks from August 1999 to present; Investigation of bird mortalities at 3 substations; Special investigation into faulting on Ariadne-Eros 132kV; Special investigation into Bald Ibis faulting on Tutuka Pegasus 275kV; Special investigation into bird related faulting on 22kV Geluk Hendrina line; Special investigation into bird related faulting on Camden Chivelston 400kV line

Specialist risk assessments for wildlife airport hazards:

Kigali International Airport – Rwanda; Port Elizabeth Airport – specialist study as part of the EIA for the proposed Madiba Bay Leisure Park; Manzini International Airport (Swaziland); Polokwane International Airport; Mafekeng International Airport; Lanseria Airport

Positions held to date:

- ✓ August 1999 to May 2004: Eastern Cape field officer for the South African Crane Working Group of the Endangered Wildlife Trust
- ✓ May 2004 to November 2007: National Field officer for Eskom-EWT Strategic Partnership and Airports Company SA – EWT Strategic Partnership (both programmes of Endangered Wildlife Trust)
- ✓ November 2007 to August 2011: Programme Manager – Wildlife & Energy Programme – Endangered Wildlife Trust
- ✓ August 2011 to present: Independent avifaunal specialist – Director at WildSkies Ecological Sevices (Pty) Ltd

Relevant achievements:

- ✓ Recipient of BirdLife South Africa's Giant Eagle Owl in 2011 for outstanding contribution to bird conservation in SA
- ✓ Founded and chaired for first two years – the Birds and Wind Energy Specialist Group (BAWESG) of the Endangered Wildlife Trust & BirdLife South Africa.

Conferences attended and presented at:

- ✓ May 2011. Conference of Wind Energy and Wildlife, Trondheim, Norway.

- ✓ March 2011. Chair and facilitator at Endangered Wildlife Trust – Wildlife & Energy Programme – "2011 Wildlife & Energy Symposium", Howick, SA
- ✓ September 2010 – Raptor Research Foundation conference, Fort Collins, Colorado. Presented on the use of camera traps to investigate Cape Vulture roosting behaviour on transmission lines
- ✓ May 2010 - Wind Power Africa 2010. Presented on wind energy and birds
- ✓ October 2008. Session chair at Pan-African Ornithological Conference, Cape Town, South Africa
- ✓ March 27 – 30 2006: International Conference on Overhead Lines, Design, Construction, Inspection & Maintenance, Fort Collins Colorado USA. Presented a paper entitled "Assessing the power line network in the Kwa-Zulu Natal Province of South Africa from a vulture interaction perspective".
- ✓ June 2005: IASTED Conference at Benalmadena, Spain – presented a paper entitled "Impact of bird streamers on quality of supply on transmission lines: a case study"
- ✓ May 2005: International Bird Strike Committee 27th meeting – Athens, Greece. Presented a paper entitled Bird Strike Data analysis at SA airports 1999 to 2004.
- ✓ 2003: Presented a talk on "Birds & Power lines" at the 2003 AGM of the Amalgamated Municipal Electrical Unions – in Stutterheim - Eastern Cape
- ✓ September 2000: 5th World Conference on Birds of Prey in Seville, Spain.

Papers & publications:

- ✓ Prinsen, H.A.M., J.J. Smallie, G.C. Boere, & N. Pires. (compilers), 2011. Guidelines on how to avoid or mitigate impacts of electricity power grids on migratory birds in the African-Eurasian Region. CMS Technical Series Number XX. Bonn, Germany.
- ✓ Prinsen, H.A.M., J.J. Smallie, G.C. Boere, & N. Pires. (compilers), 2011. Review of the conflict between migratory birds and electricity power grids in the African-Eurasian region. CMS Technical Series Number XX, Bonn, Germany.
- ✓ Jenkins, A.R., van Rooyen, C.S, Smallie, J.J, Harrison, J.A., Diamond, M.D., Smit-Robinson, H.A & Ralston, S. 2014. Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa
- ✓ Jenkins, A.R., Shaw, J.M., Smallie, J.J., Gibbons, B., Visagie, R. & Ryan, P.G. 2011. Estimating the impacts of power line collisions on Ludwig's Bustards Neotis ludwigii. Bird Conservation International.
- ✓ Jordan, M., & Smallie, J. 2010. A briefing document on best practice for pre-construction assessment of the impacts of onshore wind farms on birds. Endangered Wildlife Trust , Unpublished report
- ✓ Smallie, J., & Virani, M.Z. 2010. A preliminary assessment of the potential risks from electrical infrastructure to large birds in Kenya. Scopus 30: p32-39
- ✓ Shaw, J.M., Jenkins, A.R., Ryan, P.G., & Smallie, J.J. 2010. A preliminary survey of avian mortality on power lines in the Overberg, South Africa. Ostrich 2010. 81 (2) p109-113
- ✓ Jenkins, A.R., Smallie, J.J., & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 2010. 20: 263-278.
- ✓ Shaw, J.M., Jenkins, A.R., Ryan, P.G., & Smallie, J.J. 2010. Modelling power line collision risk for the Blue Crane *Anthropoides paradiseus* in South Africa. Ibis 2010 (152) p590-599.
- ✓ Jenkins, A.R., Allan, D.G., & Smallie, J.J. 2009. Does electrification of the Lesotho Highlands pose a threat to that countries unique montane raptor fauna? Dubious evidence from surveys of three existing power lines. Gabar 20 (2).
- ✓ Smallie, J.J., Diamond, M., & Jenkins, A.R. 2008. Lighting up the African continent – what does this mean for our birds? Pp 38-43. In Harebottle, D.M., Craig, A.J.F.K., Anderson, M.D., Rakotomanana, H., & Muchai. (eds). Proceedings of the 12th Pan-african Ornithological Congress. 2008. Cape Town. Animal Demography Unit. ISBN (978-0-7992-2361-3)
- ✓ Van Rooyen, C., & Smallie, J.J. 2006. The Eskom –EWT Strategic Partnership in South Africa: a brief summary. Nature & Faunae Vol 21: Issue 2, p25

- ✓ Smallie, J. & Froneman, A. 2005. Bird Strike data analysis at South African Airports 1999 to 2004. Proceedings of the 27th Conference of the International Bird Strike Committee, Athens Greece.
- ✓ Smallie, J. & Van Rooyen, C. 2005. Impact of bird streamers on quality of supply on transmission lines: a case study. Proceedings of the Fifth IASTED International Conference on Power and Energy Systems, Benalmadena, Spain.
- ✓ Smallie, J. & Van Rooyen, C. 2003. Risk assessment of bird interaction on the Hydra-Droërivier 1 and 2 400kV. Unpublished report to Eskom Transmission Group. Endangered Wildlife Trust. Johannesburg. South Africa
- ✓ Van Rooyen, C. Jenkins, A. De Goede, J. & Smallie J. 2003. Environmentally acceptable ways to minimise the incidence of power outages associated with large raptor nests on Eskom pylons in the Karoo: Lessons learnt to date. Project number 9RE-00005 / R1127 Technology Services International. Johannesburg. South Africa
- ✓ Smallie, J. J. & O'connor, T. G. (2000) Elephant utilization of *Colophospermum mopane*: possible benefits of hedging. African Journal of Ecology 38 (4), 352-359.

Courses & training:

- ✓ Successfully completed a 5 day course in High Voltage Regulations (modules 1 to 10) conducted by Eskom – Southern Region
- ✓ Successfully completed training on, and obtained authorization for, live line installation of Bird Flappers

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

APPENDIX E4:

Visual

VISUAL IMPACT ASSESSMENT

Scoping and Environmental Impact Assessment for the proposed development of three 100 MW Solar Photovoltaic Facilities (Skeerhok PV 1, PV 2, & PV 3) & 132 kV overhead transmission line near Kenhardt in the Northern Cape Province

Prepared by:
Council for Scientific and Industrial Research
Stellenbosch, South Africa

Contact person:
Luanita Snyman-van der Walt
Tel: +27 21 888 2490
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March 2018

Scoping and Environmental Impact Assessment for the proposed development of three 100 MW Solar Photovoltaic Facilities, near Kenhardt in the Northern Cape Province	
Visual Impact Assessment: Environmental Impact Assessment Phase Input	
CSIR Report Number	CSIR/IU/021MH/ER/2017/0013/A
Prepared by	Luanita Snyman-van der Walt (CSIR)
Version	Final
Date	March 2018

SPECIALIST EXPERTISE

LUANITA SNYMAN-VAN DER WALT
MSc Environmental Science (NWU)
Pr. Sci. Nat. Environmental Science

Specialisation: Environmental Assessment and Management; Geographic Information Systems; Landscape & Urban Ecology

Luanita commenced work at CSIR in January 2014, after completing a BSc. Botany-Zoology-Tourism, a BSc. Hons. in Environmental Science, as well as a MSc. in Environmental Science at the North West University, Potchefstroom Campus. She is pursuing a MSc. In Geographical Information Science at Vrije Universiteit Amsterdam, and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (Reg. no. 400128/16).

Her work at the CSIR involves strategic environmental assessment and management, with a focus on Geographic Information System (GIS) analyses for environmental assessment and decision-making.

QUALIFICATIONS

2017 - current	MSc. Geographic Information Science	Vrije Universiteit, Amsterdam, Netherlands
2013	MSc. Environmental Science *(Cum Laude)*	North West University, Potchefstroom, South Africa
2010	BSc. Hons. Environmental Science	North West University, Potchefstroom, South Africa
2009	BSc. Botany- Zoology-Tourism	North West University, Potchefstroom, South Africa

PROJECT TRACK RECORD

Completion	Description	Role	Client
In progress	GEF funded biodiversity and land use projects	Project management, technical/specialist support, and mentoring	SANBI
In progress	Scoping and Environmental Impact Assessment for the proposed development of the Kap Vley Wind Energy Facility near Kleinzee in the Northern Cape	Specialist study: Aquatic Ecology	juwi Renewable Energies
In progress	Sustainable Development Goal Lab on “Mainstreaming resilience into climate change adaptation and disaster risk planning.”	Project leader	Future Earth; Stockholm Resilience Centre; University of Tokyo (funders)
In progress	Strategic Environmental Assessment Aquaculture Development in South Africa	Project member – Technical GIS and mapping	Department of Environmental Affairs
June 2017	Strategic Environmental Assessment for the development of Shale Gas in South Africa	Project officer	Department of Environmental Affairs
December 2017	Guidance for Resilience in the Anthropocene: Investments for development (GRAID) – African Cities.	Project member: Sustainability assessment guideline	Stockholm Resilience Centre (funder)
January 2017	Environmental and Social Impact Assessment for the Floating Liquid Natural Gas project near Kribi, Cameroon.	Project member – Technical GIS and mapping, ecology inputs	Golar

Completion	Description	Role	Client
October 2016	Environmental Screening Study for the Giyani Waste Oil Boiler, Limpopo: Environmental management plan for the Hi-Hanyile essential oil distillery	Project manager	CSIR Enterprise Creation for Development
September 2016	Scoping and Environmental Impact Assessment for 5 x 100 MW Solar PV facilities near Dealesville, Free State.	Project manager	29 Solar
June 2016	Environmental and Social Impact Assessment for the Bomono Early Field Development Project, Cameroon.	Project member - Technical GIS and mapping, ecology inputs	EurOil
May 2016	Scoping and Environmental Impact Assessment for the proposed Development of a 7 x 75 MW Solar Photovoltaic Facilities near Kenhardt, Northern Cape	Project member - Technical GIS and mapping	Mulilo
April 2016	Scoping and Environmental Impact Assessment for the Proposed Development 3 x 75 MW Solar Photovoltaic Facilities near Kenhardt, Northern Cape	Project member - Technical GIS and mapping	Scatec
April 2016	Strategic Environmental Assessment for identification of electricity grid infrastructure development corridors in South Africa	Project member - Technical GIS and mapping	Department of Environmental Affairs
February 2016	Environmental Impact Assessment for the development of 12 Solar PV projects near Dealesville, Free State.	Project member - Technical GIS and mapping, ecology inputs, stakeholder engagement	Mainstream Renewable Energy
September 2015	Environmental Screening Study for the Proposed Vaayu Energy SA Wind Energy Facility near Wesley, Eastern Cape	Project leader	Vaayu Energy
February 2015	Environmental Screening Study for Biochar- and Composting facilities in the Umzimvubu Catchment	Project member - Technical GIS and mapping & ecology inputs	Department of Environmental Affairs
March 2015	Strategic Environmental Assessment for identification of renewable energy zones for wind and solar PV projects in South Africa	Project member - Technical GIS and mapping	Department of Environmental Affairs
November 2014	Rapid environmental screening study for WASA wind monitoring masts (11-15) in the eastern cape, Kwazulu-Natal and Free State provinces, South Africa	Project member - Technical GIS and mapping	CSIR Built Environment
August 2014	Environmental Screening Study for the importation of Liquid Natural Gas into the Western Cape	Project member - Technical GIS and mapping, ecology inputs	Western Cape Government
March 2014	Environmental Screening Study for a Proposed LNG Terminal at Saldanha and associated pipeline infrastructures to Atlantis and Mossel Bay, Western Cape	Project member - Technical GIS and mapping, ecology inputs	PetroSA

SPECIALIST DECLARATION

I, **LUANITA SNYMAN-VAN DER WALT,** 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.

Signature of the specialist: ____

Name of Specialist: __LUANITA SNYMAN-VAN DER WALT______________________________

Date: _19 January 2018____

EXECUTIVE SUMMARY

This document constitutes the Visual Impact Assessment (VIA) as part of the Environmental Impact Assessment (EIA) for the juwi Skeerhok Solar Photovoltaic (PV) development, consisting of Skeerhok PV1, Skeerhok PV2, Skeerhok PV3, and associated 132 kV powerline (Skeerhok PV – Transmission Line). This assessment draws on VIAs conducted for other solar PV developments in the direct vicinity of the juwi Solar PV development.

The proposed juwi Skeerhok PV development project area is situated approximately 40 km north-east of Kenhardt, Northern Cape. The landscape is characterised as a semi-desert steppe, sparsely vegetated by grassland with patchy occurrence of low shrubs, with a very slight elevation profile, and is mainly used for sheep farming. Existing approvals for solar PV developments, the construction of high-voltage electricity infrastructure in the direct surroundings of the project area, and the Saldanha-Sishen railway with overhead powerlines entails that the rural / pastoral landscape has been transformed by existing infrastructure to have a more industrial/electrical character. Furthermore, the landscape sensitivity, as determined by a Strategic Environmental Assessment which informed the establishment of Renewable Energy Development Zones for South Africa, is classified as low from a visual, scenic, aesthetic and amenity perspective.

The following impact drivers/pathways may lead to visual intrusion impacting on the views of potential sensitive visual receptors:

- Clearance of vegetation for solar field, laydown areas, buildings and roads
- Increased traffic
- Night lighting
- Dust
- Veld fires
- Established infrastructure
- Cumulative effects of the abovementioned impact drivers from all the proposed solar PV development in the proposed project area

A Viewshed Analysis was conducted using ArcMap 10.5 software. The height of the tallest structure on site and the boundary of the farm portions on which the juwi Skeerhok PV development is proposed was used as the extent of the development to simulate ‘worst case’ conditions.

The impact of visual intrusion to the views of potential sensitive visual receptors is expected to be moderate to low (before mitigation) and moderate to very low, with the effective implementation of the mitigation and management actions outlined in this report.

Due to the existing landscape character, and foreseeable trend of renewable energy and associated electricity infrastructure development in the area, the cumulative impacts to the views of potential sensitive visual receptors are expected to be moderate, if all the proposed solar PV developments in the area implement proposed mitigation measures and best practice to reduce visual impacts.

Based on the findings in this VIA it has been concluded that the juwi Skeerhok PV development, including its associated electricity infrastructure, from a visual, scenic, aesthetic and amenity perspective, may receive EA with adherence to the mitigation and management measures set out in this report.

LIST OF ABBREVIATIONS

DEA	Department of Environmental Affairs
DEM	Digital Elevation Model
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
I&AP	Interested and Affected Party
kV	Kilovolt
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003)
NHRA	National Heritage Resources Act (Act 25 of 1999)
PV	Photovoltaic
REDZ	Renewable Energy Development Zone
SACAD	South African Conservation Areas Database
SAPAD	South African Protected Areas Database
SEA	Strategic Environmental Assessment
SKA	Square Kilometre Array
VIA	Visual Impact Assessment

GLOSSARY

Definitions	
Landscape baseline	Existing elements, features, characteristics, character, quality and extent of the landscape (GLVIA, 2002).
Landscape character	Distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It creates the particular sense of place of different areas of the landscape (GLVIA, 2002).
Viewer sensitivity	The assessment of the receptivity of viewer groups to the visible landscape elements and visual character and their perception of visual quality and value. The sensitivity of viewer groups depends on their activity and awareness within the affected landscape, their preferences, preconceptions and their opinions.
Viewshed	A viewshed is an area of land, water, and other environmental elements that is visible from a fixed vantage point. In digital imaging, a viewshed is a binary raster indicating the visibility of a viewpoint for an area of interest. A pixel with a value of unity indicates that the viewpoint is visible from that pixel, while a value of zero indicates that the viewpoint is not visible from the pixel.
Visual impact assessment	A specialist study to determine the visual effects of a proposed development on the surrounding environment. The primary goal of this specialist study is to identify potential risk sources resulting from the project that may impact on the visual environment of the study area, and to assess their significance. These impacts include landscape impacts and visual impacts on receptors.
Visual intrusion	The level of compatibility of the project with the particular qualities of the area – its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape (Oberholzer, 2005).
Visual receptors	Viewer groups such as the local community, residents, workers, the broader public and visitors to the area, as well as public or community areas from which the development is visible.
Visual resource	The visible landscape and its recognisable elements which, through their coexistence, result in a particular landscape and visual character

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS (AS AMENDED)

Requirements of Appendix 6 – GN R326 of NEMA EIA Regulations as amended (7 April 2017)	**Where 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;	Pg 1
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Pg 2
c) an indication of the scope of, and the purpose for which, the report was prepared; (ca) an indication of the quality and age of base data used for the specialist report; (cb) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 1.1 – 1.2 Section1.5 Section 2 Section 6.8
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Not applicable, the short vegetation will offer minimal screening and therefore the same impacts are expected throughout the year.
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.3
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternatives;	Section 2.5 Section 6.1
g) an identification of any areas to be avoided, including buffers;	None
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 2.3 Section 6.1
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.4
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 6 Section 7 Section 9
k) any mitigation measures for inclusion in the EMPr;	Section 6 Section8
l) any conditions for inclusion in the environmental authorisation;	None
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8
n) a reasoned opinion- i. whether the proposed activity, activities or portions thereof should be authorised; (ia) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity 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 9
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	None
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	None
q) any other information requested by the competent authority.	Peer Review conducted

	(See Appendix A of this study)
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	None

TABLE OF CONTENTS

TABLES AND FIGURES

VISUAL IMPACT ASSESSMENT

1. INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

juwi Renewable Energies is proposing the development of three 100 MW solar photovoltaic (PV) facilities on Smutshoek Farm 395 (Skeerhok PV1 and Skeerhok PV3) and Portion 9 of Gemsbok Bult Farm 120 (Skeerhok PV2), as well as overhead 132 kilovolt (kV) powerlines on farms Smutshoek Farm 395 and Portions 3, 5, and 9 of Gemsbok Bult Farm to connect to the existing Eskom Nieuwehoop substation on Portion 3 of Gemsbok Bult Farm 120, near Kenhardt in the Northern Cape.

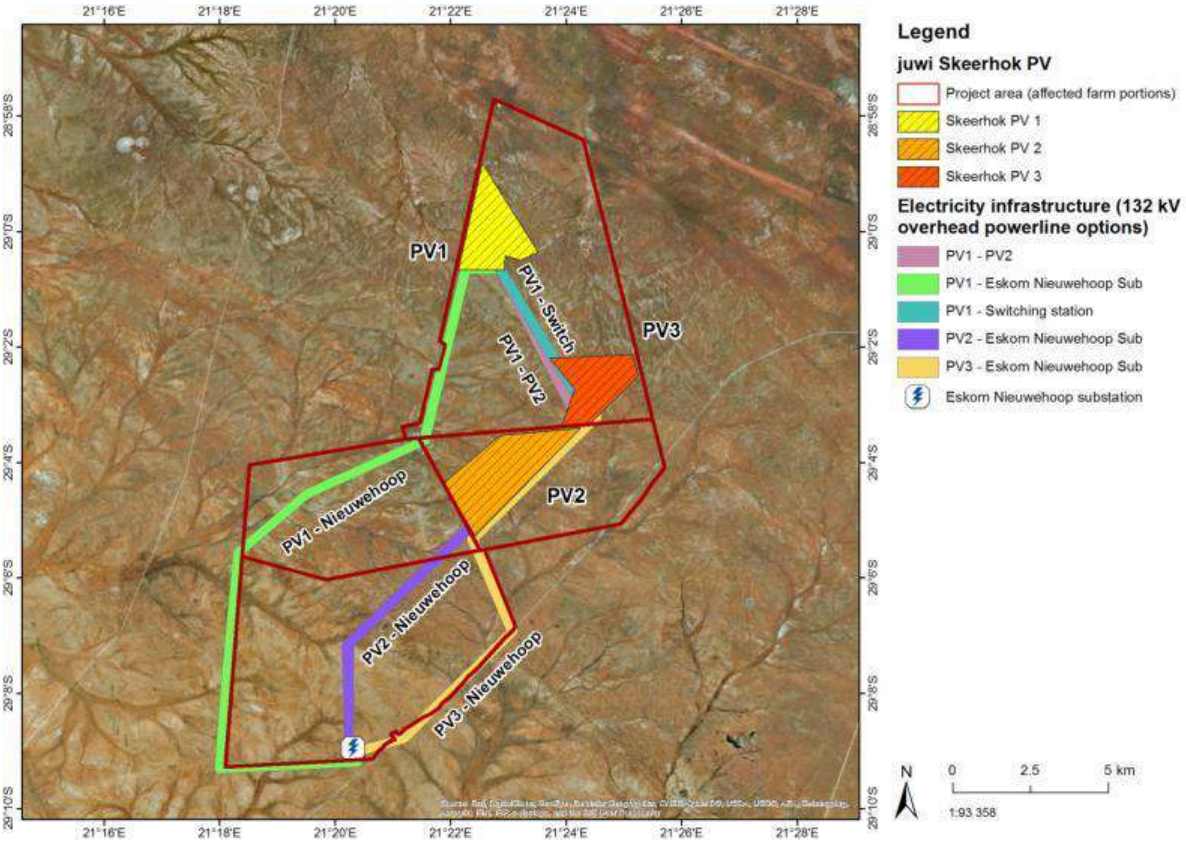

Figure 1: Layout of the proposed juwi Skeerhok solar PV development and 132 kV overhead powerlines.

Although separate Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes were conducted for the respective Skeerhok PV 1, PV 2, PV 3 projects (full scoping and EIA) and the electricity infrastructure (BA), this **VIA report is representative of the entire development, hereafter referred to as the "proposed juwi Skeerhok PV development". Thus, this VIA has assessed both the Skeerhok SEF and the Transmission line in one report.** The farm portions on which the juwi Skeerhok PV development is proposed, are collectively referred to as the “project area”.

This document constitutes the Visual Impact Assessment (VIA) as part of the EIA for the juwi Skeerhok PV development, and draws on VIAs conducted for other solar PV developments in the direct vicinity of the solar PV developments proposed by juwi.

1.2 Terms of Reference

The Terms of Reference for this VIA include:

- A desktop review of existing literature (e.g. including the EIAs of neighbouring PV developments);
- Mapping of potential sensitive visual receptors;
- Geographic Information System (GIS) analysis using ArcMap software (Esri Inc., 2017) to determine the visibility of the proposed juwi solar PV development (Viewshed Analysis);
- Impact assessment and cumulative impact assessment;
- Recommendations for mitigation, management and monitoring actions as input to the Environmental Management Programme (EMPr).

1.3 Approach and Methodology

This VIA has been conducted in accordance with the requirements of Appendix 6 of the 2014 NEMA EIA Regulations, and follows guidelines for VIA provided by the Provincial Government of the Western Cape and CSIR (Oberholzer, 2005), and the Landscape Institute of the UK (GLVIA, 2002).

1.3.1 Landscape description

A desktop study was conducted to establish and describe the landscape character of the receiving environment. A combination of data analysis using GIS and a review of existing literature was used to identify and describe landscape elements and character in relation to the visual environment. Potential areas of scenic interest and sensitive visual receptors were also identified.

1.3.2 Viewshed Analysis

A Viewshed Analysis was conducted for the surrounding region of the proposed project area and components of the development relevant to the assessment of the potential visual impact (in a 10 km radius) using ArcMap software (Esri Inc., 2017).

1.3.3 Sensitivity assessment

High-level sensitivity was based on the Strategic Environmental Assessment (SEA) for wind and solar photovoltaic energy in South Africa (DEA, 2015). At a finer scale, potential sensitive visual receptors and/or scenic resources were identified. These generally include: Topographic features; major rivers, water bodies, wetlands; private reserves/resorts; human settlements; national and provincial roads; scenic routes and passes; passenger rail lines; cultural landscapes; national parks; and nature reserves (Oberholzer et al., 2016).

1.3.4 Assessment of impacts and identification of management actions

The consequence of an impact and the likelihood of its occurrence were the main factors in determining the significance of impacts to potentially sensitive visual receptors. The consequence rating also takes into account aspects such as extent and duration of the impact, as well as the sensitivity of the receiving visual environment. Management actions were drawn from best practice and VIAs conducted for other solar PV developments in the region (e.g CSIR, 2015; CSIR, 2016a, CSIR, 2016b).

1.4 Assumptions and Limitations

1.4.1 Consultation

No consultation, apart from that undertaken as part of the formal EIA process, was undertaken. No specific comments or additional issues have been raised by I&APs specifically relating to visual impacts. Furthermore, it is assumed that the potential changes to the current landscape character and impacts to visual receptors have been deemed acceptable to Interested and Affected Parties (I&APs) that participated in the EIA for other approved solar PV projects in the direct vicinity of the proposed Skeerhok PV development.

1.4.2 Desktop assessment

This study is a desktop assessment, drawing on the findings and recommendations of the extensive VIAs as part of EIA reports that have been compiled for the area where the juwi Skeerhok PV development is proposed (e.g. see CSIR, 2015; CSIR, 2016a, CSIR, 2016b).

1.4.3 Mitigation measures

Mitigation measures in this report will assume that construction activities are managed and performed in such a way as to minimise its impact on the receiving environment. The following assumptions, in particular, apply since they are relevant to minimising visual impact during the construction phase:

- Good housekeeping will be maintained on site to avoid litter and minimise waste;
- Construction boundaries will be demarcated and areas of surface disturbance will be minimised;
- Existing roads will be used where possible;
- Vegetation removal and surface disturbance will be minimised and take advantage of existing clearings;
- Topsoil from the site will be stripped, stockpiled, and stabilised before excavating earth for the construction of the facility;
- Plant material from indigenous vegetation removal will be mulched and applied to disturbed/exposed soil to aid in the rehabilitation process;
- Plans will be set in place to control and minimise erosion risks, and rehabilitate cleared areas as soon as possible; and
- Plans will be in place to minimise fire hazards and dust generation.

1.4.4 Cumulative impacts

Cumulative impacts are assessed by adding expected impacts from this proposed development to existing and proposed developments with similar impacts in a 30 km radius. The existing and proposed developments that were taken into consideration for cumulative visual impacts include solar PV developments in direct vicinity of the juwi Skeerhok PV development project area:

- Three 75 MW solar PV facilities proposed by Mulilo Renewable Project Developments in 2014 – all of which have received Environmental Authorisation (EA) (CSIR, 2015);
- Seven 75 MW solar PV facilities proposed by Mulilo Renewable Project Developments in 2015 – four of which have received EA (CSIR, 2016a);
- Three 75 MW solar PV facilities proposed by Scatec Solar SA in 2015– all of which have received EA (CSIR, 2016b); and
- Proposed Vanguard Solar Kleinbegin 50 MW PV Facility, Northern Cape Province (Savannah, 2011).

The Department of Environmental Affairs (DEA) has indicated that, due to the potential impact of renewable energy development to the Square Kilometre Array (SKA), it envisages that no more than six approved renewable energy developments will be awarded preferred bidder status in the Kenhardt area. This being said, the cumulative visual impact assessment was based on the precautionary approach and assumed that all projects will be developed (i.e. 'worst case scenario') within the area for the cumulative impact assessment, and provides a statement on how the cumulative impacts would differ if only six projects were to be constructed.

1.4.5 Accuracy of spatial data

The most recent available and obtainable spatial data was utilised for this VIA. It must be noted that the spatial data originate from different sources and have been created at various scales and resolutions. Discrepancies and scale incompatibilities may exist. Furthermore, data from the SPOT Building Count (see Table 1) has been used to identify potential sensitivity visual receptors. However, it must be noted that not all structures recorded in the SPOT Building Count are necessarily occupied, and have not been verified as part of this VIA.

1.4.6 Viewshed Analysis

Viewsheds were calculated using a 20 m resolution Digital Elevation Model (DEM). The viewshed calculations do not take into account the potential screening effect of other vertical structures in the landscape, such as vegetation and buildings. Due to the relatively low vegetation cover in the region and the size and extent of the solar energy facility, the screening potential of vegetation is likely to be minimal over most distances.

The maximum height of the highest component of the entire development (i.e. Skeerhok PV areas and associated electricity infrastructure (see Table 3)) was used for the viewshed analysis to simulate a worst-case scenario. The boundary of the farm portions on which the juwi Skeerhok

PV development is proposed (project area) was used as the extent of the development, again to simulate ‘worst case’ conditions.

1.5 Information sources

1.5.1 Literature

The following literary information was used for conducting this VIA:

- Documentation supplied by the developer and the CSIR Environmental Assessment Practitioner;
- SEA for wind and solar photovoltaic energy in South Africa (DEA, 2015); and
- EIA reports for surrounding PV developments (CSIR, 2015, 2016a, 2016b).

1.5.2 Spatial data

The spatial data sets used for the landscape description and viewshed analysis are presented in Table 1 below.

1.5.3 Software

The following software was used for the landscape description and viewshed analysis included in this VIA:

- Esri ArcMap software (Esri Inc., 2017); and
- Google Earth (Google Inc., 2015).

Table 1: Spatial data utilised for the juwi Skeerhok PV development Visual Impact Assessment.

Data	Date	Description	Resolution/ scale	Format	Source
South African National Land Cover	2014	The land-cover dataset covers the whole of South Africa and is presented in a map-corrected, raster format. The dataset contains landcover classes, ranging from natural to man-made landscape characteristics.	30 m	Raster	South African Department of Environmental Affairs
Digital Elevation Model	2002	20m digital contours, spotheights, coastline and inland water area data captured from South African 1:50 000 scale topographical mapping.	20 m	Raster	
Roads	2006	Geometric location and attribute information of road centrelines.	1:50 000	Vector (polyline)	South African Department of Rural Development and Land Reform
Railways	2006	Geometric location and attribute information of rail centrelines.	1:50 000	Vector (polyline)	South African Department of Rural Development and Land Reform
SPOT Building Count	2011	The location of dwelling units/building structures or dense informal areas mapped using SPOT 2.5 m natural colour satellite imagery.	2.5 m	Vector (points)	Eskom
Towns	2004	Extent of town allotments.	1: 25 000	Vector (polygon)	South African Chief Surveyor General

Data	Date	Description	Resolution/ scale	Format	Source
South African Protected Areas and South African Conservation Areas	2017	The South African Protected Areas Database (SAPAD) and Conservation Areas Database (SACAD) contains spatial data for the conservation estate of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. Quarter 3 of 2017.	1: 5 000	Vector (polygon)	South African Department of Environmental Affairs
South African Renewable Energy EIA Application Database	2017	The South African Renewable Energy EIA Application Database contains spatial data for renewable energy applications for environmental authorisation. It includes spatial and attribute information for both active (in process and with valid authorisations) and non-active (lapsed or replaced by amendments) applications. Quarter 3 of 2017.	1: 5 000	Vector (polygon)	South African Department of Environmental Affairs

2. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The proposed juwi Skeerhok PV development project area is situated approximately 40 km north-east of Kenhardt, Northern Cape – a sparsely populated town with approximately 4 843 people living at a density of 30.39 per km^2 (StatsSA, 2011).

2.1 Land cover

The landscape is characterised as a semidesert steppe that is sparsely vegetated by grassland with patchy occurrence of low shrubs (Mucina et al., 2006) (Figure 2). The low vegetation and flat terrain provides very limited screening from infrastructure features situated in the landscape/

Figure 2: Photograph depicting the patchy grassland and low shrubland vegetation (CSIR, 2016a; photo credit: Henry Holland).

2.2 Elevation and slope

The elevation characteristics of the project area are very slight (ranging from ~ 900 m – 1050 m) (Figure 3) with an average of slope of 0.5 %, an elevation gain of approximately 27 m on the north-east profile (across 14 km) and 31 m on the east-west profile (across 6 km) (Figure 4) (Google Inc., 2015).

The rolling terrain provides wide open views. Incisions in the terrain would offer limited screening from infrastructure.

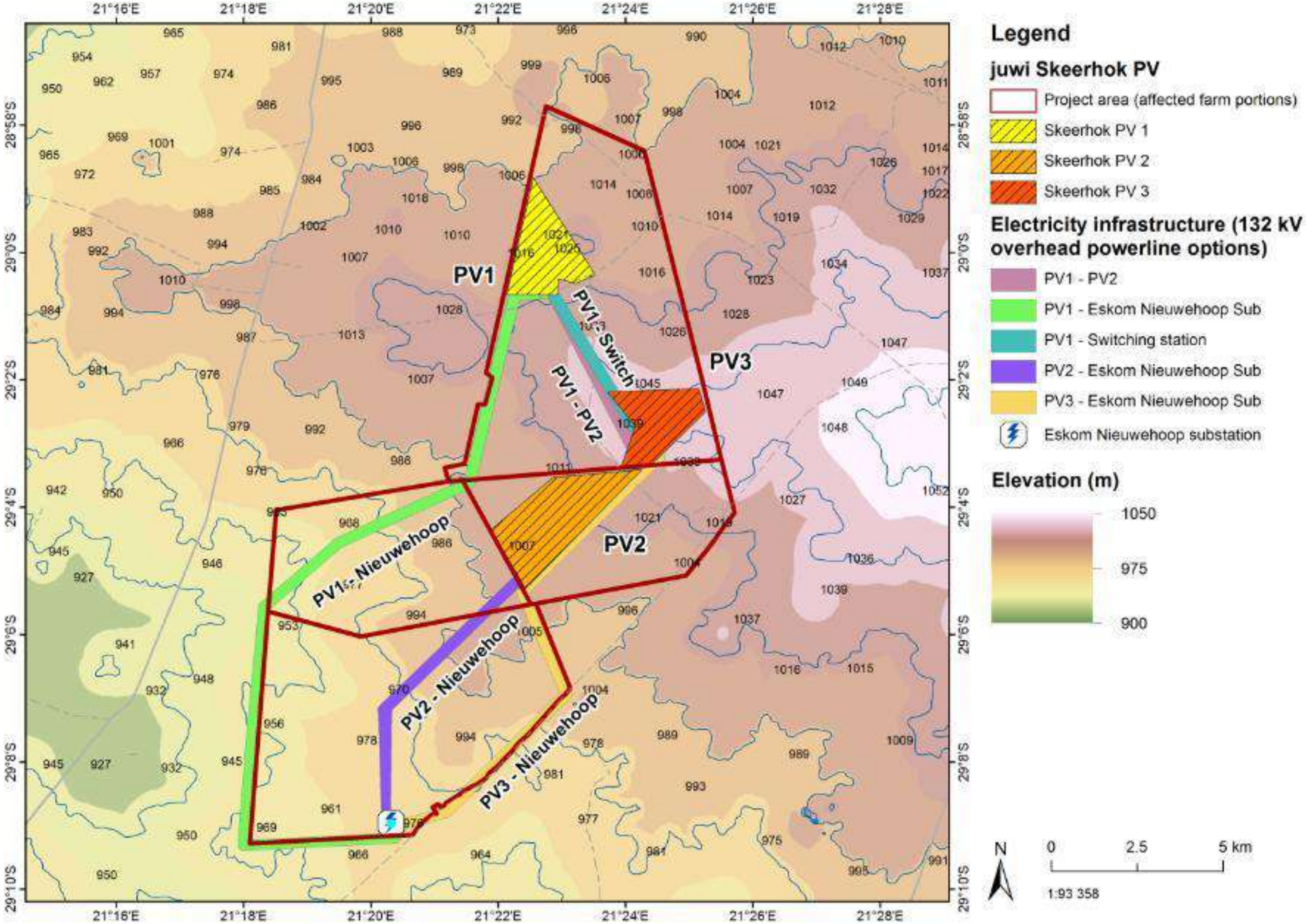

Figure 3: juwi Skeerhok PV1, PV2 and PV3, and associated electricity infrastructure connecting to the existing Eskom Nieuwehoop substation.

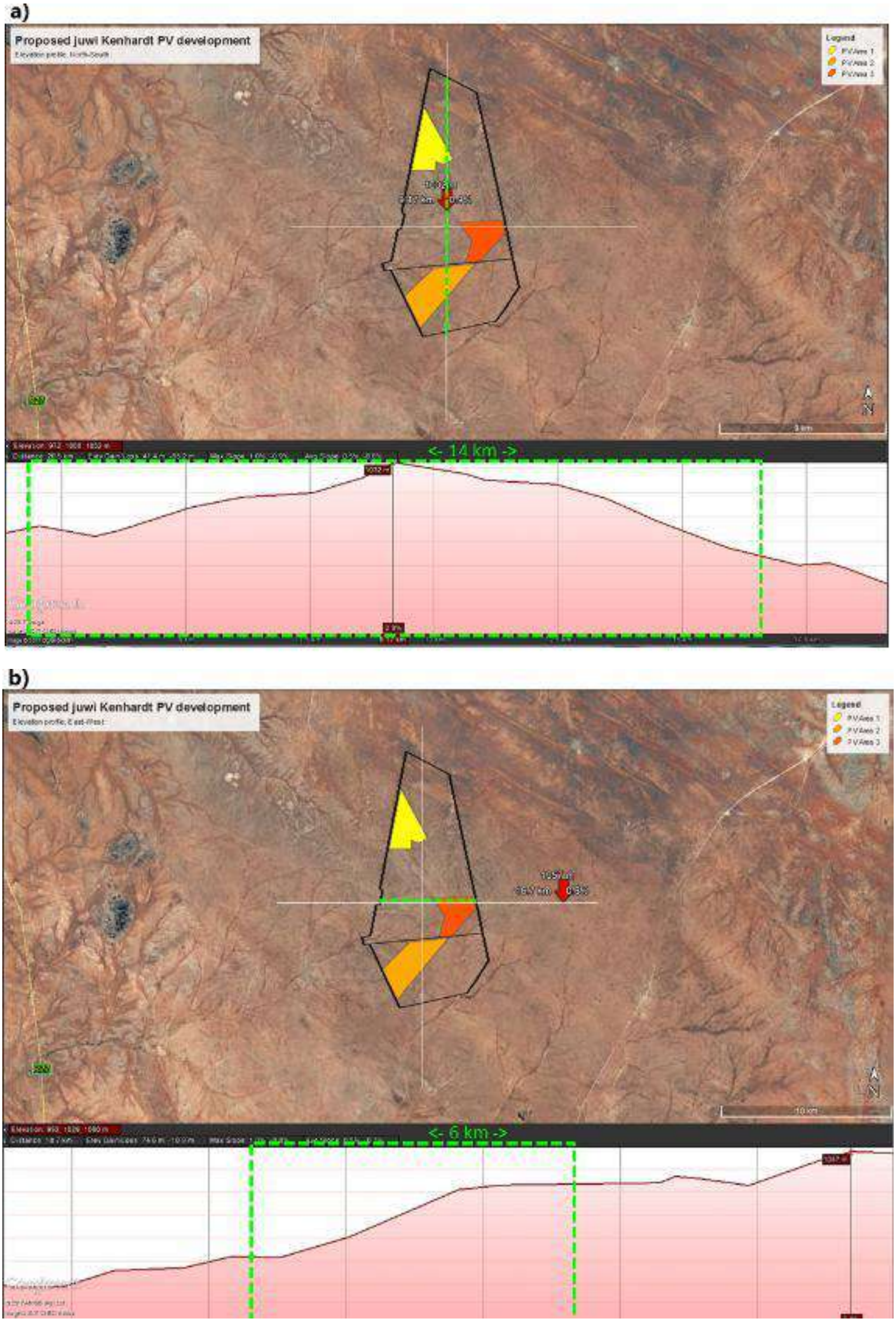

Figure 4: Image indicating the location and position of the juwi Skeerhok PV development project area in the landscape. The green dotted lines indicate the position of the project area in the landscape. There is an elevation gain of approximately a) 27 m on the north-east profile (a) and approximately 31 m on the east-west profile (b) (Google Inc., 2015).

2.3 Infrastructure and land-use

2.3.1 Road

The project area is situated approximately 20 km east of the R27 major provincial road and 20 km north of the R383 secondary road. The R27 connects Upington to Cape Town and may are often utilised by tourists visiting towns along the Orange River valley.

2.3.2 Rail

The south-eastern side of the project area is bordered by the Sishen-Saldanha iron ore railway line that is electrified with overhead lines (Figure 5). A gravel access road runs parallel to the railway line.

Figure 5: Photograph depicting Saldanha-Sishen iron ore railway bordering the south-eastern side of the project area (CSIR, 2016a; photo credit: Henry Holland).

2.3.3 Electricity

The project area does not currently have any high-voltage electricity infrastructure constructed on it. The closest distribution lines are situated approximately 7 km west of the project area, with the high-voltage transmission line that supplies Kenhardt with electricity more than 60 km to the south. A new high-voltage substation, Eskom Nieuwehoop, is currently being constructed just 7 km south of the project area (Figure 6; Figure 8) and will most probably have high-voltage transmission lines connecting to it in the future.

Figure 6: Photograph depicting the Eskom Nieuwehoop substation under construction (CSIR, 2016a; photo credit: Henry Holland).

2.3.4 Buildings/Structures

According to the SPOT Building Count (Eskom, 2011) there are several buildings/structures within 10 km of the project area. At this stage, these are assumed to be mostly farmsteads which are typical of a rural or pastoral environment. It is possible that existing views from these buildings/structures may be affected by the proposed juwi Skeerhok PV development.

2.4 Cultural landscape

Primary features characterising the cultural landscape include fences, water troughs and wind pumps. The sense of place may be described as a remoteness, which has been disturbed by the presence of the Saldanha-Sishen railway, Eskom Nieuwehoop Susbtation and electricity transmission lines (ASHA Consulting, 2018). No visually interesting features exist in the landscape. It is unlikely that the proposed development is visible to anyone other than local residents travelling on the gravel road next to the railway line, or inhabitants of the farms on which the juwi Skeerhok PV development is proposed.

2.5 Visual character

The landscape characteristics described in Sections 2.1 - 2.4 collectively constitute the visual character of the area (Figure 7). The short and sparse vegetation, flat terrain with wide open views characterise this remote rural / pastoral landscape. However, the Eskom Nieuwehoop Substation, along with sufficient solar resource, may be seen as a driver for renewable energy projects, specifically solar PV projects, in the Kenhardt area. A cluster of ten approved 75 MW PV developments are proposed directly towards the south-west of the proposed juwi Skeerhok

PV development. Although construction on these proposed developments has not yet commenced, it is reasonable to assume that they will be constructed in the future (5 – 10 years). Since these projects have all received EA, it is also assumed that the potential changes to the current landscape character and impacts to visual receptors have been deemed acceptable to Interested and Affected Parties (I&APs) that participated in the EIA for the approved solar PV projects.

The approval of solar PV developments and construction of high-voltage electricity infrastructure in the direct surroundings of the project area would contribute to the evident transformation of a rural / pastoral landscape towards a more industrial/electrical landscape character.

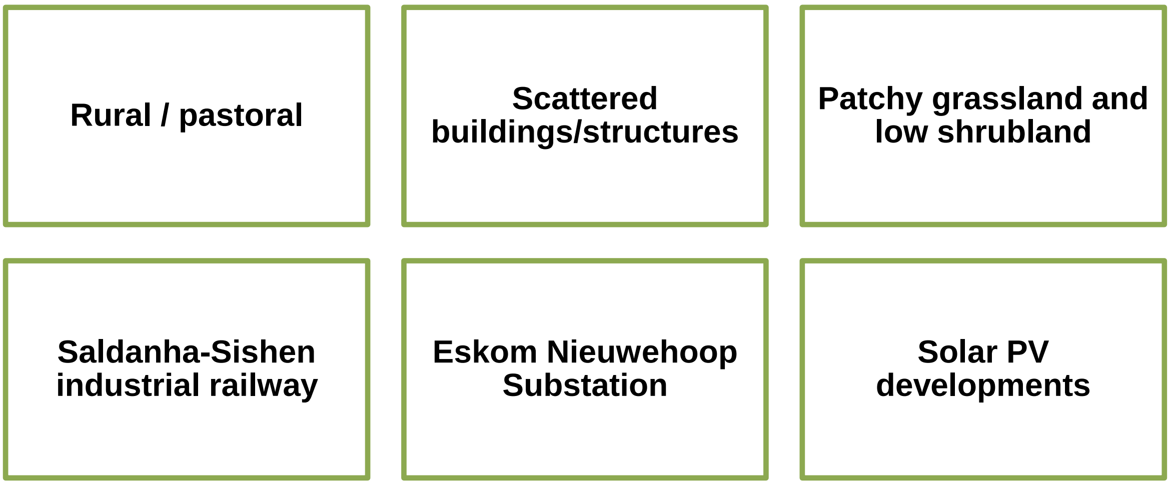

Figure 7: Summary of the key landscape elements that characterise the proposed juwi Skeerhok PV development project area and surrounds.

2.6 Visual receptors

The potential visual receptors that may be impacted by the proposed juwi Skeerhok PV development that have been identified in this desktop Scoping investigation mainly include:

- National protected/conservation areas;
- Residents of farms in and around the project area;
- Residents of towns within the vicinity of the project area; and
- Road users of the R27, R383 and other access roads in and around the project area.

Based on the distances of the project area from protected areas, tourist and major access routes, and the town of Kenhardt (Table 2; Figure 8) it is unlikely that the views of these potential visual receptors will be significantly adversely affected by the proposed juwi Skeerhok PV development. The greatest risk of visual impact would be to residents of farms in and around the project area.

Table 2: Potential visual receptors that may be impacted by the proposed juwi Skeerhok PV development.

Potential sensitive visual receptor	Distance and direction from project area
Residents of farms in and around the project area	17 structures are seemingly present on the proposed project area, with multiple present within 20 km of the project area. Not all of these structures are necessarily occupied. And discrepancies in the SPOT building count data may also register farm dams or kraals as buildings.
Motorists on other major access - R383	19 km south
Motorists on tourist routes - R27	20 km west
Residents of towns – Kenhardt	26 km south west
Visitors to and residents/staff of protected/conservation areas	48 km north west (Tierberg Nature Reserve)

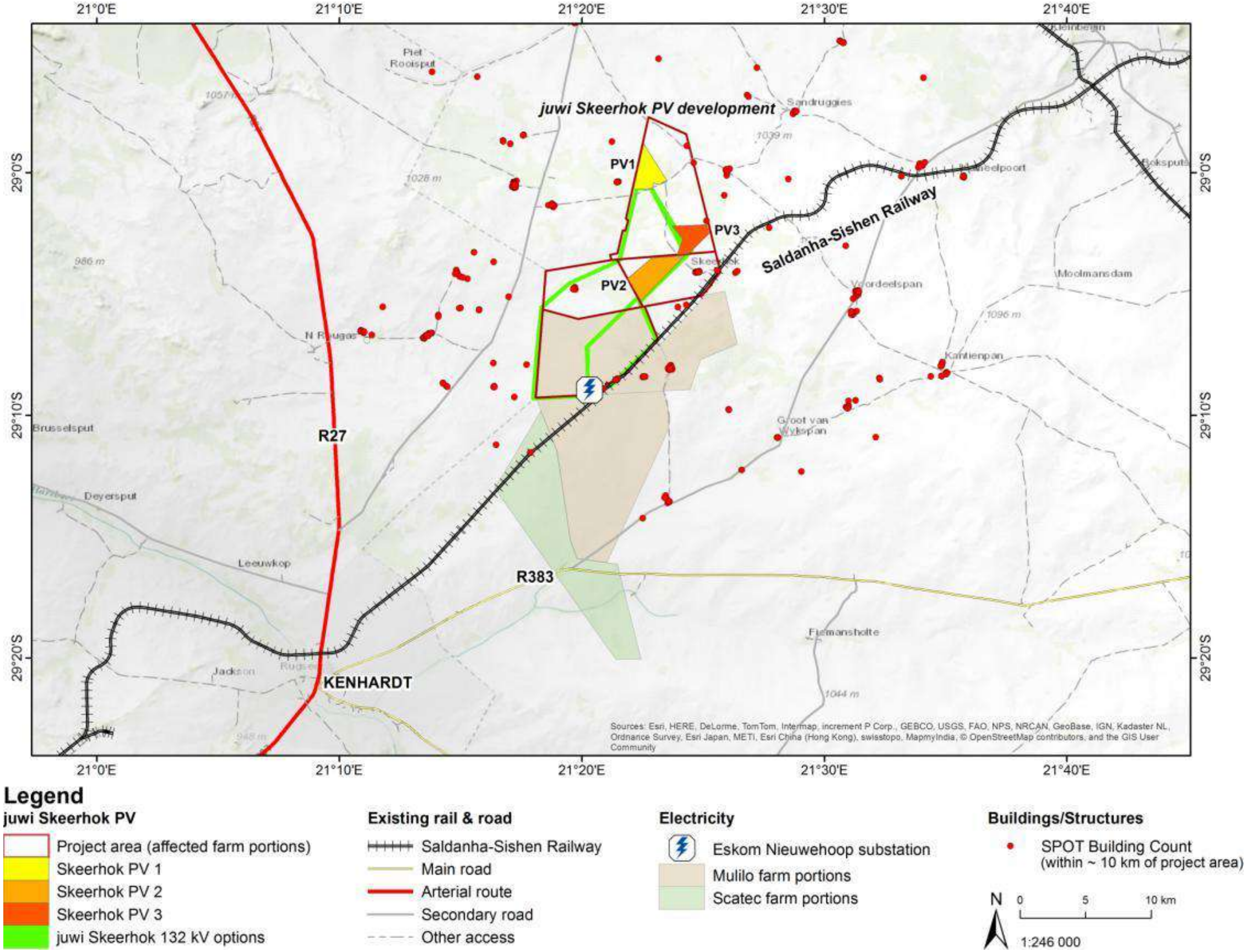

Figure 8: Summary of key landscape features and potential sensitive visual receptors in the project area and surrounds.

2.7 Sensitivity

The juwi Skeerhok PV development is situated within a Renewable Energy Development Zone (REDZ) – specifically the Upington REDZ - which was investigated as part of the SEA for wind and solar photovoltaic energy in South Africa commissioned by the DEA (DEA, 2015). The SEA included an assessment of the landscape sensitivities of features within REDZ which considered visual, scenic, aesthetic and amenity value. "Landscape sensitivity was determined as part of this study through the identification of natural, scenic and cultural resources which have aesthetic and economic value to the local community, the region, and society as a whole." (DEA, 2015: part 3, section 2, pg 2).

The landscape/visual sensitivity of the area where the juwi Skeerhok PV development is proposed, has been classified as having a low sensitivity to solar PV development (Figure 9).

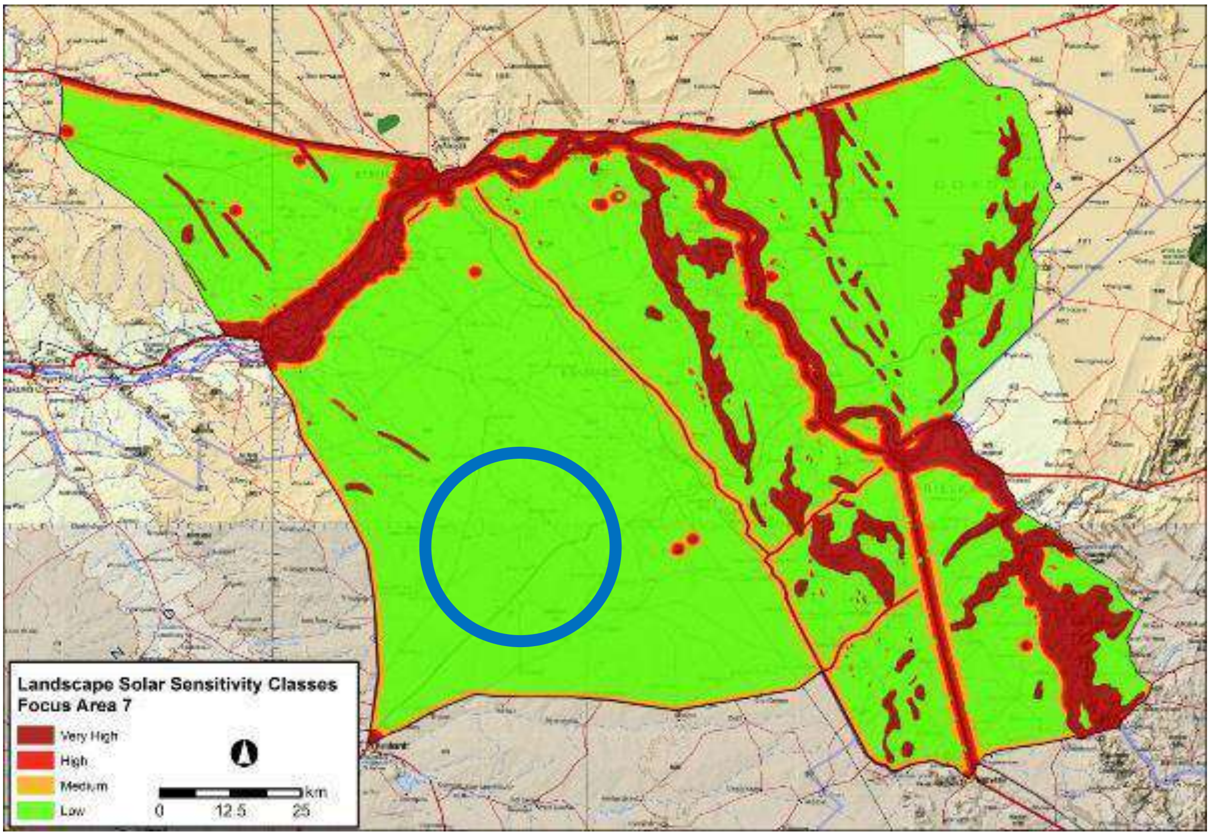

Figure 9: Landscape sensitivity of the Upington REDZ. The blue circle indicates the approximate location of the juwi Skeerhok PV development within an area classified as having low sensitivity to solar PV development (DEA, 2015).

3. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO VISUAL IMPACTS

Project aspects that may result in impacts to sensitive visual receptors mainly include established vertical infrastructure components and other features in stark contrast with the rest of the landscape (Table 3) that will be visible in the flat landscape with low growing vegetation.

Table 3: Height specifications of the juwi Skeerhok PV development infrastructure. The maximum height (i.e. 32 m) was used for the viewshed analysis.

Component	Maximum Height
SOLAR PV AREA	
Solar Panels	5 m
Operations and Management buildings	8 m
Security Fencing	3 m
Battery storage systems	8 m
ELECTRICITY INFRASTRUCTURE	
On-site collector substation	30 m
132 kV overhead power line	30 m
Telecommunication tower	32 m

4. APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

No specific legislation or permits pertaining to visual resources and/or the protection of scenic resources currently exists in South Africa. However, the legislation presented in Table 4 may be of relevance to scenic resources (Oberholzer et al., 2016).

Table 4: National legislation relating to the protection of scenic resources (Oberholzer et al., 2016).

Instrument		Objective
National	National Environmental Management: Protected Areas Act, (Act 57 of 2003) (NEMA:PAA)	The Minister / MEC may restrict or regulate development in a 'protected environment' that may be inappropriate for the area given the purpose for which the area was declared (Section 5).
	National Heritage Resources Act (Act 25 of 1999) (NHRA)	Includes protection of national and provincial heritage sites, as well as areas of environmental or cultural value, and proclaimed scenic routes.
Provincial	NEM:PAA Section 17	Local authority zoning schemes can be used to protect natural and cultural heritage resources through 'Conservation Areas', 'Heritage Overlay Zones' and 'Scenic Overlay Zones' including scenic routes.

5. IDENTIFICATION OF KEY ISSUES

5.1 Key Issues Identified During the Scoping Phase

The following impact drivers/pathways may lead to visual intrusion to the views of sensitive visual receptors:

- Clearance of vegetation for solar field, laydown areas, buildings and roads
- Increased traffic
- Night lighting
- Dust
- Veld fires
- Established infrastructure
- Cumulative effects of the abovementioned impact drivers of all proposed solar PV development in the proposed project area

The Draft Scoping Report containing the VIA input was released for a 30-day comment period from 20 September - 23 October 2017. To date, no specific comments or additional issues have been raised by I&APs specifically relating to visual impacts.

5.2 Identification of Potential Impacts

The vertical infrastructure components associated with the powerline, and potentially stark contrast of the solar field with the rest of the landscape will facilitate changes to the landscape character and impact on the views of potential sensitive visual receptors. However, the existing approvals for solar PV developments and the construction of high-voltage electricity infrastructure in the direct surroundings of the project area will establish a new status quo industrial/electrical landscape character, should they be constructed. The potential risks to sensitive visual receptors have been extensively investigated during the EIA processes for the Mulilo (CSIR, 2016a; 2015) and Scatec (CSIR, 2016b) solar PV developments. The VIAs for these proposed developments have established the following:

- The landscape has a rural agricultural character which has been transformed by extensive stock farming and large scale infrastructure in the form of the Sishen-Saldanha ore railway line and the Eskom Nieuwehoop Substation;
- Identified sensitive visual receptors include:
    - 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 the R383 and the Transnet Service Road (Loop 14) adjacent to the ore railway line. Motorists are classified as low sensitivity visual receptors since they pass through the landscape and their attention is mostly focused on the road.

- Visual intrusion on the existing views of highly sensitive visual receptors will be moderate since the development will be noticed but the quality of views is already compromised by large existing structures. The significance of the impact is moderate before mitigation and low if mitigation is successful. Mitigation measures should lower the consequence of the impact from substantial to moderate and the significance of the impact to low.
- The impact of night lighting of the facility on the nightscape (during the operational phase) is likely to be negligible compared to that of the nearby substation if a lighting plan is prepared which minimises light spill onto adjacent properties and avoids glaring lights which may affect visual receptors in the surrounding landscape.
- Cumulative visual impact on sensitive visual receptors is low due to the existing and new structures which have severely limited potential scenic views in the region. Furthermore, the landscape is rapidly changing due to the introduction of large scale and highly visible rail and electrical infrastructure.

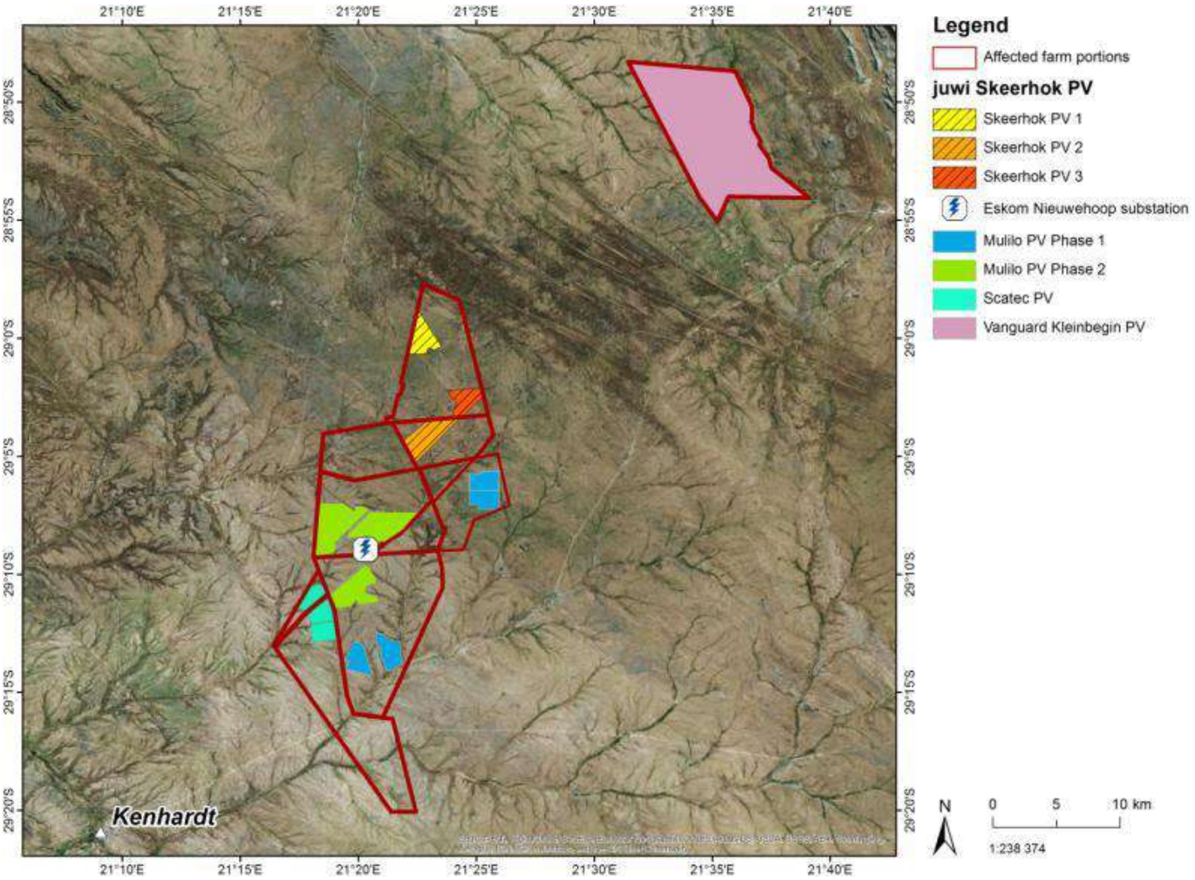

Figure 10: Solar PV developments within 30 km of the juwi Skeerhok PV development project area include the proposed Mulilo PV Phase 1, Mulilo PV Phase 2, Scatec PV, and Vanguard PV. These were considered for the cumulative impact assessment.

Key impact drivers that may intrude the views of sensitive visual receptors are presented in

Table 5.

Table 5: Key project aspects may result in impacts to the views of sensitive visual receptors and the associated project phase.

Impact	Impact pathway/driver	Project phase		
		Construction	Operation	Decommissioning
Visual intrusion to the views of sensitive visual receptors	Clearance of vegetation for solar field, laydown areas, buildings and roads	X		X
	Construction/decommissioning activities (all infrastructure, incl. roads, substations and transmission lines)	X		X
	Increased traffic	X	X	X
	Night lighting	X	X	X
	Dust	X	X	X
	Veld fires	X		X
	Established infrastructure (vertical electricity infrastructure; contrasting solar field)		X	
	Cumulative effects of the abovementioned impact drivers of all proposed solar PV development in the proposed project area	X	X	X

6. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

6.1 Viewshed Analysis

A Viewshed Analysis was conducted using ArcMap 10.5 software (Esri, 2017). The height of the tallest structure on site was used to simulate 'worst case' conditions. The tallest structure proposed as part of the juwi Skeerhok PV development is the telecommunication tower at 32 m (refer to Table 3). It was assumed that potential visual receptors will have an average height of 1.7 m. The boundary of the farm portions on which the juwi Skeerhok PV development is proposed (project area) was used as the extent of the development, again to simulate 'worst case' conditions, as well as to ensure that the results of the assessment are independent of the final placement of any infrastructure on site.

The Earth's surface curves out of sight at a distance of 5 km (Wolchover, 2012). The visual assessment zone used for the Viewshed Analysis is 10 km. The gradual nature of the landscape (i.e. no steep slopes) as well as the uncomplicated, low-growing vegetation (refer to Section 2), entailed that no additional environmental structures, that may screen the development from the view of potential receptors (e.g. tall trees), were considered in the analysis.

6.1.1 Results of the Viewshed Analysis

The result of the Viewshed Analysis produces a spatial output which indicates from where in the landscape the proposed juwi Skeerhok PV development would theoretically be visible (Figure 11). Due to the distances from potentially sensitivity visual receptors, specifically motorists on the R27 and residents of the town of Kenhardt, it is unlikely that the juwi Skeerhok PV development will negatively impact these visual receptors. The juwi Skeerhok PV development will be visible from some buildings/structures, especially those situated on site and within 2.5 km of the project area.

6.1.2 Results of the cumulative Viewshed Analysis

To determine potential cumulative impacts, the Viewshed analysis was also conducted for the proposed Mulilo, Scatec, Vanguard and juwi Skeerhok PV developments. The visual 'footprint' of the juwi Skeerhok PV development mostly overlaps those of the Mulilo, Scatec and Vanguard developments, and the addition of the juwi Skeerhok PV development extends towards the north, even farther away from Kenhardt and the R27 road (Figure 12).

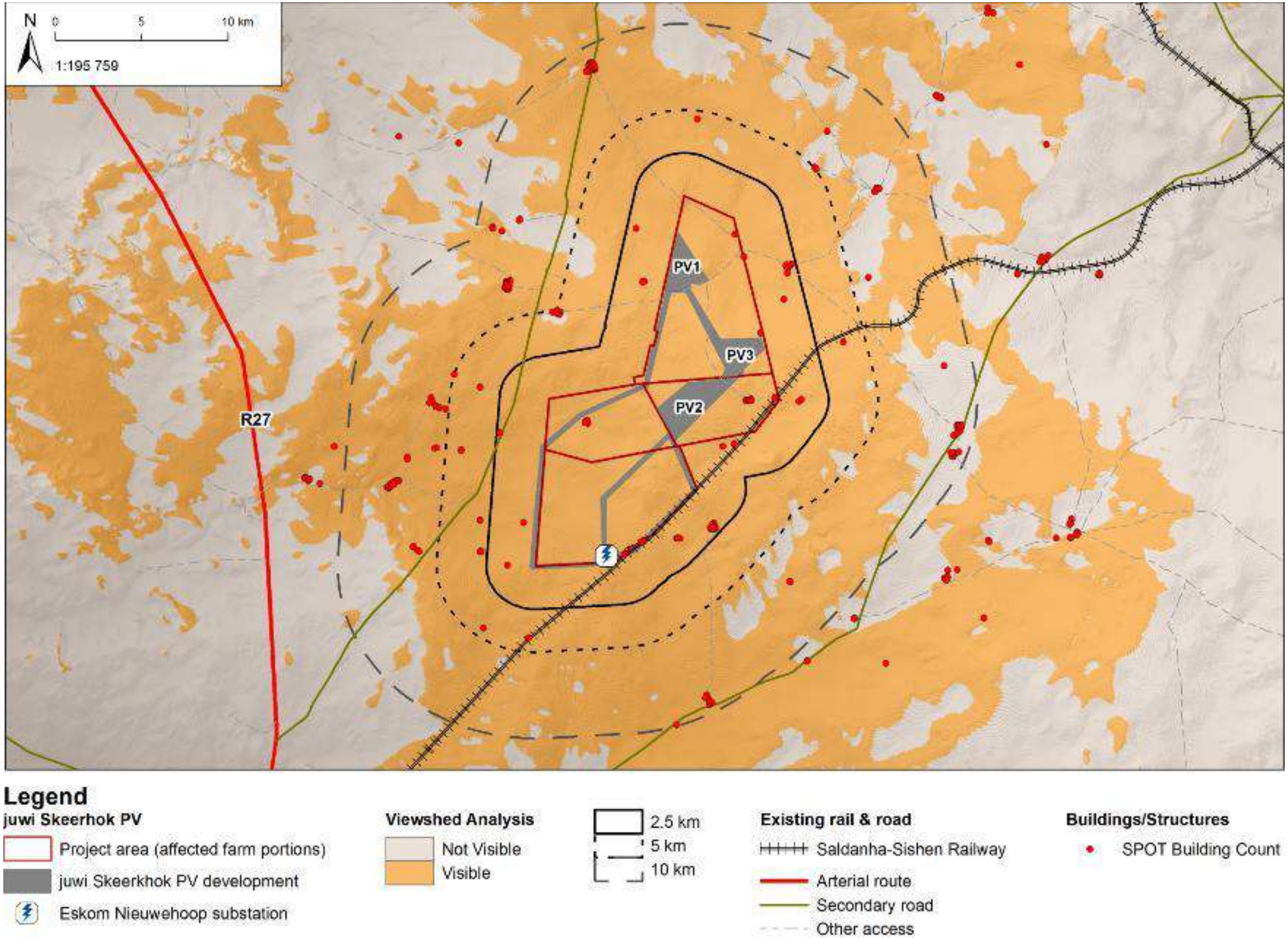

Figure 11: Viewshed Analysis for the juwi Skeerhok PV development.

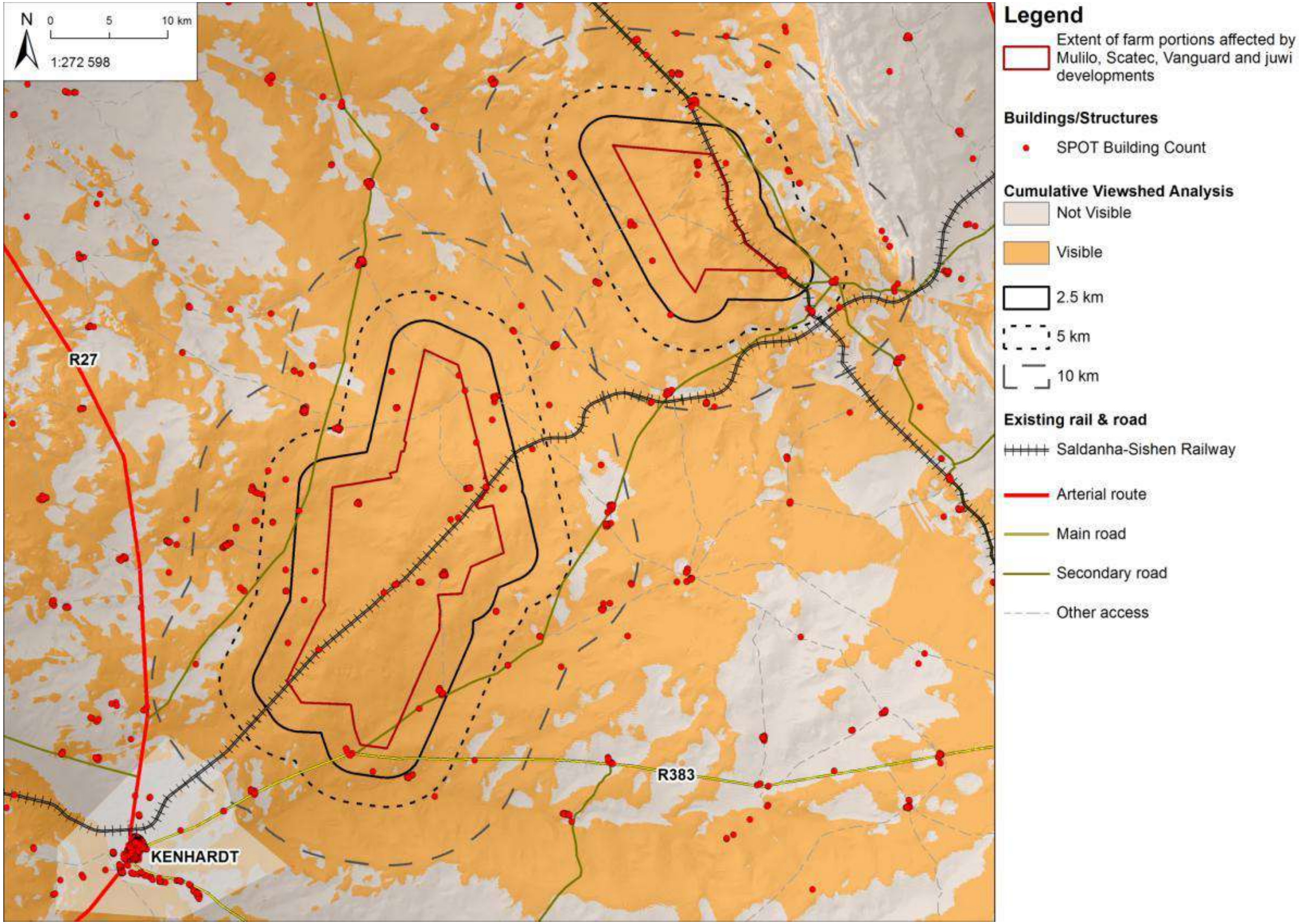

Figure 12: Cumulative Viewshed Analysis for the proposed Mulilo (CSIR, 2015 & 2016a), Scatec (CSIR, 2016b) and Vanguard PV (Savannah, 2011) developments, together with the proposed juwi Skeerhok PV development.

6.2 Potential Impact: Clearance of vegetation

CLEARANCE OF VEGETATION

Project phases

- Construction.
- Decommissioning.

Nature of the impact

Visual intrusion to the views of sensitive visual receptors due to *vegetation clearance* may have a local impact. The probability of vegetation clearance is very likely, and the consequence substantial. However, the disturbance is expected to be of short-to-medium term duration – during the construction and decommissioning phases only.

Proposed mitigation measures

- Minimise the footprint of cleared vegetation.
- Where possible, laydown areas and temporary construction equipment and camps should be placed in already in disturbed areas in order to minimise vegetation clearing.
- Phased clearance of the area for solar field in order to reduce the amount and duration of bare soil exposure.
- Commence with restoration of disturbed, cleared land as soon as possible.
- Maintain rehabilitated surfaces until vegetation is established, sustainable and blends well with surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Control Officer (ECO).

Significance of impact

Before mitigation	With mitigation
Moderate	Low

6.3 Potential Impact: Increased traffic

INCREASED TRAFFIC

Project phases

- Construction.
- Operation.
- Decommissioning.

Nature of the impact

Visual intrusion to the views of sensitive visual receptors due to *increased traffic* may have a regional impact. The probability of increased traffic is likely, and the consequence moderate. The disturbance is expected to be of long-term duration – and may be expected to be most pronounced during the construction and decommissioning phases.

Proposed mitigation measures

- Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time (06:00-10:00 and 16:00-20:00).
- Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only.

Significance of impact

Before mitigation	With mitigation
Moderate	Low

6.4 Potential Impact: Night lighting

NIGHT LIGHTING

Project phases

- Construction.
- Operation.
- Decommissioning.

Nature of the impact

Visual intrusion to the views of sensitive visual receptors due to *night lighting* may have a regional impact. The probability of night lighting is likely, and the consequence moderate. The disturbance is expected to be of long-term duration – and may be expected to be most pronounced during the construction and decommissioning phases.

Proposed mitigation measures

- Develop a lighting plan that:
  - documents the design, layout and technology used for lighting;
  - indicates how nightscape impacts will be minimised;
  - includes a process for quick and effective resolution of lighting complaints; and
  - Do not exceed the minimum lighting requirement for effective safety and security.
- Minimise bright light (uplighting and glare) with appropriate screening.
- Reduce light pollution through the use of low-pressure sodium light sources.
- Light fittings for security at night should reflect the light toward the ground and prevent light spill.
- Avoid light spilling beyond the project boundary.
- Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting.
- Switch off lights when not in use.

Significance of impact

Before mitigation	**With mitigation**
Low	Very low

6.5 Potential Impact: Dust generation

DUST GENERATION

Project phases

- Construction.
- Operation
- Decommissioning.

Nature of the impact

Visual intrusion to the views of sensitive visual receptors due to *dust generation* may have a local impact. The probability of dust generation is very likely, and the consequence slight. The disturbance is expected to be of long-term duration – mainly during the construction and decommissioning phases, with potential dust generation by maintenance vehicles during operation..

Proposed mitigation measures

- Implement standard construction site dust control methods (i.e. dampening with water) as required.

Significance of impact

Before mitigation	**With mitigation**
Low	Very low

6.6 Potential Impact: Veld fires

VELD FIRES

Project phases

- Construction.
- Decommissioning.

Nature of the impact

Visual intrusion to the views of sensitive visual receptors due to *veld fires,* which can cause smoke and burnt vegetation, may have a local impact. The probability of veld fires is unlikely, and the consequence slight. The disturbance is expected to be of short-to-medium term duration – during the construction and decommissioning phases.

Proposed mitigation measures

- Implement fire risk reduction and containment measures, including:
  - worker awareness;
  - designated, safe smoking areas;
  - fire breaks; and
  - appropriate and working firefighting equipment.

Significance of impact

Before mitigation	**With mitigation**
Low	Very low

6.7 Potential Impact: Established Infrastructure

ESTABLISHED INFRASTRUCTURE:
VERTICAL ELECTRICAL INFRASTRUCTURE

Project phases

- Operation.

Nature of the impact

Visual intrusion to the views of sensitive visual receptors due to *established infrastructure* may have a regional impact. The probability of established infrastructure is very likely, and the consequence moderate. The disturbance is expected to be of long-term duration – during the operation phase.

Proposed mitigation measures

- Use appropriate coloured materials for structures to blend in with the backdrop of the area where this is technically feasible and where the colour or paint will not negatively affect the functionality of the structures.
- Maintain painted features and repainted when colours fade or paint flakes.
- Choose materials, coatings and paints with minimum reflectivity where possible.
- Paint grouped structures the same colour to reduce colour contrast.
- Construct powerline towers to be similar to those already existing in the landscape, where possible.

Significance of impact

Before mitigation	**With mitigation**
Moderate	Moderate

ESTABLISHED INFRASTRUCTURE:
CONTRASTING SOLAR FIELD INFRASTRUCTURE

Project phases

- Operation.

Nature of the impact

Visual intrusion to the views of sensitive visual receptors due to *established infrastructure* may have a regional impact. The probability of established infrastructure is very likely, and the consequence moderate. The disturbance is expected to be of long-term duration – during the operation phase.

Proposed mitigation measures

- Use appropriate coloured materials for structures to blend in with the backdrop of the area where this is technically feasible and where the colour or paint will not negatively affect the functionality of the structures.
- Maintain painted features and repainted when colours fade or paint flakes.
- Choose materials, coatings and paints with minimum reflectivity where possible.
- Paint grouped structures the same colour to reduce colour contrast.

Significance of impact

Before mitigation	**With mitigation**
Moderate	Moderate

6.8 Cumulative impacts

CUMULATIVE IMPACTS

Project phases

- Construction.
- Operation.
- Decommissioning.

Nature of the impact

Visual intrusion to the views of sensitive visual receptors due to *cumulative impacts of many solar PV facilities and electricity infrastructure* may have a regional impact. The probability of established infrastructure is very likely, and the consequence moderate. The disturbance is expected to be of long-term duration.

The DEA has indicated, due to the impact to the SKA, it envisages that no more than six approved renewable energy developments will be awarded preferred bidder status in this area. This VIA was based on the precautionary approach and assumes that all projects will be developed (i.e. ‘worst case scenario’) within the area for the cumulative impact assessment. However, the cumulative visual impact to the views of sensitive visual receptors is dependent on both *where* projects are located, and on *how many* are present. For example, several projects clustered within close proximity of each other may have an overlapping viewshed and smaller visual “footprint” than fewer projects that area spread out which may have a larger overall visual “footprint”. The visual “footprint” of the juwi Skeerhok PV development largely overlap with those of the proposed Scatec, Mulilo and Vanguard developments, and extends the cumulative visual ‘footprint’ towards the north.

A cluster of ten approved 75 MW PV developments (Mulilo and Scatec) are proposed directly towards the south-west of the proposed juwi Kenhardt PV development. Although no projects have been awarded preferred bidder in the area, it is assumed in this study that they will be constructed in the future (5 – 10 years). Since these projects have all received EA, it is also assumed that the potential changes to the current landscape character and impacts to visual receptors have been deemed acceptable to I&APs that participated in the EIAs for the aforementioned approved projects. The approval of these solar PV developments and the construction of high-voltage electricity infrastructure (e.g. the Eskom Nieuwehoop Substation) in the direct surroundings of the project area, together with the Saldanha-Sishen railway with overhead powerlines, contribute to the degradation of the rural pastoral character of the surrounds.

Proposed mitigation measures

- Adequate implementation of proposed mitigation measures and best practice to reduce visual impacts by all solar PV facilities in the vicinity.

Significance of impact

Before mitigation	**With mitigation**
Moderate	Moderate

7. IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommended mitigation measures, as discussed in Section 6, are collated in

Table 6 -

Table 9.

Table 6: Impact assessment summary table for the construction phase.

CONSTRUCTION PHASE 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: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
Clearance of vegetation for solar field, laydown areas, buildings and roads	**VISUAL INTRUSION TO VIEWS SENSITIVE OF VISUAL RECEPTORS**	Negative	Local	Short-term	Substantial	Very Likely	Moderate	Low	- Minimise the footprint of cleared vegetation. - Phased clearance of the area for solar field in order to reduce the amount and duration of bare soil exposure. - Where possible, laydown areas and temporary construction equipment and camps should be placed in already in disturbed areas in order to minimise vegetation clearing. - Commence with restoration of disturbed, cleared land as soon as possible. - Maintain rehabilitated surfaces until vegetation is established, sustainable and blends well with surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Control Officer (ECO).	**Moderate**	**Low**	4	High
Increased traffic		Negative	Local	Long-term	Moderate	Likely	High	Low	- Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time. - Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only	**Moderate**	**Low**	4	High
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	- Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and - Do not exceed the minimum lighting requirement for effective safety and security. - Minimise bright light (uplighting and glare) with appropriate screening. - Reduce light pollution through the use of low-pressure sodium light sources. - Light fittings for security at night should reflect the light toward the ground and prevent light spill. - Avoid light spilling beyond the project boundary. - Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. - Switch off lights when not in use.	**Low**	**Very Low**	5	High
Dust		Negative	Local	Short-term	Slight	Very Likely	Very high	Low	- Implement standard construction site dust control methods (i.e. dampening with water) as required.	**Low**	**Very Low**	5	High

CONSTRUCTION PHASE 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)		
Veld fires		Negative	Local	Long-term	Slight	Unlikely	Very high	Low	- Implement fire risk reduction and containment measures, including: - worker awareness; - designated, safe smoking areas; - fire breaks; and - appropriate and working firefighting equipment.	**Low**	**Very Low**	5	High

Table 7: Impact assessment summary table for the operation phase.

OPERATION PHASE 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: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
Increased traffic	**VISUAL INTRUSION TO VIEWS SENSITIVE OF VISUAL RECEPTORS**	Negative	Local	Long-term	Moderate	Likely	High	Low	- Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time . - Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only.	**Moderate**	**Low**	4	High
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	- Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and - Do not exceed the minimum lighting requirement for effective safety and security. - Minimise bright light (uplighting and glare) with appropriate screening. - Reduce light pollution through the use of low-pressure sodium light sources. - Light fittings for security at night should reflect the light toward the ground and prevent light spill. - Avoid light spilling beyond the project boundary. - Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. - Switch off lights when not in use.	**Low**	**Very Low**	5	High
Established infrastructure • **Vertical electrical infrastructure** • **Contrasting solar field infrastructure**		Negative	Regional	Long-term	Moderate	Very Likely	Moderate	Low	- Use appropriate coloured materials for structures to blend in with the backdrop of the area where this is technically feasible and where the colour or paint will not negatively affect the functionality of the structures. - Maintain painted features and repainted when colours fade or paint flakes. - Choose materials, coatings and paints with minimum reflectivity where possible. - Paint grouped structures the same colour to reduce colour contrast. - Construct powerline towers to be similar to those already existing in the landscape, where possible.	**Moderate**	**Moderate**	4	High

Table 8: Impact assessment summary table for the decommissioning phase.

DECOMMISSIONING PHASE 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: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
Clearance of vegetation for solar field, laydown areas, buildings and roads	VISUAL INTRUSION TO VIEWS SENSITIVE OF VISUAL RECEPTORS	Negative	Local	Short-term	Substantial	Very Likely	Moderate	Low	- Minimise the footprint of cleared vegetation. - Phased clearance of the area for solar field in order to reduce the amount and duration of bare soil exposure. - Where possible, laydown areas and temporary construction equipment and camps should be placed in already in disturbed areas in order to minimise vegetation clearing. - Commence with restoration of disturbed, cleared land as soon as possible. - Maintain rehabilitated surfaces until vegetation is established, sustainable and blends well with surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Control Officer (ECO).	**Moderate**	**Low**	4	High
Increased traffic		Negative	Local	Long-term	Moderate	Likely	High	Low	- Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time . - Demarcate and strictly control permitted roads for use and parking areas so that vehicles are limited to specific areas only	**Moderate**	**Low**	4	High
Night lighting		Negative	Regional	Long-term	Moderate	Likely	High	Low	- Develop a lighting plan that: - documents the design, layout and technology used for lighting; - indicates how nightscape impacts will be minimised; - includes a process for quick and effective resolution of lighting complaints; and - Do not exceed the minimum lighting requirement for effective safety and security. - Minimise bright light (uplighting and glare) with appropriate screening. - Reduce light pollution through the use of low-pressure sodium light sources. - Light fittings for security at night should reflect the light toward the ground and prevent light spill. - Avoid light spilling beyond the project boundary. - Install timer switches or motion sensors to control the lighting of areas that do not require constant lighting. - Switch off lights when not in use.	**Low**	**Very Low**	5	High
Dust		Negative	Local	Short-term	Slight	Very Likely	Very high	Low	- Implement standard construction site dust control methods (i.e. dampening with water) as required.	**Low**	**Very Low**	5	High

DECOMMISSIONING PHASE 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: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
Veld fires		Negative	Local	Long-term	Slight	Unlikely	Very high	Low	- Implement fire risk reduction and containment measures, including: - worker awareness; - designated, safe smoking areas; - fire breaks; and - appropriate and working firefighting equipment.	**Low**	**Very Low**	5	High

Table 9: Impact assessment summary table for cumulative impacts.

CUMULATIVE 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: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Ranking of Residual Impact/ Risk	Confidence Level
Cumulative Impacts	**VISUAL INTRUSION TO VIEWS SENSITIVE OF VISUAL RECEPTORS**	Neutral	Regional	Long-term	Moderate	Very Likely	High	Low	- Adequate implementation of proposed mitigation measures and best practice to reduce visual impacts by all solar PV facilities in the vicinity.	**Moderate**	**Moderate**	4	High

8. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

The mitigation and management recommendations outlined in Section 6 should be included in the EMPr. Implementation of the recommended mitigation and management actions, for all development phases, should be monitored and reported on by the ECO. Furthermore, it important to educate workers on-site and raise awareness to the issues and required actions highlighted in this report.

9. CONCLUSION AND RECOMMENDATIONS

This document constitutes the VIA as part of the EIA, and draws on VIAs conducted for other solar PV developments in the direct vicinity of the juwi Solar PV development.

The changes to the landscape character that may be brought about by the proposed juwi Skeerhok PV development can have impacts on the views of potential sensitive visual receptors. However, the existing approvals for solar PV developments, the construction of high-voltage electricity infrastructure in the direct surroundings of the project area, and the Saldanha-Sishen railway with overhead powerlines entails that an industrial/electrical character has encroached on the rural / pastoral landscape. Furthermore, the landscape sensitivity, as determined by the SEA which informed the REDZ, is classified as low from a visual, scenic, aesthetic and amenity perspective.

A Viewshed Analysis was conducted using ArcMap 10.5 software (Esri, 2017). The height of the tallest structure on site, and the boundary of the farm portions on which the juwi Skeerhok PV development is proposed was used as the extent of the development, was used to simulate 'worst case' conditions. Due to the flat terrain the zone of visibility is extensive. However, limited potentially sensitive visual receptors exist.

The impact of visual intrusion to the views of potential sensitive visual receptors is expected to be moderate to low (before mitigation) and moderate to very low with the effective implementation of the mitigation and management actions outlined in this report. The impacts vary depending on the impact pathway being assessed.

Due to the existing landscape character, and foreseeable trend of renewable energy and associated electricity infrastructure development in the area, the cumulative impacts to the views of potential sensitive visual receptors are expected to be moderate, if all solar PV developments implement proposed mitigation measures and best practice to reduce visual impacts.

Based on the findings in this VIA it has been concluded that the juwi Skeerhok PV development, including its associated electricity infrastructure, from a visual, scenic, aesthetic and amenity perspective, may receive EA with adherence to the mitigation and management measures set out in this report.

10. REFERENCES

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APPENDIX A: EXTERNAL REVIEW

SiVEST
Environmental

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Established 1952

Council for Scientific and Industrial Research
PO Box 320
Stellenbosch
7599

Your reference
Our reference 14941
Date 07 February 2018

ATTENTION: Kelly Stroebel

Dear Kelly

EXTERNAL PEER REVIEW OF THE VISUAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THREE 100 MW SOLAR PHOTOVOLTAIC FACILITIES (SKEERHOK PV 1, PV 2, & PV 3) NEAR KENHARDT IN THE NORTHERN CAPE PROVINCE

The Council for Scientific and Industrial Research (CSIR) was appointed by juwi Renewable Energies to undertake the Environmental Impact Assessment (EIA) for the proposed development of three 100 MW Solar Photovoltaic (PV) Facilities and the associated infrastructure near Kenhardt in the Northern Cape Province. As part of the EIA process an in-house Visual Impact Assessment (VIA) was undertaken by the CSIR, and as a result this VIA report needs to be reviewed by an external visual specialist.

This letter outlines the findings of the external peer review which was undertaken by SiVEST SA (Pty) Ltd for the following report:

- Snyman-van der Walt, L. 2018. Visual Impact Assessment: Scoping and Environmental Assessment for the proposed development of three 100 MW Solar Photovoltaic Facilities (Skeerhok PV 1, PV 2, PV 3) near Kenhardt in the Northern Cape Province. CSIR: Stellenbosch. (Draft VIA_v2_juwvi Skeerhok_25Jan2018)

1. Review Summary

The review was based on SiVEST's experience and knowledge of undertaking VIAs, the requirements stipulated in Appendix 6 of the of the EIA Regulations 2014 (as amended) and the requirements stipulated by the Department of Environmental Affairs (DEA) as outlined in the table below.

DEA Peer Review Requirements	Peer Reviewer Response
A CV clearly showing expertise of the peer reviewer.	A CV of the peer reviewer is attached to this letter.
Acceptability of the terms of reference.	The terms of reference is considered acceptable, however the limitations of undertaking a desktop assessment should be noted within the report.

Is the methodology clearly explained and acceptable.	The methodology is acceptable, however the limitations of undertaking a desktop assessment should be noted within the report. In addition, the methodology should also explain the sensitivity assessment, assessment of impacts and identification of management actions.
Evaluate the validity of the findings.	Most of the findings are considered to be valid however the following is noted and should be addressed: ▪ SiVEST disagrees with the statement that "*the existing landscape has an industrial / electrical character*". This should be reworded to note that the existing landscape has a rural / pastoral visual character which has been transformed by existing infrastructure. ▪ The impacts of the electrical infrastructure and solar facility should not be rated together, but should be assessed separately. ▪ SiVEST disagrees that the potential impact of the *Established Infrastructure* can be rated as *low* with the implementation of mitigation measures. This should be changed to be *medium*. ▪ SiVEST disagrees that the potential *Cumulative Impact* can be rated as *low* with the implementation of mitigation measures. This should be changed to be *medium*.
Discuss the suitability of the mitigation measures and recommendations.	The mitigation measures and recommendations described are acceptable.
Identify any short comings and mitigation measures to address the short comings.	Additional mitigation measures have been recommended. These include: ▪ Where possible, laydown areas and temporary construction equipment and camps should be placed in already in disturbed areas in order to minimise vegetation clearing. ▪ Light fittings for security at night should reflect the light toward the ground and prevent light spill.
Evaluate the appropriateness of the reference literature.	The reference literature is considered to be appropriate. It should just be ensured that all literature is referenced in the text and included within the list of references.
Indicate whether a site-inspection was carried out as part of the peer review.	No site visit was undertaken for the peer review.
Indicate whether the article is well-written and easy to understand	The report supplied to SiVEST is considered well written and easy to understand.

General recommendations for improving the report were also provided as comments within the report and these include but are not limited to the following:

- Inclusion of a brief project description section with a map showing the layout of the proposed PV facility and power line routes.
- Section 2 *Description of the Affected Environment* should be more applicable to the visual environment.

- Inclusion of a visual character and cultural landscape section that clarifies the visual character within the area.
- Define the visual assessment zone / affected project area.

SiVEST is of the opinion that overall the VIA report compiled by the CSIR was unbiased and fair and that the methodology used was transparent. Provided the suggested changes are made to the report the findings are considered valid and the mitigation measures are appropriate.

Should you have any queries or comments regarding the peer review, please do not hesitate to contact Andrea Gibb on 011 798 0600.

Yours sincerely

Andrea Gibb
Senior Manager
SiVEST Environmental

encl: CV of Peer Reviewer

CURRICULUM VITAE

Name	Andrea Gibb
Profession	Environmental Practitioner
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Senior Manager Environmental Division
Years with Firm	7 Years
Date of Birth	29 January 1985
ID Number	8501290020089
Nationality	South African

Education

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

Professional Qualifications

BSc (Hons) Environmental Management (University of South Africa 2008-2010)
Coursework**:** Project Management, Environmental Risk Assessment and Management, Ecological and Social Impact Assessment, Fundamentals of Environmental Science, Impact Mitigation and Management, Integrated Environmental Management Systems & Auditing, Integrated Environmental Management, Research Methodology.
Research Proposal**:** Golf Courses and the Environment

BSc Landscape Architecture (with distinction) (University of Pretoria 2004-2007)
Coursework: Core modules focused on; design, construction, environmental science, applied sustainability, shifts in world paradigms and ideologies, soil and plant science, environmental history, business law and project management.
Awards: Cave Klapwijk prize for highest average in all modules in the Landscape Architecture programme, ILASA book prize for the best Landscape Architecture student in third year design, Johan Barnard planting design prize for the highest distinction average in any module of plant science.

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

Employment Record

Aug 2010 – to date	SiVEST SA (Pty) Ltd: Environmental Practitioner
Jan 2008 – July 2010	Cave Klapwijk and Associates: Environmental Assistant and Landscape Architectural Technologist
Feb 2006 – Dec 2006	Cave Klapwijk and Associates: Part time student

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent

Key Experience

Specialising in the field of Environmental Management and Visual Assessment.

Andrea has 10 years' work experience and is employed by SiVEST Environmental as the Senior Manager heading up the Johannesburg office. She is primarily involved with managing large scale multifaceted Environmental Impact Assessments (EIAs) and Basic Assessments (BAs) (incl. Amendment Applications), undertaken according to International Finance Corporation (IFC) standards and Equator Principles, within the renewable energy generation and electrical distribution sectors. Andrea has extensive experience in overseeing public participation and stakeholder engagement processes and has also been involved in environmental feasibility and sensitivity analyses. She further specialises in undertaking and overseeing visual impact and landscape character assessments.

Skills include:

- Project Management (MS Project)
- Environmental Impact Assessment (EIA)
- Basic Assessment (BA)
- Public Participation Management
- Visual Impact Assessment (VIA)
- Landscape Assessment
- Strategic Environmental Planning
- Documentation / Quality Control
- Project Level Financial Management

Projects Experience

Aug 2010 – to date

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

- EIA for the proposed construction of the Grasskoppies Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the !Xha Boom Wind Farm near Loeriesfontein, Northern Cape Province.
- Application for an Amendment of the Environmental Authorisation (EA) for the proposed construction of the Droogfontein II PV Plant near Kimberley, Northern Cape Province.
- Amendment and Resubmission of the FBAR for the Eskom Longdown Substation and Vyeboom 66kV Turn-in Power Lines near Villiersdorp, Western Cape Province.
- BA for the proposed construction of the Leeuwbosch Power Plant near Leeudoringstad, North West Province.
- BA for the proposed construction of the Wildebeestkuil Power Plant near Leeudoringstad, North West Province.
- EIA for the proposed development of the Tlisitseng 1 and 2 75MW Solar Photovoltaic (PV) Energy Facilities near Lichtenburg, North West Province.
- EIAs for the proposed development of the Sendawo 1, 2, and 3 75MW Solar PV Energy Facilities near Vryburg, North West Province.
- EIA for the proposed construction of the Sendawo Common Collector Substation and power line near Vryburg, North West Province.
- EIA for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.

- Application for an Amendment of the Environmental Authorisation (EA) for the proposed construction of the 100MW Limestone Solar Thermal Power Project near Danielskuil, Northern Cape Province.
- Applications for the Amendment of the EAs for the proposed construction of three 75MW solar PV facilities near Prieska, Northern Cape Province.
- Applications for the Amendment of the EAs for the proposed construction of the 75MW Arriesfontein and Wilger Solar Power Plants near Danielskuil, Northern Cape Province.
- Completion and submission of the final EIA report for the proposed Rooipunt PV Solar Power Park Phase 1 and proposed Rooipunt PV Solar Power Park Phase 2 near Upington, Northern Cape Province.
- EIAs for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- EIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province.
- EIA for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- BA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.
- BA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.
- BA for the proposed Construction of the SSS1 5MW Solar PV Plant on the Western Part of Portion 6 (Portion of Portion 5) of Farm Spes Bona 2355 near Bloemfontein, Free State Province.
- BA for the proposed Construction of the SSS2 5MW Solar PV Plant on the Eastern Part of Portion 6 (Portion of Portion 5) of Farm Spes Bona 2355 near Bloemfontein, Free State Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of a 132kV power line from the proposed Bophirima Substation to the existing Schweizer-Reneke Substation, North West Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of a 132kV power line from the Mookodi Substation to the existing Magopela Substation, North West Province.
- BA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province.
- Amendment of the Final Environmental Impact Report for the Proposed Mookodi 1 Integration Project near Vryburg, North West Province.
- BA for the proposed 132kV power line and associated infrastructure for the proposed Redstone Solar Thermal Energy Plant near Lime Acres, Northern Cape Province.
- BA for the proposed construction of a 132kV power line and substation associated with the 75MW PV Plant on the Farm Droogfontein (PV 3) in Kimberley, Northern Cape Province.
- BA for the proposed establishment of a Learning and Development Retreat and an Executive Staff and Client Lodge at Mogale's Gate, Gauteng Province.
- Application for an Amendment of the EA to increase the output of the proposed 40MW PV Facility on the farm Mierdam to 75MW, Northern Cape Province.
- BA for the proposed construction of a power line and substation near Postmasburg, Northern Cape Province.
- BA for the proposed West Rand Strengthening Project – 400kV double circuit power line and substation extension in the West Rand, Gauteng.
- EIA for the proposed construction of a wind farm and PV plant near Prieska, Northern Cape Province.
- Public Participation assistance as part of the EIA for the proposed Thyspunt Transmission Lines Integration Project – EIA for the proposed construction of 5 x 400kV transmission power lines between Thyspunt to Port Elizabeth, Eastern Cape Province.
- EIA assistance for the proposed construction of three Solar Power Plants in the Northern Cape Province.

- Public Participation as part of the EIA for the proposed Delareyille Kopela Power Line and Substation, North West Province.
- Public Participation as part of the EIA for the Middelburg Water Reclamation Project, Mpumalanga Province.

VISUAL IMPACT ASSESSMENT (VIA)

- VIA for the proposed construction of the Grasskoppies Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the !Xha Boom Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed Phezukomoya Wind Energy Facility near Noupoort, Northern Cape Province.
- VIA for the proposed San Kraal Wind Energy Facility near Noupoort, Northern Cape Province
- VIA for the proposed Assagay Valley Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed Kassier Road North Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed construction of a power line and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces.
- VIA (Scoping Phase) for the proposed construction of a 3000MW Wind Farm and associated infrastructure near Richmond, Northern Cape Province.
- VIA for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
- VIA for the proposed construction of a power line and associated infrastructure for the proposed Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province.
- VIAs (Impact Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.
- VIA (Impact Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
- VIAs (Impact Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province.
- VIA for the proposed construction of the Tlisitseng substation and associated 132kV power line near Lichtenburg, North West Province.
- VIA (Scoping Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
- VIA (Scoping Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.
- VIA (Scoping Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province.
- Visual recommendations for Phase 1 of the proposed Renishaw Estate Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed Tinley Manor South Banks Development, KwaZulu-Natal Province.
- VIAs (Impact Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- VIA (Scoping Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
- Visual Due Diligence Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
- Visual Status Quo and Constraints Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
- VIA for the proposed agricultural components of the Integrated Sugar Project in Nsoko, Swaziland.

- VIA for the proposed Tweespruit to Welroux power lines and substation, Free State Province.
- VIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province.
- VIA (Impact Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed amendment to the authorised power line route from Hera Substation to Westgate Substation, Gauteng Province.
- VIA (Impact Phase) for the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province.
- VIA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.
- VIA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.
- VIA (Scoping Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed Rorqual Estate Development near Park Rynie on the South Coast of KwaZulu Natal.
- VIA (Scoping Phase) for the proposed construction of a Coal-fired Power Station, Coal Mine and Associated Infrastructure near Colenso, KwaZulu-Natal Province.
- VIA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province.
- VIA for the proposed construction of the Duma transmission substation and associated Eskom power lines, KwaZulu-Natal Province.
- VIA for the proposed construction of the Madlanzini transmission substation and associated Eskom power lines, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Normandie substation to Hlungwane substation, Mpumalanga and KwaZulu-Natal Provinces.
- VIA for the proposed construction of the Nzalo transmission substation and associated Eskom power lines, KwaZulu-Natal Province.
- VIA for the proposed construction of the Sheepmoor traction substation with two 20MVA transformer bays and a new associated 88kV turn-in power line, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Uitkoms substation to Antra T-off, Mpumalanga Province.
- VIA for the proposed rebuild of the 88kV power line from Umfolozi substation to Eqwasha traction substation including an 88kV turn-in power line to Dabula traction substation, Kwazulu-Natal Province.
- VIA for the proposed construction of the new 88/25kV Vryheid traction substation with two 20MVA transforma bays and a new associated 88kV turn-in power line, KwaZulu-Natal Province.
- VIA for the proposed construction of a 132kV power line and substation associated with the 75MW PV Plant on the Farm Droogfontein (PV 3) in Kimberley, Northern Cape Province.
- VIA (Impact Phase) for the proposed Construction of a Solar PV Power Plant near De Aar, Northern Cape Province.
- VIA for the (Impact Phase) proposed Construction of the Renosterberg Wind Farm near De Aar, Northern Cape Province.
- VIA for the (Impact Phase) proposed Construction of the Renosterberg Solar PV Power Plant near De Aar, Northern Cape Province.
- VIA for the proposed construction of a 132kV power line for the Redstone Thermal Energy Plant near Lime Acres, Northern Cape Province.
- VIA for the proposed Mookodi Integration phase 2 132kV power lines and Ganyesa substation near Vryburg, North West Province.
- VIA for the proposed 132kV power lines associated with the PV Plants on Droogfontein Farm near Kimberley, Northern Cape Province.
- VIA (Scoping phase) for the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province.

- VIA for the proposed development of a learning and development retreat and an executive and staff lodge at Mogale's Gate, Gauteng Province.
- VIA for the proposed construction of a substation and 88kV power line between Heilbron (via Frankfort) and Villiers, Free State Province.
- Visual Status Quo Assessment for the Moloto Development Corridor Feasibility Study in the Gauteng Province, Limpopo Province and Mpumalanga Province.
- VIA the West Rand Strengthening Project – 400kV double circuit power line and substation extension in the West Rand, Gauteng.
- VIA for the proposed construction of a wind farm and solar photovoltaic plant near Loeriesfontein, Northern Cape Province.
- Visual sensitivity mapping exercise for the proposed Mogale's Gate Expansion, Gauteng.
- VIA (Scoping Phase) for the proposed Renosterberg Solar PV Power Plant and Wind Farm near De Aar, Northern Cape Province.
- Scoping level VIAs for the proposed construction of three Solar Power Plants in the Northern Cape Province.
- VIAs for the Spoornet Coallink Powerline Projects in KZN and Mpumalanga.
- Visual Constraints Analysis for the proposed establishment of four Wind Farms in the Eastern and Northern Cape Province.
- VIA (Scoping Phase) for the proposed development of a solar energy facility in De Aar, Northern Cape.
- VIA (Scoping Phase) for the proposed development of a solar energy facility in Kimberley, Northern Cape.

STRATEGIC ENVIRONMENTAL PLANNING

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

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

APPENDIX E5:

Impact Assessments for Soils & Agriculture, Traffic and Social

SOILS AND AGRICULTURAL POTENTIAL IMPACT STATEMENT

Statement prepared by:	*Statement reviewed by*:
CSIR – Environmental Management Services PO Box 320 Stellenbosch, 7599 South Africa	Johann Lanz – Soil Scientist P.O. Box 6209 Stellenbosch, 7599 South Africa

December 2017

Cover letter: Review of Soils and Agricultural Impact Statement

I hereby confirm that I have reviewed the Soils and Agricultural Impact Statement for the Skeerhok solar energy projects, which was prepared by the CSIR, and agree with its contents, conclusions and recommendations.

Johann Lanz (Pri.Sci.Nat)

26/01/2018

contents

SOILS AND AGRICULTURAL POTENTIAL IMPACT STATEMENT

1. INTRODUCTION

juwi Renewable Energies (PTY) Ltd is proposing to develop three 100 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and associated electrical infrastructure (132 kV transmission line) on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult 120, and the connection points to the Eskom Nieuwehoop Substation on the Portion 3 of Gemsbok Bult Farm 120, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province.

As per the Plan of Study included in Final Scoping Report (September 2017) and subsequently approved by the Department of Environmental Affairs (DEA) on 30 November 2017, it was indicated that **a Soils and Agriculture Impact Statement** will be produced to identify potential impacts of the proposed development on agricultural resources including soils and agricultural production potential for the proposed Skeerhok PV 1, Skeerhok PV 2, and Skeerhok PV 3 solar energy projects, as well as the proposed **Skeerhok PV – Transmission Line Basic Assessment**[1] project near Kenhardt in the Northern Cape.

Various projects have been approved within the same area as the proposed Skeerhok PV facilities (see map below, Figure 1) and all the previous Environmental Impact Assessments (EIAs) included Soils and Agricultural Potential Studies. There is therefore a large amount of existing information on the soils and agriculture potential of the area and therefore, the impacts of solar PV facilities on soils and agricultural is well known and documented. For this reason, it was proposed that a full specialist impact assessment is not deemed necessary for these projects.

This impact statement has been compiled by the CSIR using existing information and reviewed by Mr Johann Lanz. The studies used as a reference for this impact statement are listed in Section 3.7 below.

1.1 Terms of Reference

The Impact Statement includes the following considerations:

- The identification of any significant soils and agricultural features or disturbances, as well as any sensitive features and receptors in the wider project area;
- Assessment of the existing soil and agricultural potential data for the wider project area;
- Environmental risks to the soils and agricultural land and potential, as well as the consequences thereto;
- Topography of the site;
- Available water sources for agriculture;
- Historical and current land use, agricultural infrastructure, as well as possible alternative land use options;
- Erosion, vegetation and degradation status of the land;
- Agricultural sensitivity to development across the site.

[1] Note: this statement includes the impacts of the SEF and the Transmission Line in one report.

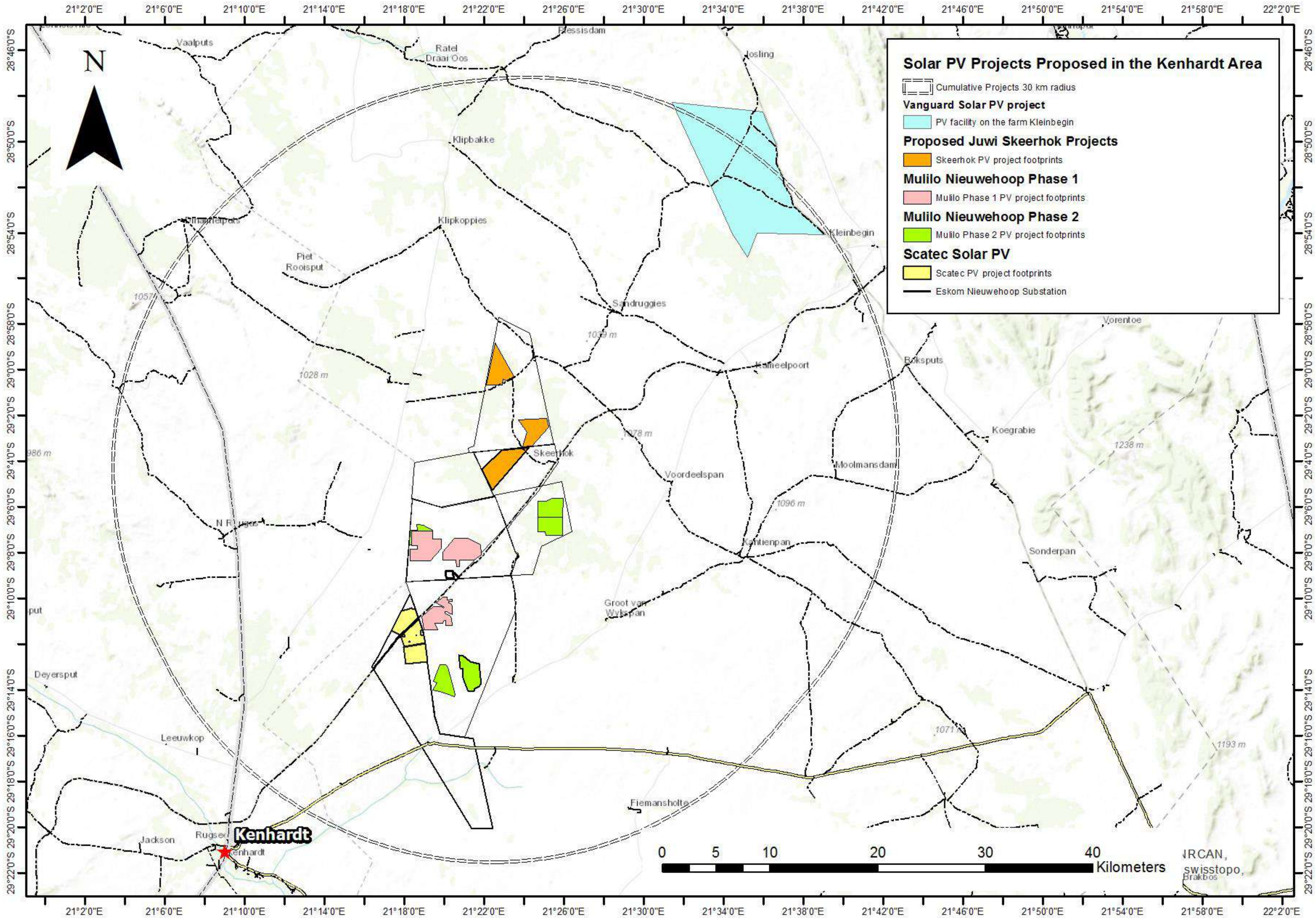

Figure 1: Cumulative locality map for the proposed three juwi Skeerhok Solar PV Projects, and the two reference studies (three Scatec Kenhardt Solar PVs and seven Mulilo Kenhardt Solar PVs) near Kenhardt in the Northern Cape.

1.2 Assumptions and Limitations

This impact statement has been based on soils and agricultural studies that have been done for other renewable energy projects in the immediate area of this proposed project. The following assumptions were used in this impact statement:

- It was assumed that water is not available anywhere on the site for irrigation. Given the very severe moisture constraints of the environment and that no suitable water has ever been identified by farmers in the area, this is a fair assumption; and
- The cumulative impact assessment assumes that a total of **six** approved renewable energy developments will be awarded preferred bidder status in the surrounding area, as stipulated by the DEA within the Scatec Environmental Authorization letter for 14/12/16/3/3/2/837, "Conditions of this Environmental Authorization", Scope of Authorization, Point 2 (07/08/2017).

The following limitations were identified in this study:

- Soils were not mapped in detail for the project area. However detailed soil mapping has little relevance to an assessment of agricultural potential in this environment, as the limitations are overwhelmingly climatic. In other words, even where soils suitable for cultivation may occur, they cannot be utilised because of the aridity constraints. The study had more than sufficient information on the soils to make an assessment on the impacts of the development on agriculture, and so this is not seen as a limitation; and
- The assessment rating of impacts is not an absolute measure. It is based on the subjective considerations and experience of the specialist, but is done with due regard and as accurately as possible within these constraints.

2. METHODOLOGY

The key steps followed in this assessment are:

- Review of available desktop information, including the soils and agricultural specialist studies mentioned above for similar projects; and
- Existing Agricultural Geo-Referenced Information System (AGIS) data, as well as satellite imagery for the site.

The Final Scoping Report was submitted to the National DEA on 3 November 2017 for decision-making. The Scoping Report was accepted by the National DEA on 30 November 2017. As part of the acceptance, the National DEA had the certain requirements for the Soils and Agricultural Potential Impact Statement, as shown in Table 1.1 below.

Table 1.1: National DEA Requirements for the Soils and Agricultural Potential Impact Statement (Acceptance of Scoping letter – 30 November 2017)

DEA Requirement	Feedback from Specialist/sub-section where this is addressed
x. The specialist input referred to in comment (viii) of the comments on the draft scoping report signed 19 October 2017; must additionally address the following:	
• indicate whether the recommendation by the EAP that detailed studies are not required is	Yes, the recommendation is acceptable.

DEA Requirement	Feedback from Specialist/sub-section where this is addressed
acceptable;	
• indicate whether the methodology used to arrive at the conclusion that detailed studies are not required is clearly explained and acceptable;	Yes this is adequately explained in Section 1 and is acceptable.
• Discuss the suitability of the proposed mitigation measures and recommendations, if any. Further, provide input to the EMPr, including additional mitigation and monitoring requirements to ensure that identified impacts are eliminated;	Suitable mitigation measures and monitoring requirements are comprehensively given in Section 3.4 of the report.
• Evaluate the appropriateness of the reference literature used;	The reference literature is appropriate and adequate.
• Indicate details and conclusions of the site-inspection if one was carried out as part of the specialist input	No site inspection was carried out for the impact statement for this proposed project, however, the reference studies conducted by Johann Lanz (2016) included site inspection(s). Please refer to Section 2 below for a description of the methodology used in the reference studies.
• Indicate if the studies being referred to covers the preferred site; and	Although the proposed Skeerhok PV 1, 2 and 3 cover different development footprints compared to the reference studies, they are in extremely close proximity and are on the same greater farms. Thus the land use is similar and the impacts can be extrapolated. See locality map above (Figure 1).
• Provide an indication on the cumulative impacts of these studies in relation to the proposed development.	Refer to Section 3.4.3 and Table 1.3 below.
• Must be conducted or input provided on by a suitably qualified specialist in the field	Refer to Appendix A for the full CV of the specialist.

3. AFFECTED ENVIRONMENT

3.1 Climate and Water Availability

Rainfall for the area is given as a very low 183 mm per annum, with a standard deviation of 71 mm according to the South African Rain Atlas (Water Research Commission, undated). One of the most important climate parameters for agriculture in a South African context is moisture availability, which is the ratio of rainfall to evapotranspiration. Moisture availability is classified into six categories across the country, the proposed development site falls within Class 6, which is described as a very severe limitation to agriculture.

Water for stock is obtained from wind pumps on the farms in the area. There is insufficient water available for any form of irrigation.

3.2 Terrain, Topography and Drainage

The proposed development is located on level plains with some relief in the Northern Cape interior at an altitude of between 900 and 1000 meters. Slopes across the site are almost entirely less than 2%. The underlying geology is migmatite, gneiss and granite of the Namaqualand Metamorphic Complex with abundant calcrete.

There are no perennial drainage courses within the proposed Skeerhok PV 1, 2 and 3 project areas. There are temporary drainage courses, typical of arid environments, where surface run-off would accumulate and flow, but this would only occur very occasionally, immediately after high rainfall events.

3.3 Soils

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climatic conditions into different land types. The proposed Skeerhok developments are located on a single land type, Ag5. This land type comprises predominantly shallow, red sands to loamy sands on underlying rock, hard-pan carbonate, or hard-pan dorbank. The soils fall into the arid Silicic, Calcic, and Lithic soil groups according to the classification of Fey (2010). The field investigation (Lanz, 2016) confirmed that the soils in the area are shallow, red sandy soils on underlying rock and hard-pan carbonate. Actual soil forms vary within short distances depending on rock ridges that run across the area and the extent of calcrete formation. There are numerous outcrops of rocky ridges at the soil surface across the entire area. All investigated sample points across the area were one of four soil forms: Coega, Mispah, Plooysberg or Hutton. However there is very little practical difference between these different soil forms. All have a clay content of approximately 7%, are shallow and are underlain by a hard impenetrable layer (either rock or hard-pan carbonate). The land has low to moderate water erosion hazard, mainly due to the low slope, but is susceptible to wind erosion because of the sandy texture of the soil.

3.3 Agricultural Capability

Land capability is the combination of soil suitability and climate factors. The area has a land capability classification, on the eight category scale, of Class 7 - non-arable, low potential grazing land. The limitations to agriculture are aridity and lack of access to water in addition to the shallow soil depth and rockiness. Because of these constraints, agricultural land use is restricted to low intensity grazing only. The natural grazing capacity is low, at mostly 31 - 40 hectares per animal unit. The current farmer uses an average stocking rate of 10 hectares per sheep.

3.3.1 Land Use and Development on and Surrounding the Site

The proposed sites (Skeerhok PV 1, 2 and 3, and Skeerhok – transmission line) are located within a sheep farming agricultural region and land use for the farm and surrounding area is sheep farming only. There is no cultivation or any history of cultivation on the farm. The Sishen-Saldanha railway line with its associated infrastructure runs through the farm to the south of the PV site. Apart from fences and one stock watering point, there is no agricultural infrastructure on the site. There are no buildings on the site.

3.3.2 Status of the Land

The biome classification for the site is Bushmanland Arid Grassland. The natural vegetation is grazed, veld conditions are very sparse but there is no evidence of significant erosion or other land degradation on the site.

3.3.3 Possible Land Use Options for the Site

Because of both the climate and soil limitations, the site is not suitable for any agricultural land use other than low intensity grazing.

The site is within one of South Africa's eight proposed Renewable Energy Development Zones (REDZs), and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impact, economic and infrastructural factors. These factors include an assessment of the significance of the loss of agricultural land. Renewable energy development is therefore a very suitable land use option for the site.

3.3.4 Agricultural Sensitivity

Agricultural potential is uniformly low across the farms in the area and the choice of placement of the facility on the chosen farms therefore has no influence on the significance of agricultural impacts. No agriculturally sensitive areas occur within the assessed area, and so no parts of it need to be avoided by the development. No buffers are required.

3.4 KEY ISSUES AND POTENTIAL IMPACTS

The following have been identified by the specialist (Lanz, 2016) as potential impacts on agricultural resources and productivity for projects in the proposed Skeerhok PV area.

3.4.1 Construction and Decommissioning Phases only

1. Degradation of veld vegetation beyond the direct footprint of the proposed PV facility due to construction and decommissioning disturbance and potential trampling by vehicles.
2. Loss of topsoil due to poor topsoil management (burial, erosion, etc.) during construction and decommissioning related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's capability for supporting vegetation.

3.4.2 All Phases – Construction, Operation and Decommissioning

1. Loss of agricultural land use due to direct occupation by the infrastructural footprint of the proposed development for the duration of the project (all phases). This will take affected portions of land out of agricultural production.
2. Soil erosion by wind or water due to alteration of the land surface characteristics. Alteration of surface characteristics may be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard standing areas, surfaces and roads. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.
3. Generation of additional land use income through the rental of the land for the proposed solar energy facility. This will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve its financial sustainability. This is rated as a positive impact.

3.4.3 Cumulative Impacts

The cumulative impact assessment assumes that a total of six approved renewable energy developments will be awarded preferred bidder status in the surrounding area, as stipulated by the DEA within the Scatec Environmental Authorisation letter for 14/12/16/3/3/2/837, "Conditions of this Environmental

Authorization", Scope of Authorisation, Point 2 (07/08/2017). However, as a precautionary approach, all developments in a 30km radius were included in the cumulative impact assessment.

3.5 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

The potential impacts identified are assessed in table format in Tables 1.2 and 1.3 below.

The proposed developments are located on land zoned and used for agriculture. South Africa has very limited arable land and it is therefore critical to ensure that development does not lead to an inappropriate loss of land that may be valuable and important for agricultural production. The proposed site is however on land which has very low agricultural potential and is only suitable for low intensity grazing.

All impacts are evaluated in terms of their consequence for agricultural production, not in terms of the impact *per se*. This is because it is agricultural production that must be the focus of an agricultural assessment. Because the undisturbed site already has extremely limited agricultural potential, it means that the consequence of any impact for agricultural production is limited with the result that the consequence and significance of agricultural impacts is low. Furthermore, the poor, very shallow soil conditions reduce the significance of loss of topsoil and the low slope gradients reduce the significance of potential erosion impacts.

Irreplaceability of resources is considered low because the resource that is being impacted is non-arable, low potential grazing land which is not a scarce resource in the country. The confidence level of the assessment is considered high because there is certainty about the low agricultural potential of the land and the impacts are fairly easy to understand and predict. There are a large number of other potential projects in the area that will also lead to a loss of agricultural land. Although the loss of individual project portions of land has low significance, as discussed above, the cumulative impacts of land loss regionally becomes more significant. However, despite this cumulative impact, it is still agriculturally strategic from a national perspective to steer as much of the country's renewable energy development as possible to regions such as this one, with very low agricultural potential. It is preferable to incur a higher cumulative loss in such a region, than to lose agricultural land with a higher production potential elsewhere in the country.

Mitigation measures are also included in Table 1.2. Recommendations for the monitoring and review of all identified mitigation measures are described below, as well as the EMPr (Part B of this Draft EIA Report).

Table 1.2: Impact assessment summary table

Aspect/Impact pathway	Nature of impact	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility	Irreplaceability	Mitigation/ Management Actions	Significance		Ranking of Residual Impact	Confidence Level
										Without Mitigation	***With Mitigation***		
Construction and Decommissioning Phases (Direct Impacts)													
Vehicle traffic and dust generation	Veld degradation	Negative	Site	Medium term	Slight	Likely	Moderate (i.e. Partially)	Low	1. Minimize footprint of disturbance. 2. Confine vehicle access on roads only. 3. Control dust generation during construction and decommissioning activities by adopting standard construct site dust control methods (such as dampening surfaces with water), where required. Because of water scarcity, this should only be done where and when dust generation is a significant problem.	Very Low	Very Low	5	High
Constructional and decommissioning activities that disturb the soil profile.	Loss of topsoil	Negative	Site	Medium term	Slight	Likely	Moderate (i.e. Partially)	Low	1. Strip and stockpile topsoil from all areas where soil will be disturbed. 2. After cessation of disturbance, re-spread topsoil over the surface. 3. Dispose of any sub-surface spoils from excavations where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.	Very Low	Very Low	5	High
Construction, Operational and Decommissioning Phases (Direct Impacts)													
Occupation of the land by the project infrastructure	Loss of agricultural land use	Negative	Site	Long term	Slight	Very Likely	High	Low	None	Very Low	Not applicable	5	High

Aspect/Impact pathway	Nature of impact	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility	Irreplaceability	Mitigation/ Management Actions	Significance		Ranking of Residual Impact	Confidence Level
										Without Mitigation	***With Mitigation***		
Construction and Decommissioning Phases (Direct Impacts)													
Change in surface characteristics and surface cover.	Erosion	Negative	Site	Long term	Slight	Likely	Low	Low	Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.	Low	Very Low	5	High
Project rental	Additional land use income	Positive	Site	Long term	Slight	Very Likely	High	Low	None	Very Low	Not applicable	5	High

Table 1.3: Cumulative impact assessment summary table

Aspect/Impact pathway	Nature of impact	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility	Irreplaceability	Mitigation/ Management Actions	Significance		Ranking of Residual Impact	Confidence Level
										Without Mitigation	***With Mitigation***		
Occupation of the land by the infrastructure of multiple projects	Regional loss of agricultural land	Negative	Regional	Long term	Likely	Likely	Moderate (i.e. Partially)	Moderate	None	Moderate	Not Applicable	3	Low

3.4 INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The following main mitigation measures and monitoring requirements are proposed for inclusion in the EMPr:

- Minimize the footprint of disturbance during construction and decommissioning activities.
- Confine vehicle access to roads only.
- Control dust generation during construction and decommissioning activities by implementing suitable, standard construction site dust control measures.
- Strip and stockpile topsoil from all areas where soil will be disturbed.
- After cessation of disturbance, re-spread topsoil over the surface.
- Dispose of any sub-surface spoil material, generated from excavations, where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.
- Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.

The following main monitoring requirements are proposed for inclusion in the EMPr:

- Undertake a periodic site inspection to verify the occurrence of off-road vehicle tracks surrounding the site.
- Establish an effective record keeping system for each area where soil is disturbed for constructional and decommissioning purposes. Recommendations for the recording system are included in the EMPr (Part B of the EIA Report).
- Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.

3.6 CONCLUSION AND RECOMMENDATIONS

The proposed Skeerhok PV 1, 2 and 3, and Skeerhok PV – Transmission Line developments are on land zoned and used for agriculture. South Africa has very limited arable land and it is therefore critical to ensure that development does not lead to an inappropriate loss of land that may be valuable for cultivation. This assessment has found that the investigated site is on land which is of very low agricultural potential and is not suitable for cultivation.

Because of the low agricultural potential of the site, the development should, from an agricultural impact perspective, be authorised. Authorisation is promoted by the fact that the sites falls within a proposed renewable energy development zone, where such land use has been assessed as very suitable in terms of a number of factors, including agricultural impact. It is preferable to incur a loss of agricultural land in such a region, without cultivation potential, than to lose agricultural land that has a higher potential, to renewable energy development elsewhere in the country.

No agriculturally sensitive areas occur within the wider project area and it is therefore assumed (with high confidence) that no part of it is therefore required to be set aside from the development. Because the sites are uniformly low potential, from an agricultural point of view, there is no preferred location or layout within the assessed sites. The following management and mitigation measures should be included in the EMPr:

- Minimize the footprint of disturbance during construction and decommissioning activities.
- Confine vehicle access to roads only.

- Control dust generation during construction and decommissioning activities by implementing suitable, standard construction site dust control measures (i.e. dampening with water) where required. Because of water scarcity, this should only be done where and when dust generation is a significant problem.
- Strip and stockpile topsoil from all areas where soil will be disturbed.
- After cessation of disturbance, re-spread topsoil over the surface.
- Dispose of any sub-surface spoil material, generated from excavations, where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.
- Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.

3.7 INFORMATION SOURCES

The information used for the compilation of this impact statement was drawn from the following sources:

1. Lanz, J. (2016). Agricultural and Soils Impact Assessment for proposed Scatec Solar PV Energy Facilities near Kenhardt, Northern Cape Province. Johann Lanz, Stellenbosch.
2. Lanz, J. (2016). Soils and Agricultural Potential Assessment for the proposed Solar Energy Facilities of the Phase 1 and 2 Nieuwehoop Solar PV Park near Kenhardt. Johann Lanz, Stellenbosch.
3. Agricultural Geo-Referenced Information System (AGIS), produced by the Institute of Soil, Climate and Water (Agricultural Research Council, undated).
4. Satellite imagery of the site available on Google Earth was also used for evaluation.

3.8 Declaration of Independence of Specialist

Mr Johann Lanz has reviewed this statement. Please refer to Appendix A of this Impact Statement for the Curriculum Vitae of Mr. Johann Lanz and his letter (page 1), which confirms that this impact assessment is suitable for this project and in lines with his previous studies' findings. The declaration of independence by the specialist is provided below:

DECLARATION OF INDEPENDENCE

I, Johann Lanz, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Skeerhok PV 1, 2 and 3, and Skeerhok – Transmission Line Projects, application or appeal in respect of which I was appointed, other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

JOHANN LANZ
26/01/2018

Appendix A: Curriculum Vitae of the Specialist

Johann Lanz

Curriculum Vitae

Education

M.Sc. (Environmental Geochemistry)	University of Cape Town	1996 - June 1999
B.Sc. Agriculture (Soil Science, Chemistry)	University of Stellenbosch	1992 - 1995
BA (English, Environmental & Geographical Science)	University of Cape Town	1989 - 1991
Matric Exemption	Wynberg Boy's High School	1983

Professional work experience

I am registered as a Professional Natural Scientist (Pri.Sci.Nat.) in the field of soil science, registration number 400268/12, and am a member of the Soil Science Society of South Africa.

Soil Science Consultant	**Self employed**	**2002 - present**

I run a soil science consulting business, servicing clients in both the environmental and agricultural industries. Typical consulting projects involve:

Soil specialist study inputs to EIA's, SEA’s and EMPR's. These have focused on impact assessments and rehabilitation on agricultural land, rehabilitation and re-vegetation of mining and industrially disturbed and contaminated soils, as well as more general aspects of soil resource management. Recent clients include: Aurecon; CSIR; SiVEST; SRK Consulting; Juwi Renewable Energies; Mainstream Renewable Power; Subsolar; Tiptrans; Planscape; Afrimat; Savannah Environmental; Red Cap Investments; MBB Consulting Engineers; Enviroworks; Haw & Inglis.

Soil resource evaluations and mapping for agricultural land use planning and management. Recent clients include: Cederberg Wines; Unit for Technical Assistance - Western Cape Department of Agriculture; Vogelfontein Citrus; De Grendel Estate; Zewenwacht Wine Estate; Goedgedacht Olives;, Lourensford Fruit Company; Kaarsten Boerdery; Wedderwill Estate; Thelema Mountain Vineyards; Rudera Wines; Flagstone Wines; Solms Delta Wines; Dornier Wines.

I have conducted several research projects focused on conservation farming, soil health and carbon sequestration.

Soil Science Consultant	**Agricultural Consultors International (Tinie du Preez)**	**1998 - end 2001**

Responsible for providing all aspects of a soil science technical consulting service directly to clients in the wine, fruit and environmental industries all over South Africa, and in Chile, South America.

Contracting Soil Scientist	**De Beers Namaqualand Mines**	**July 1997 - Jan 1998**

Completed a contract to make recommendations on soil rehabilitation and re-vegetation of mined areas.

Publications

- Lanz, J. 2012. Soil health: sustaining Stellenbosch's roots. In: M Swilling, B Sebitosi & R Loots (eds). *Sustainable Stellenbosch: opening dialogues*. Stellenbosch: SunMedia.
- Lanz, J. 2010. Soil health indicators: physical and chemical. *South African Fruit Journal*, April / May 2010 issue.
- Lanz, J. 2009. Soil health constraints. *South African Fruit Journal*, August / September 2009 issue.
- Lanz, J. 2009. Soil carbon research. *AgriProbe*, Department of Agriculture.
- Lanz, J. 2005. Special Report: Soils and wine quality. *Wineland Magazine.*

I am a reviewing scientist for the *South African Journal of Plant and Soil*.

TRAFFIC IMPACT STATEMENT

Statement prepared by:	*Statement reviewed by*:
CSIR – Environmental Management Services	Christo Bredenhann Pr Eng.
	Associate - Traffic & Transportation Engineer
	WSP Group Africa (Pty) Ltd
PO Box 320	Cnr Portswood and Beach Road, Waterfront
Stellenbosch, 7599	Cape Town, 8001
South Africa	South Africa

December 2017

WSP ref.: 24405

2018/01/23

PUBLIC

Kelly Stroebel, Environmental Assessment Practitioner (EAP)
CSIR Stellenbosch
PO Box 320
Stellenbosch
7599

Dear Madam:

Subject: Review of Skeerhok PV Traffic Impact Statement

This letter confirms that I have reviewed the Skeerhok PV Traffic Impact Statement (TIS) prepared by the CSIR.

I agree with the contents of the TIS.

Yours sincerely,

Digitally signed by Bredenhann, Christo
Date: 2018.01.24 11:25:06 +02'00'

Christo Bredenhann
Associate - Traffic and Transportation Engineer

The Pavilion, 1st Floor
Corner Portswood and Beach Rd, Waterfront
Cape Town, 8001
South Africa

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wsp.com

contents

tables

photos

TRAFFIC IMPACT STATEMENT

1. INTRODUCTION

juwi Renewable Energies (PTY) Ltd is proposing to develop three 100 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and **associated electrical infrastructure (132 kV transmission line)** on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult 120, and the connection points to the Eskom Nieuwehoop Substation on the Portion 3 of Gemsbok Bult Farm 120, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province.

As per the Plan of Study included in Final Scoping Report (September 2017) and subsequently approved by the Department of Environmental Affairs (DEA) on 30 November 2017, it was indicated that **a Traffic Impact Statement (TIS)** will be produced to identify the traffic related potential impacts of the proposed development on the local road network and environment. The TIS will be undertaken for the proposed Skeerhok PV 1, Skeerhok PV 2, and Skeerhok PV 3 solar energy projects, as well as the proposed Skeerhok PV – Transmission Line Basic Assessment project near Kenhardt in the Northern Cape. Various projects have been approved within the same area as the proposed Skeerhok PV facilities (see locality map below, Figure 1) and all the previous Environmental Impact Assessments (EIAs) included Traffic Studies. There is therefore a large amount of information regarding traffic impacts associated with PV projects in the Kenhardt area and these impacts are well known and documented. For this reason, it was proposed that a full specialist impact assessment is not deemed necessary for these projects.

This impact statement has been compiled by the CSIR using existing information and reviewed by Mr. Christo Bredenhann Pr. Eng, a qualified Traffic and Transportation Engineer. The studies used as a reference for this impact statement are listed in Section 7.

1.1 Terms of Reference

The key issues associated with the construction and operational phases of the project that will be assessed as part of the TIS are:

- Increase in traffic generation throughout the lifetime of the project;
- Decrease in air quality; and
- Increase in road maintenance required.

1.2 Assumptions and Limitations

The TIS has been based on the traffic information provided by similar PV projects in the area, as well as traffic information provided by the Applicant, juwi Renewable Energies.

The cumulative impact assessment assumes that a total of **six** approved renewable energy developments will be awarded preferred bidder status in the surrounding area, as stipulated by the DEA within the Scatec Environmental Authorization letter for 14/12/16/3/3/2/837, “Conditions of this Environmental Authorization”, Scope of Authorization, Point 2 (07/08/2017). However, as a precautionary approach, all developments in a 30km radius were included in the cumulative impact assessment.

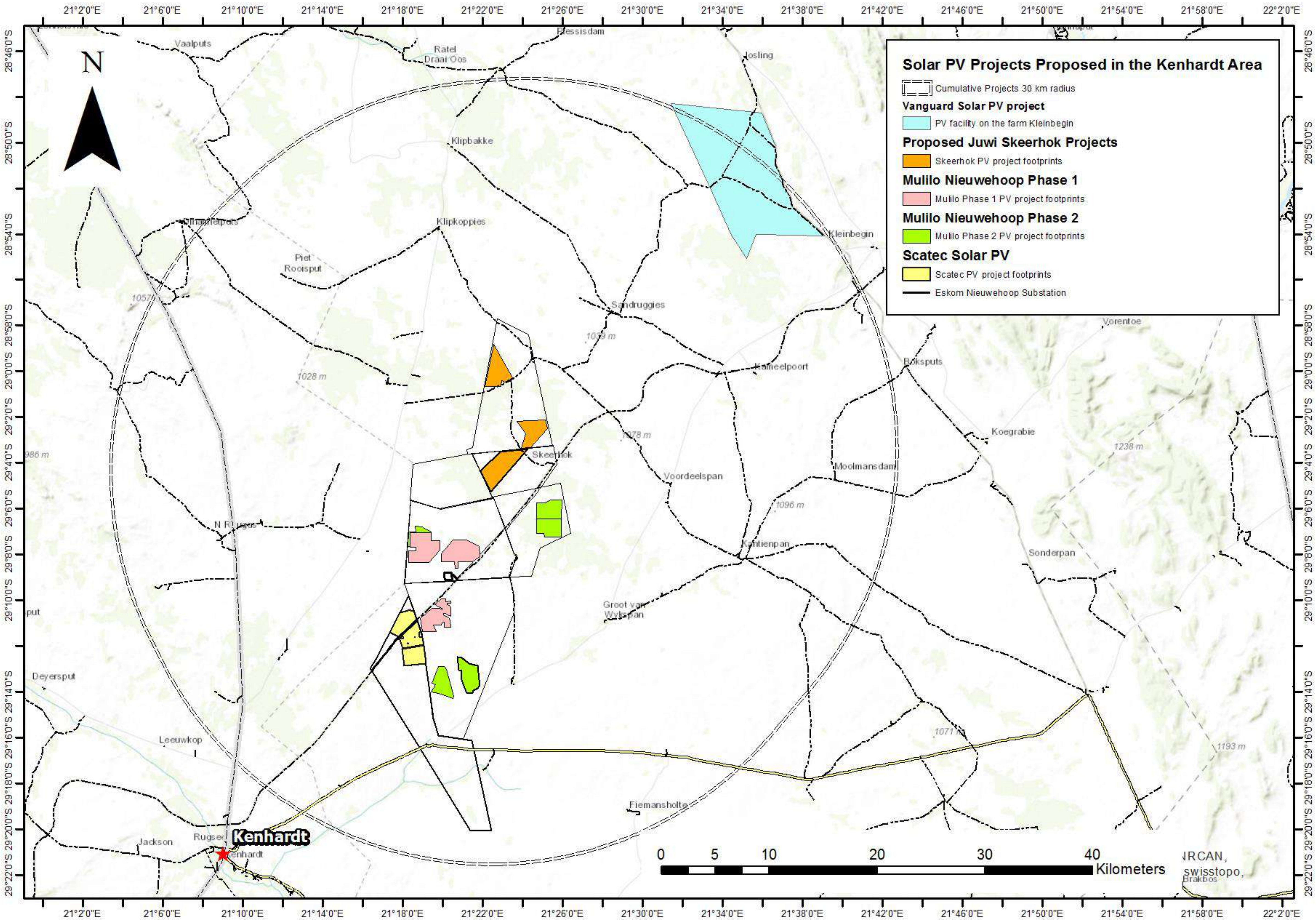

Figure 1: Cumulative locality map for the proposed three juwi Skeerhok Solar PV Projects, and the two reference studies (three Scatec Kenhardt Solar PVs and seven Mulilo Kenhardt Solar PVs) near Kenhardt in the Northern Cape

2. APPROACH AND METHODOLOGY

2.1 Objectives

- Determine the current traffic conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Identify potential impacts and cumulative impacts that may occur during the construction, operational and decommissioning phases of development;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures which could be implemented to as far as possible reduce the effect of negative impacts and enhance the effect of positive impacts; and
- Incorporate and address all issues and concerns raised by I&APs and the public (if applicable).

2.2 Methodology

The key steps followed in this statement are:

- Review of available desktop information, including the South African National Roads Agency (SANRAL) National traffic count information and google earth images;
- Review and assimilate information from similar projects (see sources below in Section 7).

The Final Scoping Report was submitted to the National DEA on 3 November 2017 for decision-making. The Scoping Report was accepted by the National DEA on 30 November 2017. As part of the acceptance, the National DEA had certain requirements for the TIS, as shown in Table 1.1 below.

Table 1.1: National DEA Requirements for the Traffic Impact Statement (Acceptance of Scoping letter – 30 November 2017)

DEA Requirement	Feedback from Specialist/sub-section where this is addressed
x. The specialist input referred to in comment (viii) of the comments on the draft scoping report signed 19 October 2017; must additionally address the following:	
• indicate whether the recommendation by the EAP that detailed studies are not required is acceptable;	Agreed, the TIS adequately investigates the traffic impacts of the development
• indicate whether the methodology used to arrive at the conclusion that detailed studies are not required is clearly explained and acceptable;	Agreed.
• Discuss the suitability of the proposed mitigation measures and recommendations, if any. Further, provide input to the EMPr, including additional mitigation and monitoring requirements to ensure that identified impacts are eliminated;	Appropriate mitigation measures are proposed for the development.

DEA Requirement	Feedback from Specialist/sub-section where this is addressed
• Evaluate the appropriateness of the reference literature used;	Sufficient literature and baseline information has been utilised.
• Indicate details and conclusions of the site-inspection if one was carried out as part of the specialist input	No site inspection was carried out for the impact statement for this proposed project, however, the reference studies conducted by CSIR (2016) included site inspection(s). Please refer to Section 1.3 below for a description of the methodology used in the reference studies.
• Indicate if the studies being referred to covers the preferred site; and	Although the reference studies used in compiling this TIS covered a different development footprint, the access roads and routes will be the same as they fall on the same farm (s). In addition, due to the fact that the Skeerhok projects will be using the same technology, similar traffic volumes can be expected.
• Provide an indication on the cumulative impacts of these studies in relation to the proposed development.	Refer to Section Table 1.2 below.
• Must be conducted or input provided by a suitably qualified specialist in the field	Refer to Appendix A for the full CV of the specialist.

3. AFFECTED ENVIRONMENT

During all phases (construction, operation and decommissioning) of the project, additional traffic will be generated. The highest traffic volumes will be created during the construction phase. This includes activities associated with:

- Site preparation and transporting the construction materials and associated infrastructure to the site; and
- Transportation of employees to and from the site on a daily basis.

The proposed project site can be accessed via an existing gravel road (an unnamed farm road) and the existing Transnet Service Road (private). Both access routes will be considered in the design of the facility and have been included in the proposed project. The R27 extends from Keimoes (in the north) to Vredendal in the south. The R27 is a 6 m wide surfaced road with 1 lane per direction and unsurfaced shoulders. It has a 45 m road reserve. This National Road is designed for minimum daily traffic exceeding 1000 vehicle units. The Transnet Service Road can be accessed from the R27. The existing gravel road can be accessed from the R383 Regional Road also via the R27 National Road. The Transnet Service Road and unnamed farm road are both 7-8 m wide, however in certain sections, the unnamed farm road is believed to be about 2-3 m wide. It is currently proposed that existing roads will be used as far as possible, to avoid the construction of new roads for the proposed Skeerhok PV 1, PV 2 and PV 3 facilities.

Photographs (taken from the TIS – Source 1 below) are included (Photo 1.1-1.44) to show the intersection of the Transnet Service Road with the R27 and the condition of the roads.

Photo 1.1: R27 towards the south (taken towards Kenhardt). The board shows “Loop 14”, located to the left, which is accessed via the Transnet Service Road. (Image source: Google, 2010)

Photo 1.2: The intersection of the R27 and Transnet Service Road, going towards Kenhardt. As can be seen on this image, the R27 was being upgraded in 2010 (Image source: Google, 2010)

Photo 1.3: The intersection of the R27 and Transnet Service Road, going towards Keimoes (Image source: Google, 2010)

Photo 1.4: The access point to the Transnet Service Road (Image taken: July 2014)

Historic traffic volume figures are not available within the study area; however, the resultant traffic volumes has been assumed to be below the allowed maximum average daily traffic limit of 1000 veh/day. Although the proposed development is expected to generate trips during the construction, operation and decommissioning phases, the traffic generated will be low, based on similar studies conducted within the study area.

4. TRANSPORT INFORMATION

The general current limitations on road freight transport are:

- Axle load limitation of 7,7t on front axle, 9,0t on single rear axles;
- Axle unit limitations are 18t for dual axle unit and 24t for 3 axle unit;
- Gross vehicle mass of 56t. This means a typical payload of about 30t;
- Maximum vehicle length of 22m for interlink, 18,5m for horse and trailer and 13,5 for a single unit;
- Width limit of 2,6m; and
- Height limit 4,3m.

Abnormal permits are required for vehicles exceeding these limits.

4.1 Solar Farm Freight

Anticipated materials and equipment transported to the site comprise of:

- Building materials (concrete aggregates, cement and gravel);
- Construction equipment such as piling rigs and cranes;
- Solar panels (panels and frames); and
- Transformer and cables.

The following is anticipated:

A. Building materials comprising of concrete materials for strip footings or piles will be transported using conventional trucks which would adhere to legal limits listed above.
B. Solar Panels and frames will probably be transported in containers using conventional heavy vehicles within the legal limits. The number of loads will be a function of the capacity of the solar farm and the extent of the frames (the anticipated number of loads are discussed below).
C. Transformers will be transported by abnormal vehicles.

4.2 Traffic Generation

The traffic generation estimates have been based on similar studies conducted within the study area. The estimated traffic generated includes the Scatec Kenhardt project and the Skeerhok PV 1, 2 and 3 projects. The generated traffic for the Skeerhok PV 1, 2 and 3 projects are anticipated to be similar to the Scatec Kenhardt projects. The trip generation was calculated based on Client information and the Scatec project information.

- ***Construction Phase (per development Skeerhok 1/2/3)***

Approximately 800 x 40ft containers resulting in approximately 800 double axel trucks will come to site during the construction phase of 18 months. In addition to this, more or less 20 light load trucks will come from and go to site on a daily basis during the construction phase. It is estimated that a total of 18 800 vehicle trips to and from the site.

It is assumed that construction will take place 5 days a week for a total of 235 standard working days per year, over a period of 18 months. A total of 353 construction days.

The maximum possible total trips per day will occur when containers are delivered to site during the 18-month construction period.

Containers:	+/- 1 truck every 2 days = 2 trips (In + Out)
Light trucks:	40 trips per day (In + Out)
Water trucks:	1 truck every 2 days = 2 trips (In + Out)
Total:	44 trips per day (In + out)

This is regarded as negligible traffic. Note that full Traffic Impact Assessments (TIA) are normally only required for developments that will generate more than 50 vehicle trips (In + Out) during any peak **hour**.

- ***Operational Phase (per development Skeerhok 1/2/3)***

More or less 4 light load trucks will come from and go to site on a daily basis and 1 small single axel truck to and from site on a weekly basis. For water supply, the current estimate is that 2 trips per month will be made by a water truck.

The lifetime of the project is assumed as the maximum 20 years which means that the total amount of trips would be 61 440 over a 20-year operational life.

The maximum possible total trips per day to site during the operational phase will only occur if all scheduled vehicles arrive on the same day, as follows:

Single axle truck:	1 truck every week = 2 trips (In + out)
Light trucks:	8 trips per day (In + Out)
Water trucks:	1 trip every 2 weeks = 2 trips (In + Out)
Total:	10 trips per day (In + out)

This is regarded as negligible traffic.

- ***Decommissioning Phase (per development Skeerhok 1/2/3)***

As per the construction phase, approximately 800 x 40ft containers resulting in more or less 800 double axel trucks will come to site during the decommissioning phase. The decommissioning phase usually takes 12 months. In addition to this, more or less 20 light load trucks to and from site will come and go to site on a daily basis.

It is assumed that the decommissioning work will take place 5 days a week for a total of 235 standard working days per year, over a period of 12 months. A total of 235 days.

The maximum possible total trips per day will be as follows:

Containers: 7 trucks every 2 days = 14 trips (In + Out)
= 7 trips per day (In + Out)
Light trucks: 40 trips per day (In + Out)
Total: 47 trips per day (In + out)

This is regarded as negligible traffic.

- ***Cumulative***

Although the 20km radius was considered for cumulative impact purposes, the worst case of all 6 approved developments proceeding simultaneously was used for the purpose of these calculations.. The cumulative impact assessment assumes that all the projects outlined within the cumulative impact section occur at the same time (Construction, operation and decommissioning phases). Even though there will most likely be overlap in the operational phases of these projects, it is unlikely that the construction phases for all these projects would occur at the same time. Since the construction phase will give rise to the most amount of trucks coming to site, this would be considered the worst case scenario in terms of traffic generation. The projects that have been approved to date within close proximity of each other are detailed within Table 1.2 below. Table 1.2 also includes the estimates for the three proposed Skeerhok PV projects. As noted above, the DEA has stated that no more than 6 projects will be approved in the area, as reflected in Table 1.2. The impact on this road is therefore not anticipated to be significant but should the Transnet Service Road be used for all the projects, a maintenance plan, agreed upon all parties involved must be implemented to ensure that the road's quality and integrity is maintained.

Table 1.2: Cumulative daily traffic generation estimates for all PV projects proposed north-east of Kenhardt, including the Skeerhok projects (Scatec, 2016)

Project name		Daily traffic generation estimates		
		Construction Phase (veh/day)	**Operational Phase (veh/day)**	**Decommission Phase (veh/day)**
1	Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 1) and proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 1)	21	5	21
2	Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 2) and proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 2)	21	5	21
3	Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 3) and proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 3)	21	5	21
4 to 6	Proposed Construction of Skeerhok 300 MW Solar facilities - PV 1 / 2 / 3	44 x 3 = 132	10 x 3 = 30	47 x 3 = 141
	Total	**195**	**45**	**204**

5. IDENTIFICATION OF IMPACTS

The traffic impacts that are likely to be generated by the proposed facility are detailed below. The impacts will largely occur during the construction phase of the project, since this is when the highest amount of traffic will be generated by the proposed facility.

As per the table below, the impacts identified and assessed as part of the reference studies are:

1. Increase in traffic generation.
2. Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.
3. Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment.
4. Decrease in quality of surface condition of the roads.
5. Cumulative impact of traffic generation of all six projects in the area, including Skeerhok 1 to 3. The cumulative impact during the construction and decommissioning phases of all 6 projects cannot be assessed, as it is unlikely that all projects will be constructed or decommissioned over the same periods.

Table 1.3: Traffic Impact Assessment Table

Aspect/ Impact Pathway	Nature of impact	Status	Spatial Extent	Dura-tion	Conse-quence	Proba-bility	Reversi-bility	Irreplac-eability	Mitigation Measures	Significance of Impact/Risk = Consequence x Probability		Ranking of Impact/ Risk	Confi-dence Level
										Without Mitigation	*With Mitigation*		
CONSTRUCTION AND DECOMMISSIONING PHASES													
Traffic gene-ration	Increase in traffic	Nega-tive	Regional	Short term	Moderate	Very likely	Yes	Replace-able	• A permit should be obtained from the PGNC Department of Public Works, Roads and Transport for any abnormal loads transported. • Provide a Transport Traffic Plan to SANRAL and the PGNC Department of Public Works, Roads and Transport. • Road and safety standards should be adhered to.	Low	Low	4	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Nega-tive	Local	Short term	Moderate	Likely	No	High irreplace-ability	• Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and fences (such as Animex fences) installed, if needed to direct animals to safe road crossings. • Adhere to all speed limits applicable to all roads used. • Implement clear and visible signage at access to site at R27 and Transnet Service Road intersection.	High	Moderate	3	Medium
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Nega-tive	Local	Medium term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles. • Postpone or reduce dust-generating activities during periods with strong wind. • Earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased. • Ensure that all construction vehicles are roadworthy and adhere to vehicle safety standards implemented by the Project Developer. • Avoid using old and noisy construction equipment and ensure equipment is well maintained.	Moderate	Low	4	Medium

Aspect/ Impact Pathway	Nature of impact	Status	Spatial Extent	Dura-tion	Conse-quence	Proba-bility	Reversi-bility	Irreplac-eability	Mitigation Measures	Significance of Impact/Risk = Consequence x Probability		Ranking of Impact/ Risk	Confi-dence Level
										Without Mitigation	***With Mitigation***		
	Change in quality of surface condition of the roads	Nega-tive	Local	Short term	Slight	Likely	Yes	Replace-able	• Construction activities will have a higher impact than the normal road activity and therefore the road should be inspected on a weekly basis for structural damage; • A Road Maintenance Plan should be developed for the section of the Transnet Service Road that will be used to addresses the following: – Grading requirements; – Dust suppressant requirements; – Drainage requirements; – Signage; and – Speed limits.	Low	Low	4	Medium
OPERATIONAL PHASE													
Traffic gene-ration	Increase in traffic	Nega-tive	Regional	Long term	Slight	Very likely	High	Replace-able	• Adhere to requirements made within Transport Traffic Plan; • Limit access to the site to personnel; • Increase traffic will be negligible.	Very low	Very low	5	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Nega-tive	Local	Long term	Moderate	Likely	No	High irreplace-ability	• Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and fences installed, if needed to direct animals to safe road crossings. • Adhere to all speed limits applicable to all roads used. • Due to negligible traffic increases, increase in accidents is minimal.	High	Moderate	3	Medium
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Nega-tive	Local	Medium term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles; • Limit noisy maintenance/operational activities to daytime only.	Moderate	Low	4	Medium

Aspect/ Impact Pathway	Nature of impact	Status	Spatial Extent	Dura-tion	Conse-quence	Proba-bility	Reversi-bility	Irreplac-eability	Mitigation Measures	Significance of Impact/Risk = Consequence x Probability		Ranking of Impact/ Risk	Confi-dence Level
										Without Mitigation	***With Mitigation***		
	Change in quality of surface condition of the roads	Nega-tive	Local	Long term	Slight	Likely	Yes	Replace-able	• Implement requirements of the Road Maintenance Plan.	Low	Low	4	Medium
CUMULATIVE IMPACTS (Concurrent operational phase of all 6 developments)													
Traffic gene-ration	Increase in traffic	Nega-tive	Regional	Long term	Slight	Very likely	High	Replace-able	• Adhere to requirements made within Transport Traffic Plan; • Limit access to the site to personnel; Increase traffic will be negligible.	Very low	Very low	5	Medium
	Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Nega-tive	Local	Long term	Moderate	Likely	No	High irreplace-ability	• Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and fences installed, if needed to direct animals to safe road crossings. • Adhere to all speed limits applicable to all roads used. Due to negligible traffic increases, increase in accidents is minimal.	High	Moderate	3	Medium
	Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Nega-tive	Local	Mediu m term	Moderate	Likely	Yes	Replace-able	• Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles; Limit noisy maintenance/operational activities to daytime only.	Moderate	Low	4	Medium

6. CONCLUSIONS AND RECOMMENDATIONS

Based on the assessment of the potential impacts that can be associated with the traffic to be generated during the construction, operation and decommissioning phases of the reference projects, the overall impact from traffic generation is anticipated to be **low** when implementing suitable mitigation measures. The highest traffic will be generated during the construction phase.

The measures included within the EMPr must be adhered to, with the main requirements outlined below:

- Should abnormal loads have to be transported by road to the site, a permit needs to be obtained from the PGNC Department of Public Works, Roads and Transport.
- Provide a Transport Traffic Plan to SANRAL and the PGNC Department of Public works, Roads and Transport.
- Ensure that roadworthy and safety standards are implemented at all time for all construction.
- Adhere to all speed limits applicable to all roads used.
- Implement clear and visible signalisation indicating movement of vehicles and when turning off or onto the Transnet Service Road to ensure safe entry and exit.
- Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles.
- Construction activities will have a higher impact than the normal road activity and therefore the road should be inspected on a weekly basis for structural damage.
- A Road Maintenance Plan should be developed for the section of the Transnet Service Road.
- Ensure that road network is maintained in a good state for the entire operational phase.

7. INFORMATION SOURCES

The information used for the compilation of this impact statement was drawn from the following sources:

1. Laurie, S. (2016). Traffic Impact Assessment for proposed Scatec Solar PV Energy Facilities near Kenhardt, Northern Cape Province. Surina Laurie, CSIR, Stellenbosch.
2. Laurie, S. (2014). Traffic Impact Assessment for the proposed Solar Energy Facilities of the Phase 1 Nieuwehoop Solar PV Park near Kenhardt. Surina Laurie, CSIR, Stellenbosch.
3. Laurie, S. (2015). Traffic Impact Assessment for the proposed Solar Energy Facilities of the Phase 2 Nieuwehoop Solar PV Park near Kenhardt. Surina Laurie, CSIR, Stellenbosch.
4. South African National Roads Agency (SANRAL) National traffic count information.
5. Satellite imagery of the site available on Google Earth was also used for evaluation.

8. DECLARATION OF INDEPENDENCE OF SPECIALIST

Mr Christo Bredenhann has reviewed this statement. Please refer to Appendix A of this Impact Statement for the Curriculum Vitae of Mr. Bredenhann and his letter (page 1), which confirms that this impact assessment is suitable for this project and in lines with his previous studies' findings. The declaration of independence by the specialist is provided below:

DECLARATION OF INDEPENDENCE

I, Christo Bredenhann, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Skeerhok PV 1, 2 and 3, and Skeerhok – Transmission Line Projects, application or appeal in respect of which I was appointed, other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

CHRISTO BREDENHANN

Appendix A: Curriculum Vitae of the Specialist

SOCIAL IMPACT STATEMENT

Statement prepared by:	*Statement reviewed by*:
CSIR – Environmental Management Services P O Box 320 Stellenbosch South Africa	Applied Science Associates (Pty) Ltd- Rudolph du Toit 3 Red Oak Lane, Welgevonden Stellenbosch South Africa

December 2017

APPLIED SCIENCE ASSOCIATES

26 January 2018

Mrs. Kelly Stroebel
CSIR Environmental Management Services
11 Jan Cillier Road
Stellenbosch
7600

RE: EXTERNAL REVIEW OF THE SOCIAL IMPACT STATEMENT PREPARED FOR THE PROPOSED SKEERHOK 1 SOLAR PHOTOVOLTAIC (PV) FACILITY ON FARM SKEERHOK 395, PORTION 0, KENHARTD, NORTHERN CAPE PROVINCE

This letter is submitted in response to a Department of Environmental Affairs (DEA) request for an external review of the Social Impact Statement (SIS) submitted by CSIR as part of the EIA application for the Skeerhok 1 Solar PV facility. Juwi Renewable Energies (Pty) Ltd (the Applicant) subsequently appointed Applied Science Associates (Pty) Ltd on 18 January 2018 to conduct the requisite external review.

1. **Context of the review**

The Kenhardt area has seen a significant increase in solar PV EIA applications over the past 3 years (at least 11 applications have been submitted to DEA). All the relevant applications are proposed on a small cluster of farms located to the north-east of Kenhardt. As a result, numerous EIA reports, with attendant Social Impact Assessments (SIA) have been completed for this comparatively small geographic area. The anticipated social impacts likely to occur as a result of the proposed Skeerhok 1 Solar PV application is therefore well understood and extensively documented. In light of this reality, DEA instructed Juwi Renewable Energies (Pty) Ltd to compile a SIS, which draws on the findings of existing SIAs rather than primary research, in order to identify social impacts and assess its relative significance.

Consequently, the review findings presented in this letter is provided within the context of the detail, content, and level of research which is commensurate with an impact statement; and not a full-scale impact assessment.

2. Structure of the review

DEA requested that the review should answer the following questions:

- Indicate whether the recommendation by the Environmental Assessment Practitioner (EAP), that detailed studies are not required, is acceptable;
- Indicate whether the methodology used to arrive at the conclusion that detailed studies are not required is clearly explained and acceptable;
- Discuss the suitability of the proposed mitigation measures and recommendations, if any. Further, provide input to the EMPr, including additional mitigation and monitoring requirements to ensure that identified impacts are eliminated; and
- Evaluate the appropriateness of the reference literature used.

DEA further resolved that the external review findings should be submitted in the form of a cover letter; and not a full review report as is customary for the review of SIAs.

3. Review findings

3.1 *Indicate whether the recommendation by the Environmental Assessment Practitioner (EAP), that detailed studies are not required, is acceptable*

The recommendation is acceptable. Social change processes are, in general, slow changing variables which are unlikely to have changed significantly over the past 3 years since the original SIAs were drafted. Slow rates of social change are also associated with communities which are relatively insulted from exogenous change and shocks. While the Kenhardt community is most certainly vulnerable to change and shock; it is, by virtue of its rural location and limited economic growth, relatively insulated from exogenous socio-economic change processes (This notably excludes climate-related shocks). Furthermore, none of the proposed solar PV facilities, which are the topic of the SIAs considered in the impact statement, have received preferred bidder status; nor have any of these facilities been constructed in the study area. As a result, the economic and labor force context of the study areas is unlikely to have changed significantly since 2015.

3.2 *Indicate whether the methodology used to arrive at the conclusion that detailed studies are not required is clearly explained and acceptable*

The methodology used is acceptable. The SIS is correct in concluding that the argument in support of an impact statement is based on: (*i*) the abundance of social impact research available for the study area; (*ii*) the relative recency of said social impact research; and (*iii*) the similarity of the proposed development to previously assessed facilities. These factors are self-explanatory and, if considered together, provides a clear rationale that detailed studies are not required.

However, the research methodologies employed in the original SIAs, though referenced, is not explained in the SIS. This exclusion places a reader who is unfamiliar with said methodologies at disadvantage; as the research findings presented in the SIS could be difficult to interpret in the absence of a methodological framework.

The SIS should be updated to include a brief summary of the research methodologies upon which the findings in the report is based; alternatively, all references to these methodologies should be removed from the SIS.

3.3 *Discuss the suitability of the proposed mitigation measures and recommendations, if any. Further, provide input to the EMPr, including additional mitigation and monitoring requirements to ensure that identified impacts are eliminated*

The proposed mitigation measures and recommendations are suitable within the context of the proposed Skeerhok 1 Solar PV facility.

3.4 *Evaluate the appropriateness of the reference literature used*

The reference material used is appropriate. However, the 2014 Integrated Development Plan (IDP), and the Statistics South Africa 2011 Census Report used in the SIS appears to be dated. The !Kheis Local Municipality recently released its 2017/2018 IDP document, while Statistics South Africa has released the 2016 Community Household Survey. All the figures and facts extracted from the 2014 IDP, and the 2011 Census Report should be reviewed by CSIR to ensure accuracy. In addition, CSIR should update the SIS reference list to include the latest version of the IDP and the Statistics South Arica 2016 Community Household Survey.

It should be noted that, although updating of the reference literature is required, the basic socio-economic data presented in the SIS is unlikely to have changed significantly (please refer to the explanation of slow social change processes provided under *3.1* above). However, should the new material introduce significantly different socio-economic data; such data must be stated in the SIS, the relevant impacts and mitigation measures should be amended accordingly, and the SIS should be resubmitted to for external review.

4. Review statement

The SIS prepared for the proposed Skeerhok 1 Solar PV facility appears to be accurate in terms of the identified social impacts, the relative significance of said impacts, and the mitigation measures proposed. The SIS will benefit from a summary of the research methodologies employed in the SIAs which form the basis of the impact statement's findings; or alternatively removing all references to said methodologies so as to avoid confusion. In addition, the reference documents used in the SIS must be updated to include the !Kheis Local Municipality 2017/2018 IDP, and the 2016 Statistics South Africa Community Household

Survey. Should the updated material introduce significantly different socio-economic data; the SIS should be updated accordingly and resubmitted for external review.

However, these limited deficiencies, though in need of correction, do not appear to vitiate the basic accuracy of the impact statement.

In light of the above, this external review concludes that should the proposed changes be applied, and should no significantly new data be forthcoming from the updated reference material; the findings, accuracy, content, and quality of the Skeerhok 1 Solar PV SIS is of an acceptable standard, and is fit for purpose.

Yours sincerely,

Rudolph du Toit

Managing Director
rudolph@appliedscience.co.za
0769026479

contents

tables

figures

SOCIAL IMPACT STATEMENT

1. INTRODUCTION

juwi Renewable Energies (PTY) Ltd is proposing to develop three 100 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and **associated electrical infrastructure (a 132 kV transmission line)** on Portion 0 of Smutshoek Farm 395 and Portion 9 of Gemsbok Bult 120, and the connection points to the Eskom Nieuwehoop Substation on the Portion 3 of Gemsbok Bult Farm 120, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province.

As per the Plan of Study included in Final Scoping Report (September 2017) and subsequently approved by the Department of Environmental Affairs (DEA) on 30 November 2017, it was indicated that a **Social Impact Statement** will be produced to identify potential social impacts of the proposed development for the proposed Skeerhok PV 1, Skeerhok PV 2, and Skeerhok PV 3 solar energy projects, as well as the proposed Skeerhok PV – Transmission Line Basic Assessment project near Kenhardt in the Northern Cape. Various projects have been approved within the same area as the proposed Skeerhok PV facilities (Figure 1) and all the previous Environmental Impact Assessments (EIAs) included Social Impact Assessments (SIAs). There is therefore a large amount of information regarding the social impacts associated with PV projects in the Kenhardt area and these impacts are well known and documented. For this reason, it was proposed that a full specialist impact assessment is not deemed necessary for these projects.

This impact statement has been compiled by the CSIR using existing information and reviewed by Mr. Rudolph du Toit of Applied Science Associates (Pty) Ltd. The studies used as a reference for this impact statement are listed in Section 7.

1.1 *Terms of Reference*

The Social Impact Statement includes:

- A review of existing information, and collecting and reviewing baseline social information etc.
- Data from conducted interviews with key affected parties, including local communities, local landowners, key government officials (local and regional) etc as part of the reference studies (undertaken as part of the previous SIAs).
- An identification and assessment of key social issues and potential impacts (negative and positive) associated with the construction, operational and decommissioning phases of the proposed projects.
- An identification of potential mitigation and enhancement measures.
- A statement which includes an assessment of the potential social impacts associated with the proposed projects.
- An outline of mitigatory measures and additional management or monitoring guidelines.
- Input for the Environmental Management Programme (EMPr), including mitigation and monitoring requirements to ensure that negative social impacts are limited.

The Final Scoping Report was submitted to the National DEA on 3 November 2017 for decision-making. The Scoping Report was accepted by the National DEA on 30 November 2017. As part of the acceptance, the National DEA had the certain requirements for the Social Impact Statement, as shown in Table 1.1 below.

Table 1.1: National DEA Requirements for the Social Impact Statement (Acceptance of Scoping letter - 30 November 2017)

DEA Requirement	Feedback from Specialist/sub-section where this is addressed
x. The specialist input referred to in comment (viii) of the comments on the draft scoping report signed 19 October 2017; must additionally address the following:	
• indicate whether the recommendation by the EAP that detailed studies are not required is acceptable;	Please refer to cover letter above.
• indicate whether the methodology used to arrive at the conclusion that detailed studies are not required is clearly explained and acceptable;	Please refer to cover letter above.
• Discuss the suitability of the proposed mitigation measures and recommendations, if any. Further, provide input to the EMPr, including additional mitigation and monitoring requirements to ensure that identified impacts are eliminated;	Please refer to cover letter above.
• Evaluate the appropriateness of the reference literature used;	Please refer to cover letter above.
• Indicate details and conclusions of the site-inspection if one was carried out as part of the specialist input	No site inspection was carried out for the impact statement for this proposed project, however, the reference studies conducted by CSIR (2016) included site inspection(s). Please refer to Section 1.3 below for a description of the methodology used in the reference studies.
• Indicate if the studies being referred to covers the preferred site; and	Although the reference studies used in compiling this TIS covered a different development footprint, the access roads and routes will be the same as they fall on the same farm (s). In addition, due to the fact that the Skeerhok projects will be using the same technology, similar loads and frequencies can be expected.
• Provide an indication on the cumulative impacts of these studies in relation to the proposed development.	Refer to Section Table 1.2 below.
• Must be conducted or input provided on by a suitably qualified specialist in the field	Refer to Appendix A for the full CV of the specialist.

1.2 Study approach and methodology

The SIAs used as reference for this statement consulted secondary data sources (published documentation) to obtain basic socio-economic baseline demographics. This secondary data was then augmented with primary data generated by a site visit to the proposed project site as well as the town of Kenhardt. The methodologies used in the reference studies included:

- *Applied Anthropological Methods*
    - Collection of primary data during the site visit was guided by a Participant Observation Methodology (Anderson & Taylor, 2002).
    - The interviews aimed to uncover the major livelihood strategies present in the study area, to understand the key socio-economic challenges, and gain insights into the 'constructed reality' of the Kenhardt community.
    - Observation of community members' lives, routines and living environments help to gain insight into practices, patterns and processes which community members may not be consciously aware of.

- *Systems Theory*
    - A holistic approach was adopted towards understanding and representing the affected environment.
    - Accordingly, the receiving environment and subsequent impacts thereon were viewed and interpreted as a coupled socio-ecological system (SES).
    - Typical socio-economic baseline data is then represented in a Causal Loop Diagram (CLD) to illustrate the systemic causal linkages between variables present in the SES in which the study area is located.

- *Vulnerability Context*
    - An Asset Pentagon was used to interpret the collected information. An Asset Pentagon is an assessment method developed within the discipline of Livelihoods Assessment, and aims to establish the vulnerability context of a given social grouping.
    - As a result, the research approach is descriptive in nature and uses indicative reasoning to reach its impact assessment findings.

1.3 Assumptions and Limitations

The following assumptions and limitations were listed in the SIAs and would therefore apply to this impact statement:

- Primary and secondary data on the study area is very limited. The site visit undertaken as part of the reference studies (CSIR, 2015) was therefore intended to gather sufficient primary data to guide the SIA. However, information gathered during the site visit generally carried a medium level of confidence as the SIA is an applied research method, as opposed to a scientific research method. This means that much less time and resources are available for primary research and the subsequent verification of findings. As a result, the majority of the significance ratings ascribed to both the potential positive and negative impacts of the proposed Kenhardt PV and Transmission Line projects were given a ***medium*** confidence rating.
- The SIAs assumed that the majority of socio-economic impacts will be experienced in the town of Kenhardt; due to its proximity to the project site. It is however possible for socio-economic impacts to be experienced in other urban nodes close to the project site. The project boundary, in terms of socio-economics, is therefore arbitrarily constructed.

- The cumulative impact assessment assumes that a total of **six** approved renewable energy developments will be awarded preferred bidder status in the surrounding area, as stipulated by the DEA within the Scatec Environmental Authorisation letter for 14/12/16/3/3/2/837, "Conditions of this Environmental Authorization", Scope of Authorisation, Point 2 (07/08/2017). However, as a precautionary approach, all developments in a 30km radius were included in the cumulative impact assessment.

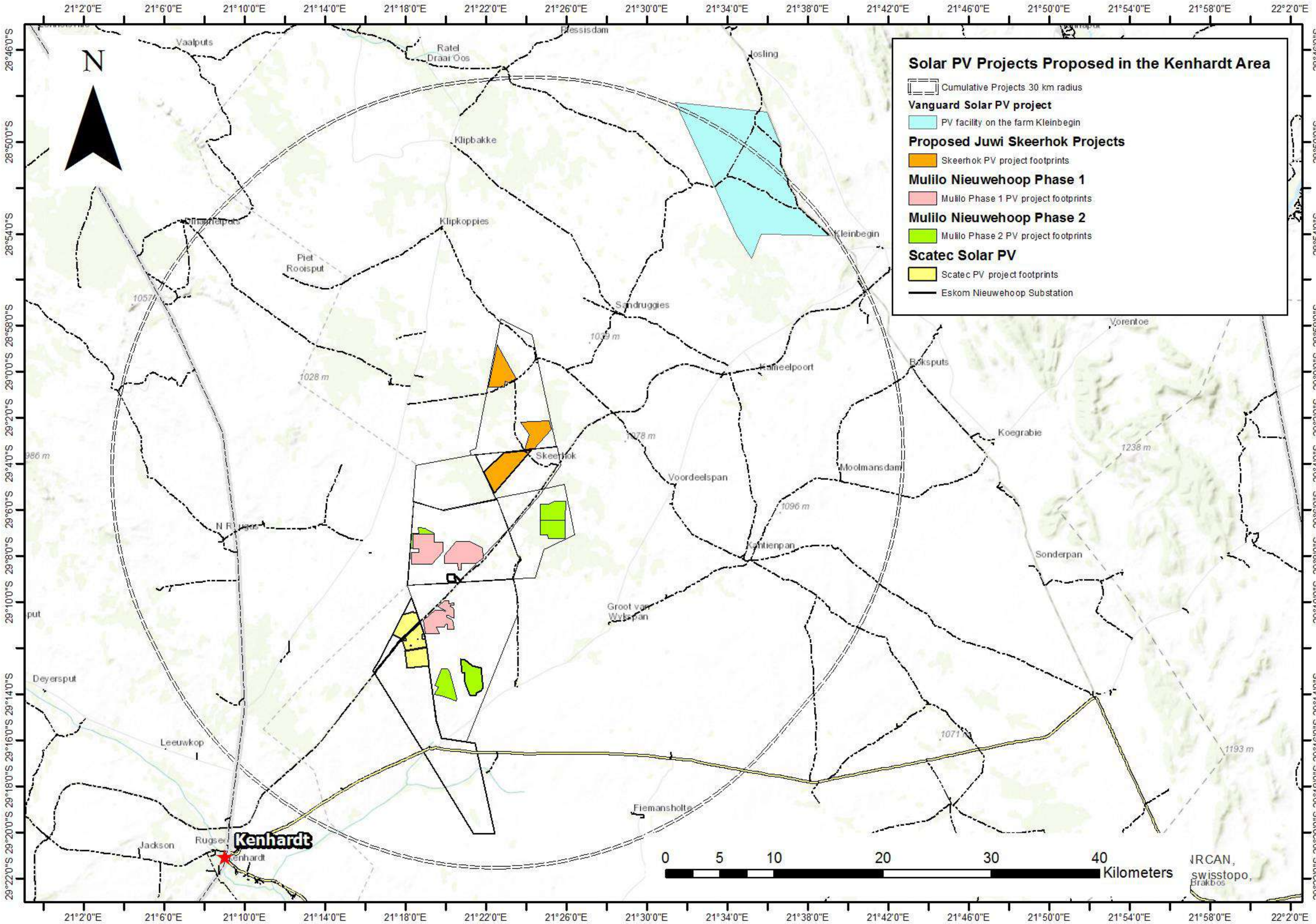

Figure 1: Cumulative locality map for the proposed three juwi Skeerhok Solar PV Projects, and the two reference studies (three Scatec Kenhardt Solar PVs and seven Mulilo Kenhardt Solar PVs) near Kenhardt in the Northern Cape

2. PROJECT CONTEXT (SOCIO-ECONOMICS)

2.1.1 Project Information

The current land use of the proposed project areas, as well as the surrounding land parcels is zoned for agricultural development and use (see locality in Figure 1 above). The construction phase of each proposed solar PV facility would last approximately 18 months. The construction phase of the proposed transmission line (which is subject to the BA Process) is expected to last 12 to 14 months. However, it should be noted that the construction period is subject to the final requirements of Eskom and the Renewable Energy Independent Power Producer Procurement Request for Proposal provisions at that point in time.

Employment opportunities created during the construction phase for the PV projects equates to 1600 (600 direct and 1000 indirect) employment during the construction period and 200 (50 direct and 150 indirect) employment opportunities during the operation period. Employment opportunities created during the construction phase of each transmission line project are estimated to range between 1 560 and 1 820 man months. It should be noted that the employment opportunities provided in this Statement are estimates taken from the reference studies and is dependent on the final engineering design and the REIPPPP Request for Proposal provisions at that point in time.

Employment opportunities to be created during the operational phase equate to approximately 4 800 man months (for skilled opportunities) and approximately 9 600 man months (for unskilled opportunities) per project (i.e. three 100 MW PV projects in total) over the 10 -20 year plant lifespan. A detailed project description is provided in Chapter 2 of the EIA Report and Section A of the BA Report.

3. AFFECTED SOCIO-ECONOMIC ENVIRONMENT

3.1.1 Socio-economic Baseline Data

3.1.1.1 Secondary Data

The study area is located within the ZF Mgcawu District Municipality (formally known as the Siyanda District Municipality) and the the !Kheis Local Municipality. However, the closest urban centre, Kenhardt, is located in the Kai !Garib Local Municipality. Given the proximity of the proposed projects to the town of Kenhardt; the focus of this Social Impact Statement will be on the Kai !Garib Local Municipality (Figure 1.2), as this is where the vast majority of potential project impacts (both positive and negative) might manifest.

According to the Kai !Garib Final IDP (2017/18) and the Stats SA 2011 Census data, the total population of the Kai !Garib municipal area is 68 929; of which 6 679 resides in the Kenhardt area. A total of 16 703 households resides in the Kai !Garib Local Municipality, with 35% of households being female headed. The total female population dominates the total male population by 8.5% (Kai !Garib Draft IDP, 2017/18). Population of the working age demographic (15 to 65 years) makes-up 70.5% of the population, whereas those below 15 years of age comprises 24.4% of the population; the + 65 years age group makes-up 5.1% of the population. Accordingly, the dependency ratio (the economically active population vs the non-economically active population) is 41.9% (Stats SA, 2011). The official unemployment rate of 10% has decreased by 6.1% since the 2011 Census measurement of 16.1%. The economic sector is dominated by agriculture which provides 51.8% of jobs, followed by the Community and Government Services sector with 15.9%.

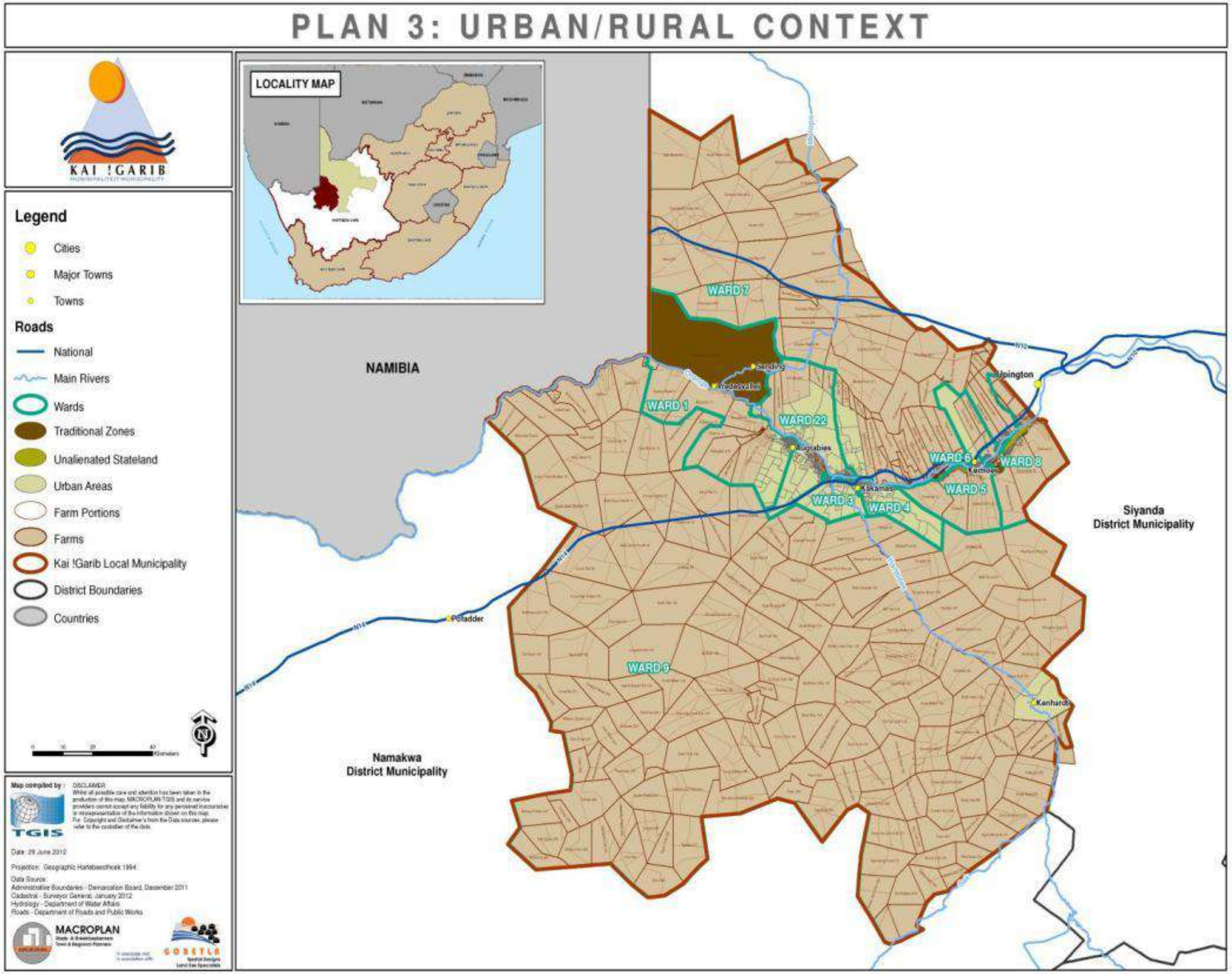

Figure 4: Kai !Garib Local Municipality (Source: Kai !Garib Draft IDP, 2017/18

The major social challenges faced in the Kai !Garib Municipal area include (Kai !Garib Draft IDP, 2014):

- Increases in drug abuse;
- Increases in children under 10 years abusing alcohol;
- Increases in teenage pregnancies;
- Increased crime linked to alcohol and drug abuse;
- High youth unemployment rates; and
- Increased prevalence of HIV & AIDS.

The Kenhardt community appears to have acceptable access to both Human and Social capital. Informants reported that community members are generally in very good health and that most young adults have a secondary education. The high level of unemployment and the increasing number of teenage pregnancies present in Kenhard requires robust social capital to prevent affected community members from falling into abject poverty. The relative success of the local community in preventing this, suggests that access to Social capital is satisfactory.

Access to pysical capital in Kenhardt seems average to low. The community has access to bulk services (water, electricity and waste collection), and a range of housing types ranging from formal to informal. Transport is not a significant factor within Kenhardt, due to its very small size; however, access to other urban areas (e.g. Keimoes, Kakemas and Upington) is limited to private transport. Informants also indicated that access to information and awareness of basic rights and public services are very low. Natural capital in Kenhardt is limited due to the harsh climatic conditions and general lack of irrigation water. As a result, community members appear to have limited access to productive natural assets. Finally, access to financial capital is very limited as the bulk of the vulnerable section of the Kenhardt community seems to be dependent on government subsidies and pensions.

4. IDENTIFICATION OF KEY ISSUES AND ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

By far the most significant driver of change likely to result from the proposed project is the influx of job seekers into the Skeerhok PV 1, 2 and 3 study area, and the corresponding increase in spending and employment. Such an influx of "strangers" into the receiving environment is likely to cause a disturbance in the order of the existing social structure and might also lead to increases in social deviance. Increased spending and employment (even though such employment might be short-term) generates positive impacts through the multiplier effect and by providing much needed financial relief in the area. However, it also creates significant, and often unrealistic, expectations regarding potential employment. **Table 1.3** below summarizes the impacts from each phase that are anticipated or expected to occur due to the proposed Skeerhok PV projects and transmission line.

The Draft Scoping Report was released for a 30-day comment period which extended from Wednesday 20th September 2017 to Monday 23rd October 2017. The Draft EIA Report is also being released for a 30-day comment period. To date, no specific comments have been raised by I&APs that relate to social impacts.

4.1.1 Identification of Potential Impacts

Based on the status quo conditions of the study area and the nature of the proposed development, the following social impacts were identified:

- Influx of jobseekers;
- Increases in social deviance;
- Increases in incidence of HIV/AIDS infections;

- Expectations regarding jobs;
- Local spending;
- Local employment;
- Human development resulting from the proposed Economic Development Plan; and
- Job losses at the end of the project life-cycle.

4.1.2 Residual Impacts

A number of potential negative socio-economic impacts resulting from the proposed Skeerhok projects are likely to persist regardless of proposed mitigation measures. Increases in social deviance are unlikely to be mitigated completely and a certain measure of social disruption and loss of social capital must be accepted as part of the proposed developments. Secondly, an influx of job seekers will occur in spite of the mitigation proposed. In-migration is a double edged sword; as not all in-migration necessary leads to social disruption.

4.1.3 Cumulative Impacts

Development of more solar energy facilities and associated electrical infrastructure (such as transmission lines) in the study area is likely to negatively impact on biodiversity, farming and tourism. These impacts might further negatively affect local industries, and consequently diminish certain livelihood strategies. However, the relationship of biodiversity, tourism and farming to the majority of local livelihood strategies is weak (CSIR, 2015). As a result, cumulative impacts on biodiversity, tourism and farming in the study area appear to be acceptable.

Similarly, the incidence and severity of the in-migration of job seekers as well as increases in social deviance might increase as more solar energy facilities and associated electrical infrastructure (such as transmission lines) are developed in the study area. This is of importance as several other solar energy developments are being proposed in the Kenhardt area (e.g. the Mulilo Renewable Project Developments (PTY) Ltd Nieuwehoop Phase 1 and Phase 2 solar energy developments). However, such increases are also associated with most other forms of economic and social development and should therefore be expected from any industrial scale developments in the study area.

Finally, the cumulative success of the proposed project and other projects offering significant socio-economic benefits are likely to present a major economic pull factor which might exacerbate in-migration into the study area as well as increases in social deviance. However, the cumulative socio-economic benefit offered by industrial scale development in the study area outweighs the negative impacts associated with economic growth. It should also be borne in mind that influx of job seekers does not necessarily equate in social deviance; i.e. influx of job seekers is a social disruptor which *could* result in social impacts. Given the relative balance between cumulative benefits and impacts, the significance rating ascribed to the cumulative impact of the proposed development is rated as being ***long term to medium term*** in duration, ***local*** in extent and of ***moderate significance*** (negative) rating.

Table 1.2: Impact rating table

Aspect/ Impact pathway	Nature of potential impact/ risk	Status	Spatial Extent	Dura-tion	Conse-quence	Proba-bility	Reversi-bility of impact	Irreplace-ability of receiving environ-ment/ resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/ risk	Confi-dence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION AND OPERATIONAL PHASE													
Impact 1: Influx of job seekers into the Kenhardt area	Disruption of existing social structures	Negative	Local	Medium to Long-term	Substantial	Likely	Low	Moderate	• Develop and implement a Workforce Recruitment Plan • Reserve employment, where practical, for local residents • Clearly define and agree upon the PAP • Develop a database of PAP and their relevant skills and experience • Develop and implement a Stakeholder Engagement Plan	Moderate	Low	4	Medium
Impact 2: Outsiders moves into the Kenhardt area	Increases in social deviance	Negative	Local	Medium-term	Substantial	Likely	Low	Moderate	• Develop and implement a Workforce Recruitment Plan • Reserve employment, where practical, for local residents • Clearly define and agree upon the PAP • Develop a database of PAP and their relevant skills and experience • Develop and implement a Stakeholder Engagement Plan • Delivery on the Economic development Plan must be contractually binding on the proponent	Moderate	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/ risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/ risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Impact 3: Expectations created regarding possible employment	Increased frustration in the local community	Negative	Local	Short-term	Moderate	Likely	High	Moderate to low	• Develop and implement the Stakeholder Engagement Plan	Low	Very low	5	Medium
Impact 4: Local spending	Socio-economic benefits as a result of the multiplier effect	Positive	Local	Medium to long-term	Moderate	Likely	n/a	n/a	• Procure goods and services, where practical, within the study area • Obtain regularly required goods and services from as large a selection of local service providers as possible	Low	Low	4	Medium
Impact 5: Local employment	Socio-economic benefits	Positive	Local	Long-term	Substantial	Very likely	n/a	n/a	• Develop and implement a Workforce Recruitment Policy	Moderate	Moderate	3	High
Impact 6: Economic Development Plan	Contribute to local employment, local spending and human capacity development	Positive	Local	Long-term	Substantial	Very likely	n/a	n/a	• The proponent should engage with local NGOs, CBOs and local government structures to identify and agree upon relevant skills and competencies required in the Kenhardt community • Such skills and competencies should then be included in the Economic Development Plan • Where possible, align Economic development Plan with Local Municipality's IDP	Moderate	Moderate	3	High
DECOMMISSIONING PHASE													

Aspect/ Impact pathway	Nature of potential impact/ risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/ risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Impact 7: Decommissioning of the proposed development	Job losses	Negative	Local	Long-term	Substantial	Very likely	Moderate	Moderate	• The proponent should comply with relevant South African labour legislation when retrenching employees • Juwi should also implement appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning • All project infrastructures should be decommissioned appropriately and thoroughly to avoid misuse	Moderate	Low	4	High
CUMULATIVE IMPACTS													
Exacerbated in-migration	Disruption of social structures	Negative	Local	Medium to long-term	Substantial	Likely	Low	Moderate	n/a	Moderate	Moderate	3	Medium

5. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The key mitigation measures proposed by the specialist in the reference studies, and which needs to be included in the EMPr are listed below.

Construction and Operational Phase Mitigations:

- Develop and implement a Workforce Recruitment Plan;
- Reserve employment, where practical, for local residents;
- Clearly define and agree upon the Project Affected People (PAP);
- Develop a database of PAP and their relevant skills and experience, or use an existing legitimate database of skills and expertise;
- Develop and implement a Stakeholder Engagement Plan;
- Delivery on the Economic Development Plan must be contractually binding on the proponent;
- Procure goods and services, where practical, within the study area;
- Obtain regularly required goods and services from as large a selection of local service providers as possible;
- The proponent should engage with local NGOs, CBOs and local government structures in the Kenhardt community to identify and agree upon relevant skills and competencies required;
- Such skills and competencies should then be included in the Economic Development Plan; and
- Where possible, align the Economic Development Plan with Local Municipality's IDP.

Decommissioning Phase Mitigations

- The proponent should comply with relevant South African labour legislation when retrenching employees;
- juwi should also consider appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning; and
- All project infrastructures should be decommissioned appropriately and thoroughly to avoid misuse.

Monitoring recommendations for the above mitigation measures are included in the complete EMPr (included as Part B of the EIA Report).

6. CONCLUSION AND RECOMMENDATIONS

Very little socio-economic data is available for the study area. Census data and information from the Kai !Garib Local Municipality Draft IDP (2014) was obtained for the reference studies; however, these only deal with the larger municipal area and offer no site specific data on socio-economic conditions within and around the town of Kenhardt. Secondary data was subsequently supported by a site visit to Kenhardt during the previous SIAs undertaken. (CSIR, 2015). The site visit's outcome showed that Kenhardt is an area of low employment, substantial poverty and limited livelihood strategies. Access to Human and Social capital appears to be acceptable, while access to Physical capital seems average. However, access to Natural and Financial capital is limited. This constrained access to capital limits the ability of vulnerable members of the community to adapt livelihood strategies should it be required; which results in vulnerability.

The overall significance rating of the *negative* socio-economic impacts associated with the proposed project is ***low to moderate***; whereas the overall significance rating of the *positive* socio-economic impacts associated with the proposed development is ***moderate***.

It should be accepted that the development of the proposed projects is likely result in some form of negative social impact to the local community. However, such a negative impact needs to be weighed against the potential benefit likely to result from the same development. Given the overall medium significance negative impact of the project, as compared to the overall medium-high significance positive impact of the project; it can be concluded that the prospective socio-economic benefits of the proposed project outweighs the socio-economic losses/impacts. In addition, the local vulnerability context strongly suggests that acceptable, though declining, levels of Social and Human capital is present within the Kenhardt community, which should assist with the mitigation of potential negative socio-economic impacts resulting from the proposed project. Conversely, very limited Financial capital is available in the local community, which in turn adds to the erosion of existing Social and Human capital. Accordingly, there appears to be a clear need to invest in the development of Financial capital within the Kenhardt community in order to restore some level of balance between asset classes which in turn should facilitate more options to local community members in terms of viable livelihood strategies.

7. INFORMATION SOURCES

The information used for the compilation of this impact statement was drawn from the following sources:

- Du Toit, R. (2015). Social Impact Assessment for proposed Scatec Solar PV Energy Facilities near Kenhardt, Northern Cape Province. Surina Laurie, CSIR, Stellenbosch.
- Du Toit, R. (2014). Social Impact Assessment for the proposed Solar Energy Facilities of the Phase 1 Nieuwehoop Solar PV Park near Kenhardt. Surina Laurie, CSIR, Stellenbosch.
- Du Toit, R. (2015). Social Impact Assessment for the proposed Solar Energy Facilities of the Phase 2 Nieuwehoop Solar PV Park near Kenhardt. Surina Laurie, CSIR, Stellenbosch
- The Kai !Garib Local Municipality Draft IDP of 2014.

8. DECLARATION OF INDEPENDENCE OF SPECIALIST

Mr. Rudolph du Toit has reviewed this statement. Please refer to Appendix A of this Impact Statement for the Curriculum Vitae of Mr. du Toit and his letter (page 1), which confirms that this impact assessment is suitable for this project and in line with his previous studies' findings. The declaration of independence by the specialist is provided below:

BOX 1.1: DECLARATION OF INDEPENDENCE

I, Rudolph du Toit, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Skeerhok PV Facilities and Transmission Lines Project, application or appeal in respect of which I was appointed, other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

RUDOLPH DU TOIT
DATE: 26 January 2018

Appendix A: Curriculum Vitae of the Specialist

APPLIED SCIENCE ASSOCIATES

Curriculum Vitae: Rudolph du Toit

Personal information

Name:	Rudolph du Toit
Firm:	Applied Science Associates (Pty) Ltd
Position in Firm:	Managing Director
Date of Birth:	23 May 1978
Email:	rudolph@appliedscience.co.za
Telephone number:	076 902 6479

Tertiary qualifications

Undergraduate:

Bachelor of Arts (BA) in Environment and Development Studies
Department of Geography and Environmental Studies
University of Stellenbosch (US), 2003-2005

Honours:

Bachelor of Philosophy (B.Phil.) in Development Planning
School for Public Leadership
University of Stellenbosch (US), 2006

Masters:

Master of Philosophy (M.Phil.) in Development Planning
School of Public Leadership
University of Stellenbosch (US), 2007-2009

Academic honours

- Golden Key International Academic Honours Association invitee: 2003 to 2007

- Stellenbosch University Dean's List (Top 10% academic achievers): 2003
- Stellenbosch University Merit Bursary: 2004 & 2005
- Transnet Bursary: 2004
- South African National Energy Research Institute (SANERI) Bursary: 2007 & 2008

Employment experience

1. Organisation: Independent contractor for the CapeNature Working for Water Project
   Position: Team leader: Natural resource management (Alien clearing)
   Period: 1998 to 2001

3. Organisation: Strategic Environmental Focus (SEF) (Pty) Ltd.
   Position: Sustainability coordinator: Environmental planning & reporting
   Period: 2008 to 2010

4. Organisation: Council for Scientific and Industrial Research (CSIR)
   Position: Senior Environmental Planner
   Period: 2010 to 2017

5. Organisation: University of Stellenbosch
   Position: Guest lecturer: Development Planning and Environmental Analysis module (part-time)
   Period: 2013 to present

6. Organisation: University of Stellenbosch
   Position: External moderator of the Honours-level Development Planning course (School for Public Leadership) (part-time)
   Period: 2015 to present

7. Organisation: Applied Science Associates (Pty) Ltd
   Position: Managing Director
   Period: 2017 to present

Professional affiliations

Registered member of the South African Institute for Impact Assessment (IAIA) (Registration number 2779)

Research publications

- Contributing author to: Dalal-Clayton, B. (2013) ***The Role of Strategic Environmental Assessment in Promoting a Green Economy: Background document for the OECD DAC SEA task Team workshop on SEA & Green Economy, Lusaka, 17- 18 January 2013***. IIED, London
- Du Toit, R. (2009). ***Developing a Scorecard for Sustainable Transport: A Cape Town Application.*** Stellenbosch University Press
- Michelle Audouin, Mike Burns, Alex Weaver, David le Maitre, Patrick O'Farrell, Rudolph du Toit, Jeanne Nel. (2015). ***An Introduction to Sustainability Science and its Links to Sustainability Assessment.*** *In Morrison-Saunders, A. and Pope, J., Eds. Handbook of Sustainability Assessment.* Edward Elgar Publishing, 321 -349. ISBN 978-1-78347-136-2

Conference presentations & papers

- Du Toit, R. (2012). **Wind *Energy and Public Participation: A one-sided debate?*** Proceedings of the 17th Annual Conference of the International Association for Impact Assessment South Africa: "Urban Evolution", 27 - 29 August, 2012.

- Du Toit, R. & Van der Westhuizen, C. (2013). ***Strategic Environmental Assessment (SEA) as a means of building the Green Economy in South Africa: The development of a national wind and solar energy roll-out plan.*** Proceedings of the OECD DAC SEA Task Team Workshop on SEA & Green Economy, Lusaka (Zambia), 17- 18 January 2013.

- Burns, M., Du Toit, R. & Schreiner, G. (2013). ***Graphical Causal Loop modelling of socio-ecological systems to identify & evaluate key impact "strings".*** Proceedings of the 18th Annual Conference of the International Association for Impact Assessment South Africa: 16 - 18 September, 2013.

Key courses

- Advanced Facilitation & Experiential Learning: Team Building Institute (Pty) Ltd (2001)
- Clean Development Mechanism (CDM) Project Development Training: Danish Energy Management (Pty) Ltd (2008)
- Project Management Principles & Practice: University of Pretoria (2011)
- Integrating Sustainability with Environmental Assessment in South Africa (Presented by A. Morrison –Saunders & J. Pope): North-West University (2012)
- Science Communication and Working with the Media: Proof Communications/Jive Media Africa (2014)
- Sharpening the Tool: New techniques and methods in Environmental Impact Assessment: Sustainable Environmental Solutions (Pty) Ltd (2015)
- Effective Skills for Challenging Meetings & Engagements: Conflict Dynamics (2015)

Professional experience

The following table presents an abridged list of projects that I have been involved in, indicating my role in each project:

Environmental Impact Assessment (EIA) Experience

Project	Role	Date
1. Basic Assessment: Bottelary Road Upgrade: Van der Merwe Venter Twenty Group and Silmore Trust	Environmental Control Officer	July 2009
2. MTN Remote Hub: Umbutho Civil & Electrical	Environmental Control Officer	July 2009
3. Basic Assessment: Hermanus (Overberg Municipality) substation upgrade & underground cable	Junior Environmental Manager and co-author	August 2009

Environmental Impact Assessment (EIA) Experience		
Project	**Role**	**Date**
4. Basic Assessment for the InnoWind Swellendam wind energy project: Single test turbine construction	Project manager and lead author	January 2010
5. Basic Assessment for the InnoWind Heidelberg wind energy project: Single test turbine construction	Project manager and lead author	January 2010
6. Basic Assessment for the InnoWind Albertinia wind energy project: Single test turbine construction	Project manager and lead author	January 2010
7. Basic Assessment for the InnoWind Mossel Bay wind energy project: Single test turbine construction	Project manager and lead author	January 2010
8. EIA for InnoWind Swellendam wind energy project, Western Cape	Project manager and lead author	July 2010
9. EIA for InnoWind Heidelberg wind energy project, Western Cape	Project manager and lead author	July 2010
10. EIA for InnoWind Albertinia wind energy project, Western Cape	Project manager and lead author	July 2010
11. EIA for InnoWind Mossel Bay wind energy project, Western Cape	Project manager and lead author	July 2010
12. EIA for the Electrawinds (NL) Coega IDZ Wind Energy Project: Proposed construction of 75 MW installed capacity	Project manager	January 2010
13. EIA for Glencore Exploration (UK): On-shore and off-shore exploration drilling operation; Matanda Block, Cameroon	Project manager	November 2010
14. EIA for Noble Energy (Cameroon): Off-shore exploration drilling, Yoyo Concession and Tilapia Exploration Block, Cameroon	Management, integration and drafting of water quality section of the EIA report.	April 2011
15. EIA for the Vleesbaai Independent Power Producer (VIPP) Wind Energy Facility near Vleesbaai	Project manager and lead author	August 2012
16. Windlab Developments South Africa (Pty) Ltd Ishwati Emoyeni 140 MW Wind Energy EIA near Murrysburg in the Western Cape	Project manager	September 2014
17. EIA for the City of Cape Town 1500 MW Gas-to-power facility, Atlantis, Western Cape	Project leader	July 2015

Strategic Environmental Assessment (SEA) Experience		
Project	**Role**	**Date**
18. Strategic Environmental Assessment (SEA) for the Port of Saldanha: Transnet National Ports Authority (TNPA)	Project manager and lead author	July 2012
19. City of Cape Town Far South Strategic Environmental Assessment (SEA)	Project manager and lead author	June 2014

Social Impact Assessment (SIA) Experience		
Project	**Role**	**Date**
20. Mulilo Renewable Project Developments (Pty) Ltd Gemsbok Solar PV1 75MW Solar Photovoltaic EIA in the Northern Cape	Conducting the Social Impact Assessment (SIA) as part of the suite of EIA specialist studies	September 2014
21. Mulilo Renewable Project Developments (Pty) Ltd Gemsbok Solar PV2 75MW Solar Photovoltaic EIA in the Northern Cape	Conducting the Social Impact Assessment (SIA) as part of the suite of EIA specialist studies	September 2014
22. Mulilo Renewable Project Developments (Pty) Ltd Boven Solar PV1 75MW Solar Photovoltaic EIA in the Northern Cape	Conducting the Social Impact Assessment (SIA) as part of the suite of EIA specialist studies	September 2014
23. Scatec (Pty) Ltd Rugseer Farm Solar PV1 75MW Solar Photovoltaic EIA in the Northern Cape	Conducting the Social Impact Assessment (SIA) as part of the suite of EIA specialist studies	August 2015
24. Scatec (Pty) Ltd Rugseer Farm Solar PV2 75MW Solar Photovoltaic EIA in the Northern Cape	Conducting the Social Impact Assessment (SIA) as part of the suite of EIA specialist studies	August 2015
25. Scatec (Pty) Ltd Rugseer Farm Solar PV3 75MW Solar Photovoltaic EIA in the Northern Cape	Conducting the Social Impact Assessment (SIA) as part of the suite of EIA specialist studies	August 2015
26. SEA for the Square Kilometer Array (SKA) South Africa	Social engagement specialist for the CSIR	September 2015
27. Mainstream Renewable Energy (Pty) Ltd 2 x 140MW Wind Energy Facility EIA near Victoria West	Conducting the Social Impact Assessment (SIA) as part of the suite of EIA specialist studies	April 2016
28. Afdaksrivier Trust Residential Development near Fisherhaven, Western Cape Province	Conducting the Social Impact Assessment (SIA) as part of the suite of EIA specialist studies	August 2017
29. CSIR National Aquaculture Strategic Environmental Assessment (SEA)	Contributing author to the socio-economic impacts chapter of the SEA.	October 2017

Environmental Law Experience		
Project	**Role**	**Date**
30. EIA for InnoWind Swellendam wind energy project, Western Cape	Drafting of appeal against EA refusal by Competent Authority	June 2011
31. EIA for InnoWind Heidelberg wind energy project, Western Cape	Drafting of appeal against EA refusal by Competent Authority	June 2011
32. EIA for InnoWind Albertinia wind energy project, Western Cape	Drafting of appeal against EA refusal by Competent Authority	June 2011
33. EIA for InnoWind Mossel Bay wind energy project, Western Cape	Drafting of appeal against EA refusal by Competent Authority	June 2011
34. Windlab Developments South Africa (Pty) Ltd Ishwati Emoyeni 140 MW Wind Energy EIA near Murrysburg in the Western Cape	Drafting of responding statement in rebuttal of appeal of EA buy I&APs	October 2015
35. Mulilo Renewable Project Developments (Pty) Ltd Gemsbok Solar PV2 75MW Solar Photovoltaic EIA in the Northern Cape	Drafting of appeal against EA refusal by Competent Authority	September 2016
36. Mulilo Renewable Project Developments (Pty) Ltd Gemsbok Solar PV3 75MW Solar Photovoltaic EIA in the Northern Cape	Drafting of appeal against EA refusal by Competent Authority	September 2016
37. Mulilo Renewable Project Developments (Pty) Ltd Boven Solar PV2 75MW Solar Photovoltaic EIA in the Northern Cape	Drafting of appeal against EA refusal by Competent Authority	September 2016
38. Scatec (Pty) Ltd Rugseer Farm Solar PV1 75MW Solar Photovoltaic EIA in the Northern Cape	Drafting of appeal against EA refusal by Competent Authority	October 2016
39. Scatec (Pty) Ltd Rugseer Farm Solar PV2 75MW Solar Photovoltaic EIA in the Northern Cape	Drafting of appeal against EA refusal by Competent Authority	October 2016
40. Scatec (Pty) Ltd Rugseer Farm Solar PV3 75MW Solar Photovoltaic EIA in the Northern Cape	Drafting of appeal against EA refusal by Competent Authority	October 2016
41. EIA for the City of Cape Town 1500 MW Gas-to-power facility, Atlantis, Western Cape	Drafting of appeal against EA refusal by Competent Authority	July 2016

Environmental Management & Sustainability Planning Experience		
Project	**Role**	**Date**
42. Working for Water (CapeNature) alien clearing project: Uniondale Poort	Team Leader: natural resource management	January 1998
43. Working for Water (CapeNature) alien clearing project: Avontuur area	Team leader: natural resource management	March 1999
44. Working for Water (CapeNature) alien clearing project: Prince Alfred	Team leader: natural resource management	January 2000

Environmental Management & Sustainability Planning Experience		
Project	**Role**	**Date**
Pass area		
45. Working for Water (CapeNature) alien clearing project: Langkloof farms	Team leader: natural resource management	February 2001
46. Qualitative Environmental Impact Analysis related to Major Incedent: PetroSA Mossel Bay GTL refinery	Project manager and lead author	October 2010
47. Maseve Platinum Sustainability Assessment, Rustenburg	Project manager	August 2011
48. Notice of Impacts Associated with Exploration Drilling in BHP Billiton Gabon's Licensed Areas of Okondja, Akieni & Lastoursville (Gabon)	Project manager	June 2011
49. PetroSA LNG Importation Pipeline Screening Study (Saldanha Bay to Mosselbay)	Responsible investigating and assessing planning impacts	March 2014
50. Department of Environmental Affairs (DEA) National Sustainable Development Strategy and Action Plan (NSSD) 1: Monitoring & Evaluation Report	Project manager and lead author	November 2013 (on-going)
51. Apollo Brick (Pty) Ltd energy efficiency and fuel switching CDM project	Investigation of possible conversation of the energy efficiency project to an accredited CDM project	January 2008
52. Mxit Lifestyle (Pty) Ltd carbon footprint audit	Carbon audit of Mxit Lifestyle (Pty) Ltd	January 2009
53. EIA for Addax Petroleum: Off-shore exploration/appraisal drilling; Ngosso Permit, Cameroon	Research team: collection of benthic macrofauna samples and bio-indicators for water quality analysis	August 2010
54. EIA for Glencore Exploration (UK): Off-shore exploration drilling, Bolongo Block, Cameroon	Research team: collection of benthic macrofauna samples and bio-indicators for water quality analysis	February 2011
55. Second Integrated State of the Environment Report for Namibia (Phase 1)	Project leader	June 2015
56. Windlab Developments South Africa (Pty) Ltd extension of Environmental Authorisation for the Ishwati Emoyeni 140 MW Wind Energy EIA near Murrysburg in the Western Cape	Project manager	October 2017
57. Calling Education (NPC) Environmental Statement for the proposed Calling Education Secondary School, in Stellenbosch, Western Cape Province	Project manager and lead author	November 2017

Language capability

LANGUAGES	Speaking	Reading	Writing
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

References

Dr Michelle Audouin
Senior researcher: CSIR (Sustainability Science Group)
Tel: 021 888 2401
Email: maudouin@csir.co.za

Mr Gerhard Gerber
Director: Development Facilitation Unit (Department of Environmental Affairs & Development Planning; Western Cape)
Tel: 021 483 2787 / 083 226 9127
Email: Gerhard.Gerber@westerncape.gov.za

BASIC ASSESSMENT REPORT

APPENDIX F: Additional Information

contents

Appendix F.1: References used in the BA Report

CSIR (2015a). DEA National Wind and Solar Phase 1 Strategic Environmental Assessment. https://redzs.csir.co.za/

CSIR (2015b). DEA National Electricity Grid Infrastructure Strategic Environmental Assessment Background and Update Presentation, ERG Meeting, 21 July 2015

Environmental Resources Management (ERM) (2011). Final Environmental Impact Report for the Proposed Renewable Energy Facility at the Sutherland Site, Western and Northern. Cape DEA Reference Number: 12/12/20/1782

Intergovernmental Panel on Climate Change (IPCC). 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge: Cambridge University Press.

Karoo Hoogland Local Municipality (2016). Karoo Hoogland Municipality Revised Integrated Development Plan (IDP) 2016 - 2017. Accessed in February 2017: *http://www.karoohoogland.gov.za/wp-content/uploads/2015/06/KAROO-HOOGLAND-MUNICIPALITY-INTERGRATED-DEVELOPMENT-PLAN-REVISED-2016-2017-APRIL-2016.pdf*

Laingsburg Local Municipality (2012). Laingsburg Local Municipality Integrated Development Plan 2012 - 2017. Accessed in February 2017: http://www.laingsburg.gov.za/resource-category/integrated-development-plan?category=104

Northern Cape Provincial Government (2012). Northern Cape Provincial Development and Resource Plan and Provincial Spatial Development Framework (PSDF). Accessed in February 2017: *http://northerncapepsdf.co.za/wp-content/uploads/Northern_Cape_PSDF_22_August_2012.pdf*

Northern Cape Provincial Government (2016a) – Namakwa District Municipality. Namakwa District Municipality Revised Integrated Development Plan 2016 - 2017. Accessed in February 2017: *http://www.namakwa-dm.gov.za/wp-content/uploads/2011/08/NDM-Revised-IDP-2016-2017-12-05-2016.pdf*

Savannah Environmental (PTY) Ltd (2016). Suurplaat Wind Energy Facility and Associated Infrastructure on a site near Sutherland, Western Cape and Northern Cape Provinces, DEA Reference Number: 12/12/20/1583/AM3: 1) Motivation for Amendment of Environmental Authorisation; 2) EIA Process: Draft Split EIA Report 1: Proposed Suurplaat Wind Energy Facility and Associated Infrastructure: Suurplaat Phase; 3) EIA Process: Draft Split EIA Report 2: Proposed Suurplaat Wind Energy Facility and Associated Infrastructure: Gemini Phase; 4) EIA Process: Draft Split EIA Report 3: Proposed Suurplaat Wind Energy Facility and Associated Infrastructure: Klipfontein Phase; 5) EIA Process: Draft Split EIA Report 4: Proposed Suurplaat Wind Energy Facility and Associated Infrastructure: Grid Connection Phase. Accessed: http://www.savannahsa.com/projects/project.php?project=467. Accessed on November 2016 – June 2017

Statistics South Africa (2016a). Community Survey 2016: Statistical Release P0301 [on-line], http://www.statssa.gov.za/, Accessed: February 2017. Statistics South Africa, Pretoria:

Statistics South Africa (2016b). Community Survey 2016: Provinces at a Glance Report 03-01-03 [on-line], http://www.statssa.gov.za/, Accessed: February 2017. Statistics South Africa, Pretoria:

Statistics South Africa (2017). Karoo Hoogland Local Municipality and Laingsburg Local Municipality 2001 and 2011 Census [on-line], http://www.statssa.gov.za/, Accessed: February 2017.

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Western Cape Provincial Government (2014). Northern Cape Provincial Spatial Development Framework (March 2014). Accessed in February 2017: *https://www.westerncape.gov.za/eadp/sites/eadp.westerncape.gov.za/files/your-resource-library/2014%20Provincial%20Spatial%20Development%20Framework%20%28PSDF%29_0.pdf*

Appendix F.2: Confirmation of provision of municipal services (Manager: Project Management Unit at Kai !Garib Municipality)

Munisipaliteit Kai !Garib Municipality

Munisipale Gebou
11de Laan
Tel 054 461 6400
Faks 086 516 9066
E-Pos: mm@kaigarib.gov.za
Privaatsak X 6
KAKAMAS
8870
BTW Reg Nr. 4170193371

KAI !GARIB

JG Lategan
Handel met hierdie saak

Municipal Building
11th Avenue
Tel 054 461 6400
Fax 086 516 9066
E-Mail: mm@kaigarib.gov.za
Private Bag X 6
KAKAMAS
8870
VAT Reg No. 4170193371

13 December 2017
Juwi Renewable Energies (Pty) Ltd
7 Walter Sisulu Avenue
Foreshore
CAPE TOWN
8001

SKEERHOK PF FACILITY: WATER, SEWERAGE AND WASTE REMOVAL REQUIREMENTS

Your email, dated Thursday, 07 December 2017, to Mr J Mac Kay, Director Planning & Development of Kai !Garib Municipality, has relevance.

Council hereby, in principle approve the supply of potable water for staff needs – which we will be able to meet during the construction and operational phases. Our agreement with the Department of Water & Sanitation prevent us from supplying water for construction – this you have to source from groundwater facilities in the area.

Our licensed solid waste site in Kenhardt are available for all solid waste as stipulated in the waste license attached. The removal of waste from your site will be done by your vehicles and delivered to the site at R524 per ton or part thereof.

The oxidation ponds are able to process the estimated volumes indicated in your letter but our honey sucker will not be able to service the plant due to the gravel road. Our tariffs are as follows:

1. Sewerage volume R300/kl
2. Distance from oxidation ponds R25/km

Please address any queries to Mr J Mac Kay.

Yours truly

JG LATEGAN
ACTING MUNICIPAL MANAGER

MUNISIPALITEIT KAI !GARIB - DIENSTETARIEWE 2017/18
BTW UITGESLUIT

Annexure B

KODE	ELEKTRISITEITVOORSIENING - STEDELIK	TARIEWE 2017/18		
		EENHEID	BASIES	PER KVA
	Voorafbetaal meters			
EP01	Huishoudelik: Hulpbehoewende verbruikers: Block 1 (0-350kwh)	134,30c		
	Huishoudelik: Hulpbehoewende verbruikers: Block 2 (> 351 kwh)	151,30c		
EP02	Huishoudelik: 1x60 amp: Block 1 (0 - 350kwh)	158,06c		
	Huishoudelik: 1x60 amp: Block 2 (> 350 kwh)	158,81c		
EP03	Kommersieel: 1x60 amp: Block 1 (0 - 350kwh)	190,81c		
	Kommersieel: 1x60 amp: Block 2 (> 351 kwh)			
EP04	Kommersieel: 3x60 amp	190,81c		
	Kleinmaat			
E001	Huishoudelik: 1x5 amp - 1x60 amp: Block 1 (0 - 350kwh)	135,85c	R 226,80	
	Huishoudelik: 1x5 amp - 1x60 amp: Block 2 (> 351 kwh)	149,73c		
E003	Huishoudelik: 3x5 amp - 3x60 amp: Block 1 (0 - 350kwh)	135,85c	R 352,00	
	Huishoudelik: 3x5 amp - 3x60 amp: Block 2 (> 351 kwh)	149,73c		
E005	Kommersieel: 1x5 amp - 1x60 amp:	146,31c	R 666,24	
E006	Kommersieel: 3x5 amp - 3x60 amp:	146,31c	R 1 116,59	
E015	Kommersieel: 3x70 amp - 3x100 amp:	146,31c	R 1 503,68	
	Grootmaat verbruikers			
E008/EK08	Grootmaat: Laagspanning metering : - 110 amp - 150 amp	87,33c	R 1 570,68	R 198,65
E009/EK09	Grootmaat: Hoogspanning metering : - > 150 amp	87,33c	R 1 570,68	R 198,65
	Verligting			
E010	Straatligte	33,00c	R 945,11	
E011	Hoemasligte	92,85c	R 962,88	
	Ander			
E012	Beskikbaarheidsgelde: Residensieel		R 143,60	
E013	Beskikbaarheidsgelde: Besigheid en Nywerheid		R 143,60	

KODE	ELEKTRISITEITSVOORSIENING - LANDELIK	TARIEWE 2017/18		
		EENHEID	BASIES	PER KVA
	Voorafbetaal meters			
EP01	Huishoudelik: Hulpbehoewende verbruikers: Block 1 (0-350kwh)	134,30c		
	Huishoudelik: Hulpbehoewende verbruikers: Block 2 (> 351 kwh)	151,30c		
EP02	Huishoudelik: 1x60 amp: Block 1 (0 - 350kwh)	158,06c		
	Huishoudelik: 1x60 amp: Block 2 (> 351 kwh)	158,81c		
EP03	Kommersieel: 1x60 amp:	190,81c		
EP04	Kommersieel: 3x60 amp:	190,81c		
	Kleinmaat			
E021	Huishoudelik: 1x5 amp - 1x60 amp: Block 1 (0 - 350kwh)	135,85c	R 226,80	
	Huishoudelik: 1x5 amp - 1x60 amp: Block 2 (> 351 kwh)	149,73c		
E023	Huishoudelik: 3x5 amp - 3x60 amp: Block 1 (0 - 350kwh)	135,85c	R 352,00	
	Huishoudelik: 3x5 amp - 3x60 amp: Block 2 (> 351 kwh)	149,73c		
E026	Kommersieel: 1x5 amp - 1x60 amp:	146,31c	R 666,24	
E027	Kommersieel: 3x5 amp - 3x60 amp:	146,31c	R 1 116,59	
E029	Kommersieel: 3x70 amp - 3x100 amp:	146,31c	R 1 503,68	
	Grootmaat verbruikers			
E030/EK30	Grootmaat: Laagspanning metering : - 110 amp - 150 amp	87,33c	R 1 570,68	R 198,65
E031/EK31	Grootmaat: Hoogspanning metering : - > 150 amp	87,33c	R 1 570,68	R 198,65

MUNISIPALITEIT KAI !GARIB - DIENSTETARIEWE 2017/18
ETW UITGESLUIT

Annexure C

KODE	WATERVOORSIENING	TARIEWE 2017/18		
		EENHEID	BASIS	
W001	Kleinmaat - (20 - 25 mm aansluiting)		R 69,00	
W002	Grootmaat (50 mm aansluiting)		R 367,58	
W003	Grootmaat (75 mm aansluiting)		R 2 336,27	
W004	Grootmaat (100 mm aansluiting)		R 6 093,58	
	Rouwater		R 277,03	
W006	Beskikbaarheid residensieel		R 69,00	
W007	Beskikbaarheid besighede en nywerhede		R 69,00	
	- Verbruik - 0 tot 6 kl/ maand (6)	R 6,01		
	- Verbruik - 7 tot 20 kl/ maand (14)	R 5,53		
	- Verbruik - 21 tot 30 kl/ maand (10)	R 6,00		
	- Verbruik - 31 tot 50 kl/ maand (20)	R 6,59		
	- Verbruik - Bo 50 kl/ maand (>50)	R 7,77		
	Gesuiwerde Water - Prepaid			
	- "PREPAID" Verbruik - 0 tot 6 kl/ maand (6)	R 6,60		
	- "PREPAID" Verbruik - 7 tot 20 kl/ maand (14)	R 6,25		
	- "PREPAID" Verbruik - 21 tot 30 kl/ maand (10)	R 7,20		
	- "PREPAID" Verbruik - 31 tot 50 kl/ maand (20)	R 7,80		
	- "PREPAID" Verbruik - Bo 50 kl/ maand (>50)	R 8,40		
	Flatrate		R 109,48	

Annexure D

KODE	RIOOLAFVALVERWYDERING	TARIEWE 2017/18		
		EENHEID	BASIES	
	SUIGTENKS			
S001	Basiese fooi		R 152,49	
	Suigtenk Vraggeld per kiloliter (vooraf betaalbaar):			
S001/S011	_Stedelik (Per KL)		R 8,00	
S002	_Landelik (Per KL)		R 300,00	
S003	Ritfooie per kilometer (Vanaf die eerste 100km)		R 25,00	
S004	Sanitasie-emmers		R 138,61	
	RIOOLGELDE			
A001	Residensieel: Stedelike Gebied		R 152,49	
A002	Kerke & Sale		R 152,49	
A003	Klein Besighede (<200kl/mnd)		R 446,77	
A004	Groot Besighede (>200kl/ mnd); Kokerboom Resort, BK Ouetehuis		R 959,75	
A005	Skole (<500kl/mnd), Koshuise, SAPD & Hotelle		R 2 799,06	
A006	Skole (>500kl/mnd), Hospitale		R 6 109,49	

Annexure E

KODE	REINIGINGSDIENSTE	TARIEWE 2017/18		
		EENHEID	BASIES	
R001	Huishoudelik, Klein kantore en Kerke (1verw/week)		R 94,55	
R002	Besighede, Skole, Koshuise, Hotelle en Verblyfsondernemings (2 verw/week)		R 257,88	
R003	Grootmaatvullis (Hokke)		R 386,51	
R004	Grootmaatvullis (Houers)		R 242,63	
R005	Grootmaatvullis (per ton)		R 524,00	

the denc

Department:
Environment & Nature Conservation
NORTHEN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Private Bag X6102, Kimberley, 8300, SASKO Building, Tel: 053-807 7430, Fax: 053-831 3530

Enquiries / Dipatlisiso / Navrae / Imibuzo : D Kgosi

Date / Letlha / Datum / Umhla : 31 October 2014

Reference / Tshupelo / Verwysing / Isalathiso : 16/2/7/D11/Z1/P452

The Municipal Manager
Kai! Garib Local Municipality
Private Bag X6
Kakamas
8870

Fax: (086) 502 8887

Dear License holder

WASTE LICENSE FOR THE OPERATION OF THE KENHARDT GENERAL WASTE DISPOSAL SITE, KAI! GARIB LOCAL MUNICIPALITY IN TERMS OF SECTION 20(b) OF THE NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008

Please find hereto attached waste licence for Kai! Garib Local Municipality for the above mentioned activity. The license application form was submitted on the 20th February 2014 and the Pollution and Waste Management unit within the Environment Quality Management Directorate reviewed the documents submitted and concluded the application as per the National Environmental Management: Waste Act, 2008, (Act 59 of 2008)

This letter serves to inform you that your waste license application for the above mentioned activity in the location as per the coordinates in the application has been issued.

Yours Sincerely

PP

Mr B D Fisher
Acting Director: Environmental Quality Management
Date: 31 October 2014

Copy: Mr J van Huyssteen
MBB Consulting engineering South (PTY) LTD

1

the denc

Department:
Environment & Nature Conservation
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

Private Bag X6102, Kimberley, 8300, SASKO Building, Tel: 053-807 7430, Fax: 053-831 3530

Ref: 16/2/7/D530/D11/Z1/P452
Enquiries: Martha S. Molokwane
Tel: (054) 338-4800 **Fax:** (054) 331-1155 **Email:** mmolokwane@ncpg.gov.za

PERMIT NUMBER:	16/2/7/D530/D11/Z1/P452
CLASS:	G: C: B⁻
WASTE FACILITY:	KENHARDT GENERAL WASTE DISPOSAL SITE
LOCATION:	PART OF PORTION 1049 OF THE FARM KENHARDT, KENHARDT
PERMIT HOLDER:	KAI! GARIB MUNICIPALITY
ADDRESS:	PRIVATE BAG X6, KAKAMAS, 8870
CONTACT PERSON:	THE MUNICIPAL MANAGER
CONTACT DETAILS:	TEL: (054) 461 6400, FAX: (086) 502 8887

PERMIT IN TERMS OF SECTION 20 OF ENVIRONMENT CONSERVATION ACT, 1989 (ACT 73 OF 1989)

I, Bryan D. Fisher, in my capacity as Acting Director: Environmental Management Quality Management of the Department of Environment and Nature Conservation (hereinafter referred to as "the Department"), in terms of section 20(1) of the Environmental Conservation Act, 1989 (Act 73 of 1989) (as amended), hereby authorise the abovementioned Permit Holder to establish and operate the abovementioned waste disposal site, subject to the conditions specified herein.

PERMIT CONDITIONS

In this Permit, "Acting Director" means the Director of Environmental Quality Management of the Northern Cape Department of Environment and Nature Conservation who may both be contacted at the address below:

Director: Environmental Quality Management
Department of Environment and Nature Conservation
Private Bag X 6010
Kimberley
8301

In this Licence, "Director-General" means the Director-General of the Department of Water and Sanitation who may be contacted at the address below:

Director-General
Department of Water and Sanitation
Private Bag X 313
PRETORIA
0001

1. LOCATION

1.1 This Permit authorises the establishment, development and operation of a waste disposal site on part of Portion 1049 of the farm Kenhardt, Kai! Gaib Municipality, Z. F. Mgcawu District (hereinafter referred to as "the Site").

1.2 The location of the site must be according to co-ordinates submitted by the Permit holder on the 21 October 2014 is defined as follows:

Latitude	Longitude
3 245 389.208	14 616.018
3 245 400.548	14 705.301
3 245 251.743	14 724.200
3 245 240.404	14 634.918

2. PERMISSIBLE WASTE

2.1 The Site may be used for the disposal of all waste types, excluding those listed in Annexure I and excluding those where specific control has been established in terms of the Nuclear Energy Act, 1982 (Act 92 of 1982). Waste types controlled in terms of the Minerals Act, 1991 (Act 50 of 1991) and the Electricity Act, 1987 (Act 41 of 1987) are also excluded from disposal on the Site unless written permission has been obtained from the Regional Director.

2.2 The Permit Holder must take all reasonable steps to ensure that-

2.2.1 no organic or inorganic element or compound which may have a definite acute or chronic negative effect on human health and/or the environment, due to its toxic, physical, chemical or persistent characteristics and which corresponds with the UNEP definition of hazardous waste;

2.2.2 no medical waste; and

2.2.3 no scheduled pharmaceutical products registered in terms of the Medicines and Related Substances Control Act, 1965 (Act 101 of 1965) or associated containers, are disposed of on site.

3. CONSTRUCTION

3.1 The Site or any portion thereof may only be used for the disposal of permissible waste if the Site or any such portion has been constructed or developed according to condition 3 of this Permit.

3.2 Construction and further development within the Site shall be done under the supervision of a suitably qualified person proposed by the Permit Holder and approved by the Director-General.

3.3 After construction of the Site or further development within the Site, the Permit Holder shall notify the Director or/and the Director-General thereof, and the person referred to in condition 3.2 shall submit a certificate or alternatively a letter to the Director or/and the Director-General that the construction of the Site or further development within the Site, as proposed by the Permit Holder and approved by the Director or/and the Director-General, is in accordance with recognised civil engineering practice before disposal may commence on the Site. The completed construction works of the Site shall be inspected by an official of the Department and the person referred to in condition 3.2. If the Director or/and Director-General is satisfied with the construction of the Site or any further development within the Site and has given written permission, the Permit Holder may use the Site or any further development within the Site for the disposal of waste.

3.4 The Permit Holder shall take all reasonable steps, such as suitable zoning and/or written agreements with adjacent landowners, to establish and maintain an unbuilt area or "buffer zone" of 200 metres between the Site and the nearest residential and/or light industrial areas during the operative life of the Site. Heavy industries or industries which may create nuisance conditions may be permitted within the buffer zone in terms of the appropriate legislation.

3.5 Work shall be constructed and maintained on a continuous basis by the Permit Holder to divert and drain from the Site in a legal manner, all runoff water arising on land adjacent to the Site, which could be expected as a result of the estimated maximum precipitation during a period of 24 hours with an average frequency of one in every fifty years (50) (hereinafter referred to as the "estimated maximum precipitation"). Such works shall, under the said rainfall event, maintain a freeboard of half a metre.

3.6 Works shall be constructed and maintained on a continuous basis by the Permit Holder to divert and drain from the working face of the Site, all runoff water arising on the Site, which could be expected as a result of the estimated maximum precipitation and to prevent such runoff water from coming into contact with leachate from the Site. Such works shall, under the said rainfall event, maintain a freeboard of half a metre.

3.7 Runoff water referred to in condition 3.6 shall comply with the quality requirements of the General Standard, prescribed in terms of section 21(1) (a) of the Water Act, 1956 as published in Government Notice 991 of 18 May 1984, or with such quality requirements as may from time to time be determined by the Minister and shall be drained from the Site in a legal manner.

3.8 Runoff water referred to in condition 3.6 which does not comply with the quality requirements applicable in terms of condition 3.7 shall, by means of works which shall be constructed and maintained on a continuous basis by the Permit Holder –

3.9 be treated to comply with the aforementioned standard and discharged in a legal manner; and/or,

3.8.1 with the written approval of the Director-General be evaporated in dams and/or be evaporated by spraying over those portions of the Site which comply with the requirements set in terms of condition 3.1.

3.9 The Site shall be constructed in accordance with recognised civil engineering practice to ensure that it remains stable.

3.10 The maximum height of the Site above ground level shall not exceed 3.5 metres.

3.11 The slope of the sides of the Site shall be constructed in such a manner that little or no erosion occurs.

3.12 The Permit Holder shall make provision for adequate sanitation facilities on the Site.

4. ACCESS CONTROL

4.1 Weatherproof, durable and legible notices in at least three official languages applicable in the area, shall be displayed at each entrance to the site. These notices shall prohibit unauthorised entry and state the hours of operation, the name, address and telephone number of the Licence Holder and the person responsible for the operation of the Site.

4.2 The Site shall be fenced and/or secured to reasonably prevent unauthorised entry.

4.3 The Permit Holder shall take all reasonable steps to maintained service roads in a condition which ensures unimpeded access to the Site for vehicles transporting waste and keep the roads free of waste.

4.4 The Permit Holder shall ensure effective access control.

4.5 The Permit Holder shall take all reasonable steps to prevent the disposal of waste on the Site for which the Site has not been approved.

5. OPERATION

5.1 Waste disposed of on the Site shall be covered on a weekly basis with a minimum of 150 millimetres of soil or other material approved by the Director.

5.2 Waste disposed of on the Site may be reclaimed. The reclamation activity shall not interfere with the daily operational activities of the Site. The relevant Government Notice 926, National Norms and Standards for the storage of waste may be applicable.

5.3 The Permit Holder shall take all reasonable steps to ensure that the Site is operated in a manner that shall prevent the creation of nuisance conditions or health hazards.

5.4 The Permit Holder shall keep a record of the volume and nature of the waste materials which are reclaimed and report this on an annual basis to the Director.

6. MONITORING

6.1 Further monitoring

If, in the opinion of the Director, environmental pollution, nuisances or health risks may be or are occurring on the Site, the Licence Holder must initiate an investigation into the cause of the problem or suspected problem. Should the investigation reveal any unacceptable levels of pollution, the Licence Holder must submit mitigatory measures to the satisfaction of the Director.

7. METHODS OF ANALYSIS

7.1 The Permit Holder shall carry out all tests in accordance with methods prescribed by and obtainable from the South African Bureau of Standards (SABS), referred to in the Standard Acts, 1982 (Act 30 of 1982), to analyse the samples taken under the monitoring programmes specified in condition 6.

7.2 The Permit Holder shall only use another method of analysis if written proof that the method is equivalent to the SABS method, is submitted to the Director and/or Director-General.

8. AUDITING

8.1 DEPARTMENTAL AUDITS AND INSPECTIONS

8.1.1 The Department reserves the right to audit and/or inspect the site at any time and at a frequency decided by the Director.

8.1.2 The Licence Holder must make any records or documentation available to the Director: upon request, as well as any other information the Director may require.

8.1.3 The findings of these audits or inspections must be made available to the Licence Holder within 60 days of the end of the audit or inspection. Information from the audits must be treated in accordance with the Promotion of Access to Information Act, 2000 (Act 2 of 2000).

9. RECORDING

9.1 The Licence Holder must keep records and update all the information referred to in Annexure II and submit this information to the Director and/or Director-General on an annual basis.

10. REPORTING

10.1 The Licence Holder must, within 24 hours notify the Director and/or Director-General of the occurrence or detection of any incident on the Site, or incidental to the operation of the site, which has the potential to cause, or has caused pollution of the environment, health risks, nuisance conditions or water pollution.

10.2 The Licence Holder must within 14 days submit an action plan which must include a detailed time schedule, to the satisfaction of the Director on measures taken to –

(a) correct the impact resulting from the incident;

(b) prevent the incident from causing any further impact; and

(c) prevent a recurrence of a similar incident.

10.3 The Licence Holder must submit a written report to the Director and/or Director-General regarding any deviations from plans described in this Licence and must obtain written permission from the Director-General before such deviations may be implemented.

11. LEASING AND ALIENATION OF THE SITE

11.1 Should the Permit Holder want to alienate or lease the site, he/she must notify the Director and/or Director-General in writing of such an intention at least 60 days prior to the said transaction.

12. GENERAL

12.1 This Permit shall not be construed as exempting the Permit Holder from compliance with the provisions of the National Environmental Management Act, 1998 (Act 107 of 1998), the Health Act,1977 (Act 63 of 1977), the National Water Act, 1998 (Act 36 of 1998) or any other applicable act, ordinance, regulation or by-law.

Mr. B. D. FISHER

ACTING DIRECTOR- ENVIRONMENTAL QUALITY MANAGEMENT

DATE: 30-10-2014

ANNEXURE I

LIST OF HAZARDOUS OR TOXIC MATERIALS WHICH MAY NOT BE DISPOSED OF ON A GENERAL WASTE DISPOSAL SITE

1. Waste where specific control has been established in terms of the Nuclear Energy Act, 1999 (Act 46 of 1999).

2. Waste types controlled in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002) and the Electricity Act, 1987 (Act 41 of 1987), Nuclear Energy Act, 1999 (Act 46 of 1999), unless written permission has been obtained from the HOD.

3. Waste which is defined, according to the Minimum Requirements, as an extreme hazard or Hazard Group 1 (HG1); high hazard or Hazard Group 2 (HG2); moderate hazard or Hazard Group 3 (HG3) and low hazard or Hazard Group 4 (HG4).

4. Flammable wastes, with a closed cup flash point less than 61°C.

5. Corrosive substances, as defined and described in the Minimum Requirements as Class 8 (1998 edition: page 6-8, Diagram III).

6. Oxidising substances and organic peroxides, as defined and described in the Minimum Requirements as Class 5 (1998 edition: page 6-8, Diagram III).

7. Any waste with a substance which is a Group A and/or Group B carcinogen/mutagen. A carcinogens / mutagens have been proven in humans, both clinical and epidemiological. Group B Group carcinogens/mutagens have been proven without doubt in laboratory animals.

8. Any waste with a substance at a concentration greater than 1% where the substance is a Group C and/or Group D carcinogen/mutagen. Group C carcinogens/mutagens have shown limited evidence in animals. Group D carcinogen/mutagen - the available data is inadequate and doubtful

9. Any infectious waste which is generated during the diagnosis, treatment or immunisation of humans or animals; in the research pertaining to this; in the manufacturing or testing of biological agents including blood, blood products and contaminated blood products, cultures, pathological wastes, sharps, human and animal anatomical wastes and isolation wastes that contain infectious substances.

10. All materials which fall in Class 1 (explosives), Class 2 (compressed gases) and Class 7 (radioactive materials), as defined and described in the Minimum Requirements.

11. Any waste with a pH less than 6 or greater than 12.

12. Any waste which is difficult to analyse and classify.

13. Any complexes of heavy metal cations, paint and paint sludges, or laboratory chemicals.

14. Organic or inorganic element or compound which may have a definite acute or chronic negative effect on human health and/or the environment, due to its toxic, physical, chemical or persistent characteristics;

ANNEXURE II

INFORMATION WHICH SHALL BE SUBMITTED ON AN ANNUAL BASIS: CONDITION 9.1

** = Indicate with an X. Please print legibly.*

NAME OF SITE: ____________________ DATE OF REPORT: ________ (yy/mm/dd)

1. Registered owner(s) of property on which disposal site is situated:

Name	Telephone	
Postal Address	Fax	
	Postal Code	

2. Operator in control of disposal site:

Name		Telephone	
Identity number		After hours	
Educational Qualifications (*)			

3. Indicate the type of waste and approximate quantities of waste disposed of during the year:

Type of waste	Quantity (m^3 $annum^{-1}$)	Compacted (C)	Uncompacted (U)
Household			
Garden refuse			
Building rubble			
Other (not hazardous) - Specify			
TOTAL			

4. Indicate the applicable waste types and quantities salvaged during the year (*)

Salvaging undertaken?		Yes	No		
Type	**Company sold/ given to**	**Quantity (m^3)**	**Type**	**Company sold/ given to**	**Quantity (m^3)**
Paper/wood fibre			Rubber		
Plastics			Textiles		
Glass			Iron		
Waste for composting			Food residues		

Other			Other		

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk Management	Residual risk
What is at risk? What do I wish to protect?	What is the agent or process with potential to cause harm?	What are the harmful consequences if things go wrong?	How might the receptor come into contact with the source?	How likely is this contact?	How severe will the consequences be if this occurs	What is the overall magnitude of the risk? (Low-Medium - High)	On what did I I my judgement?	How can I best manage the risk to reduce the magnitude?	What is the magnitude of the risk after management? This residual risk will be controlled by Compliance Assessment)
Local human population	Airbone dusts /particulars	Nuisance -dust on cars, clothing etc.	Deposition from air						
Local human population	Noise from machine	Nuisance loss of amenity, loss of sleep	Air transport						
Local human population	Fugitive releases, waste, litter and mud on roads	Nuisance loss of amenity.	Vehicles entering and leaving the Site. Waste escaping the Site						
Local human population	Odour	Nuisance loss of amenity.	Air transport						
Local human population	Scavenging birds and animals	Nuisance loss of amenity.	Air transport and over land						
	Pests (e.g flies)	Nuisance loss of amenity.	Air transport and over land						
Local human population	Flooding of Site	If waste is washed off site it may cause contamination	Flood waters						
Groundwater and surface waters	Fire on site leading to run-off from polluted fire fighting waters.	Contaminating of groundwater and aquatic ecosystems	Direct and indirect run-off						
Local human population and/or livestock gaining unauthorised access to the activities	All non-site hazards-particularly relating to waste handling & storage activity	People/ livestock coming into contact with hazards	Direct physical contact						
		Arson and/or vandalism causing the release of polluting	Arson-air Liquids polluting watercourses and/or						

		materials	groundwater						
Ground water	Contaminated run-off from waste	Contaminating of ground water	Soil to ground water to borehole.						
Local human population	Smoke from burning of waste in case of fire.	Nuisance, loss of amenity, loss of sleep. Respiratory irritation/illness	Air transport						
EXPAND TABLE AS PER YOUR RISKS									

Basic Assessment for the Proposed Construction of Electrical Grid Infrastructure to support the juwi Skeerhok PV 1, 2 and 3 Solar Energy Facilities (SEF), Near Kenhardt, Northern Cape

DRAFT BASIC ASSESSMENT REPORT

APPENDIX G:

Environmental Management Programme (EMPr)

contents

tables

figures

1 INTRODUCTION

This Environmental Management Programme (EMPr) has been prepared as part of the requirements of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R325 on 7 April 2017. This EMPr is being submitted to the National Department of Environmental Affairs (DEA) as part of the Application for Environmental Authorisation (EA) for the proposed construction of electrical infrastructure to support the proposed three 100 MWac Solar PV projects, collectively referred to as the Skeerhok Solar Energy Facility (SEF), near Kenhardt within the !Kheis Local Municipality, Northern Cape Province.

juwi Renewable Energies (PTY) Ltd (hereinafter referred to as juwi) intends to develop electrical infrastructure to connect the Skeerhok SEF to the Eskom Nieuwehoop Substation and to ensure that the electricity generated by the proposed SEF feeds into the national grid. The proposed transmission line and electrical infrastructure will be constructed within a single electrical infrastructure corridor and is referred to as the <u>Skeerhok Transmission Line</u> project.

As noted in the Basic Assessment (BA) Report for the proposed electrical infrastructure, three separate Environmental Impact Assessment (EIA) Reports were compiled for the proposed Skeerhok Solar PV projects. These projects are referred to as Skeerhok PV 1, Skeerhok PV 2 and Skeerhok PV 3 (DEA Reference Numbers: 14/12/16/3/3/2/1033; 14/12/16/3/3/2/1034; and 14/12/16/3/3/2/1035, respectively).

This EMPr is being made available to Interested and Affected Parties (I&APs), stakeholders and Organs of State, as part of the BA Report, for a 30-day review period. Comments received from stakeholders during this aforementioned review period will be incorporated into this EMPr, where applicable. Following the incorporation of comments from I&APs, stakeholders and Organs of State, this EMPr is intended as a “living” document and should continue to be updated regularly, as needed.

1.1 PROJECT DESCRIPTION

The following proposed transmission line and electrical infrastructure will be constructed for the Skeerhok Transmission Line:

- An 132 kV transmission line from the proposed Skeerhok SEF on-site substation to the Nieuwehoop Sustation (including tower/pylon infrastructure and foundations);
- An on-site substation with a capacity of 22/33 to 132 kV;
- For powerline maintenance existing service and access roads will be utilised as much as possible for maintenance purposes. Where no existing access is present, due to the low traffic anticipated, access will be provided in the form of jeep tracks, as opposed to formalised roads.

As part of this BA, three connectivity alternatives were considered, namely:

1. **Skeerhok Alternative 1- Transmission Line**
2. **Skeerhok Alternative 2- Transmission Line**
3. **Skeerhok Alternative 3- Transmission Line**

A description of each alternative is summarised in Table 1 below.

Table 1: The Skeerhok Alternatives – Transmission Line descriptions

	Skeerhok Alternative 1	**Skeerhok Alternative 2**	**Skeerhok Alternative 3**
Line length	30 km	18 km	19 km
Farm portions affected	• Portion 0 of Smutshoek Farm 395 • Portion 9 of Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120 • Portion 3 of Gemsbok Bult Farm 120 • Portion 1 of N'Rougas Zuid Farm 121 • Portion 3 of Onder Rugzeer Farm 168 • Portion 0 of Boven Rugzeer Farm 169	• Portion 0 of Smutshoek Farm 395 • Portion 3 of Gemsbok Bult Farm 120 • Portion 9 Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120	• Portion 0 of Smutshoek Farm 395 • Portion 9 of Gemsbok Bult Farm 120 • Portion 3 of Gemsbok Bult Farm 120 • Portion 5 of Gemsbok Bult Farm 120
Foundation	Concrete	Concrete	Concrete
Pylon	Steel tower	Steel tower	Steel tower
Tower type	Self-supporting suspension structures or Guyed monopoles	Self-supporting suspension structures or Guyed monopoles	Self-supporting suspension structures or Guyed monopoles
Height	32 m	32 m	32 m
Span length	200 – 300 m	200 – 300 m	200 – 300 m
Servitude width	40 m	40 m	40 m

Each of these alternative connectivity options are proposed within a 300 m wide electrical infrastructure corridor. These corridors were considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities will be avoided in the final siting and location of the proposed transmission line. It is important to note that should the routing change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout or revisions to the layout occurring within the boundaries of the corridor 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 corridor and have identified sensitivities, which have been avoided in the siting of the proposed infrastructure. The corridor is considered to be a "box" in which the project components can be constructed at whichever location (within the boundary of the corridor) without requiring an additional assessment or change in impact significance. Any changes to the layout within the boundaries of the corridor following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

The location of the proposed supporting electrical infrastructure, the three connectivity options, farm portions affected and the three Skeerhok PV facilities are shown in Figure 1.

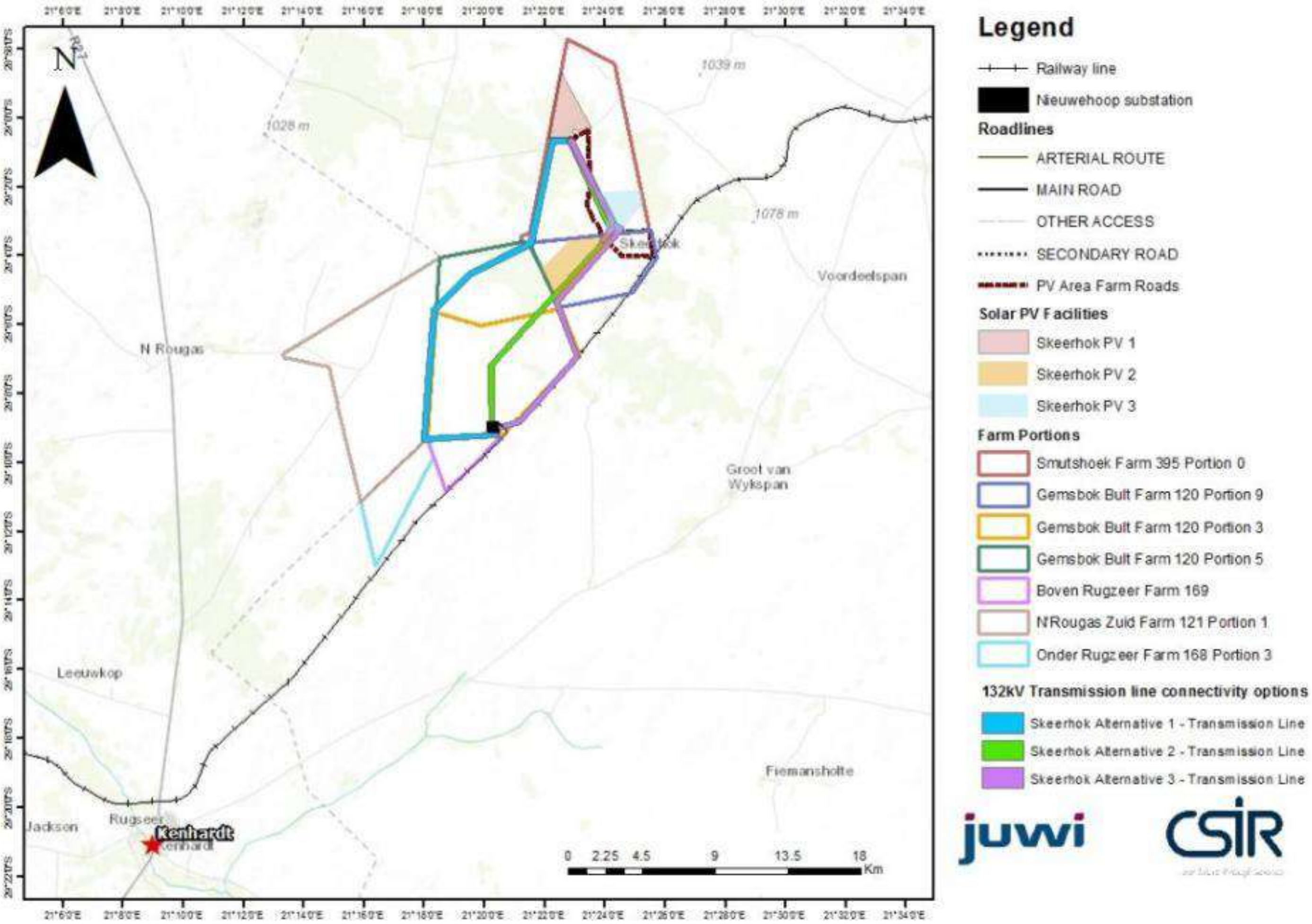

Figure 1: Locality Map of the proposed 132 kV Transmission line connectivity options (showing affected farm portions)

As discussed previously, the overall aim of this proposed project is to provide the necessary electrical infrastructure to ensure that the proposed Skeerhok SEF is equipped and enabled to transmit the generated electricity (from the SEF) to the Nieuwehoop substation. The three routing options for the proposed transmission line were considered to determine the most acceptable and preferred routing. Please refer to Figure 1 for the locality map of the three routing options that were assessed. The three routing options for the proposed transmission line were considered to determine the most acceptable and preferred routing. The preferred routing option is the **Skeerhok Alternative 2 - Transmission line**, as described above. The preferred routing was determined based on environmental sensitivities, as well as economic feasibility (shortest route between the two points), and the willingness of landowners to provide consent for the development of the proposed electrical infrastructure on their land.

The proposed 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 has therefore been assessed by the specialist studies (Appendix E of the BA Report).

It is proposed that the local municipality will provide services in terms of water, waste removal, and sewage for the construction phase of the proposed project. However, should the municipality not have adequate capacity available for the handling of waste and sewage, and the provision of water; 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 dockets of waste and sewage that is removed from site. Any electricity required during the construction phase will be generated through the use of onsite generators. During the operational phase, the distribution line will not have any electricity requirements as the project itself will transmit and distribute electricity. It is important to note that for the operational phase, requirements for water, sewage management and waste disposal do not apply.

The construction phase will take place subsequent to the issuing of an EA from the DEA and a successful off taker is selected. The construction phase is expected to extend for approximately 12 months.

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;
- 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 transmission line and additional infrastructure.

The following main activities will occur during the operational phase:

- The transmission of electricity generated from the proposed Skeerhok SEF to the Eskom Nieuwehoop substation; and
- Maintenance of the transmission line servitude including the gravel service road.

In the event of decommissioning, the main aim would be to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the actual SEF becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and any legislation or guidelines relevant at the time and the site will be rehabilitated and returned to its pre-construction state. Possible decommissioning activities will include removing the infrastructure, and covering the concrete footings with soil to a depth sufficient for the re-growth of natural vegetation. Any other supporting infrastructure no longer in use will be removed from the site and either disposed of at a registered disposal facility or recycled if possible.

It should be noted that a detailed project description (based on the conceptual design) is provided in Section A (3) of the BA Report.

1.2 AUTHORS OF THE EMPr

This EMPr has been compiled by the Environmental Assessment Practitioners and the various specialists on the team (as indicated in Table 2). The details and expertise (including the Curriculum Vitae) of the Environmental Assessment Practitioners and the specialists are respectively provided in Appendix A and Appendix E of the BA Report.

Kelly Stroebel holds a Bachelor of Science with Honours in Environmental Science from Rhodes University in Grahamstown and is currently pursuing a Masters at the University of Stellenbosch. Her undergraduate degree was a Bachelor of Science with majors in Environmental Science and Zoology. Kelly has been the Project Manager of several EIA's in South Africa and several Basic Assessments for the Special Needs and Skills Development Programme. She has assisted in the SIP projects including the National Wind & Solar Strategic Environmental Assessment (SEA) and Electricity Grid Infrastructure SEA as SEAs which were commissioned by the National Department of Environmental Affairs.

Table 2: The BA Management Team

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Environmental Assessment Practitioners		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Surina Laurie	CSIR	
Kelly stroebel	CSIR	Project Manager (Appointed EAP)
Babalwa Mqokeli	CSIR	Project Officer; GIS
Specialists		
Simon Bundy	Sustainable Development Projects (SDP)	Ecological Impact Assessment (including Terrestrial and Aquatic Ecology)
Jon Smallie	Wild Skies Ecological Services	Avifauna Impact Assessment
Luanita Snyman-Van der Walt	CSIR	Visual Impact Assessment
Andrea Gibb	SiVEST	External review of the VIA
Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
Christo Bredenhann	WSP	Review of the Traffic Impact Statement complied by the CSIR using existing studies in the project area.
Rudolph du Toit	N/A	Review of the Social Impact Statement complied by the CSIR using existing studies in the project area.
Johann Lanz	N/A	Review of the Soils and Agricultural Impact Statement complied by the CSIR using existing studies in the project area.

1.3 IMPACTS IDENTIFIED DURING THE BA PROCESS

Based on the specialist studies, the following main direct potential impacts, as indicated in Table 3, have been identified and appropriate management and mitigation measures included within the EMPr (where required) as per the recommendations made in the specialist studies to ensure the potential impacts are suitably addressed and managed during all phases of the project. Indirect and cumulative impacts are noted in Sections 4 to 12 of this EMPr. It should be noted that other impacts for which specialist studies were not undertaken but where mitigation or management actions may be required, are also included in the EMPr.

Table 3: Impacts Identified in the BA

KEY IMPACT	IMPACTS IDENTIFIED
Terrestrial Ecology, Aquatic Ecology an Avifauna	**Construction Phase:** ▪ Alteration of habitat structure and composition in and around towers and possibly through the stringing phase of the project. ▪ The disturbance of fauna and loss of vegetation/habitat through anthropogenic activities, disturbance of refugia and general change in habitat. ▪ Disturbance of vegetation, in particular habitat associations as a consequence of the establishment of the proposed towers of the transmission line. ▪ Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points. ▪ Invasion and a prevalence of exotic vegetation as a result of the import of earth materials and the general disturbance of the site. ▪ Alteration of surface water quality on account of construction activities that lead to change in water chemistry. ▪ Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure, primarily the establishment of the proposed concreteor steel towers along the transmission line route, which require some level of excavation and the placement of concrete foundations. ▪ Disturbance of avifauna during the construction. **Operational Phase:** ▪ Exotic vegetation invasion as a consequence of low level but regular and continued disturbance of habitat along the transmission line route. ▪ Alteration of vegetation community structure through maintenance operations around the transmission line. ▪ Potential disturbance of avifauna and displacement effects during maintenance and operation of the transmission line. ▪ Bird collisions with transmission line. ▪ Electrocution of birds on transmission line and possibly within the on-site substation. ▪ Bird nesting on transmission line. **Decommissioning Phase:** ▪ Vegetation and habitat alteration as result of the removal of the proposed infrastructure (i.e. alteration of 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). ▪ Exotic weed invasion as a consequence of abandonment of transmission line and cessation of any weed control measures that may be in place during the operational stage. ▪ Recruitment and behavioural change in fauna. ▪ Minor and subtle changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment.
Visual	**Construction Phase:** ▪ Potential visual intrusion of construction activities on existing views of sensitive visual receptors in the surrounding landscape.

KEY IMPACT	IMPACTS IDENTIFIED
	Operational Phase: ▪ Potential landscape impact of the proposed electrical infrastructure on a rural agricultural landscape. ▪ 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.
Heritage (Archaeology and Cultural Landscape)	**Construction Phase:** ▪ Destruction of archaeological resources as a result of the construction of the proposed transmission line. ▪ Potential impacts to graves. ▪ Alteration of the cultural and natural landscape as a result of the construction of the proposed transmission line. **Operational Phase:** ▪ Alteration of the cultural and natural landscape as a result of the existence and maintenance of the proposed transmission line. **Decommissioning Phase:** ▪ Impacts to the cultural landscape as a result of the removal of the proposed transmission line and on-site substation.
Heritage (Palaeontology)	**Construction Phase:** ▪ Potential loss of palaeontological heritage resources through disturbance, damage or destruction of fossils and fossil sites through surface clearance and excavation activities during the construction phase. • Destruction of palaeontological material as a result of the construction of the proposed transmission line.

2 APPROACH TO PREPARING THE EMPr

2.1 COMPLIANCE WITH RELEVANT LEGISLATION

In terms of legal requirements, a crucial objective of the EMPr is to satisfy the requirements of Section 24N of the NEMA, as amended, and Appendix 4 of the amended NEMA EIA Regulations published in Government Notice No. R 326 of 7 April 2017. These regulations regulate and prescribe the content of the EMPr and specify the type of supporting information that must accompany the submission of the report to the authorities. An overview of where the requirements are addressed in this EMPr is presented in Tables 4 and 5.

Table 4: Compliance with Section 24N of NEMA

Requirements of Section 24N of NEMA	Where it is included in this EMPr?
2) The environmental management programme must contain- a) information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of: (i) planning and design; (ii) pre-construction and construction activities;	Section 1.3 (Page 8-9) and the columns detailing the impact description, mitigation and management objectives, and mitigation and management actions in Sections 4 to 12 of this EMPr (Page 18-82).

Requirements of Section 24N of NEMA	Where it is included in this EMPr?
(iii) the operation or undertaking of the activity in question; (iv) the rehabilitation of the environment; and (v) closure, if applicable;	
b) details of- (i) the person who prepared the environmental management programme; and (ii) the expertise of that person to prepare an environmental management programme;	Section 1.2 (Page 7) of this EMPr and Appendix A of the BA Report
c) a detailed description of the aspects of the activity that are covered by the environmental management programme;	Section 1 and Section 1.1 (Page 3-7)
d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);	Columns in Section 4 to 12 (Page 18-82) of the EMPr regarding the monitoring responsibility, including the requirements for monitoring and reporting on compliance and the responsible parties noted in Section 3 (Page 15-17).
e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance;	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 12 of this EMPr (Page 18-82).
f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and	Sections 4 to 12 (Page 18-82)of this EMPr, as applicable to the post-construction, rehabilitation phase and the decommissioning phase.
g) a description of the manner in which it intends to- (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; and (iii) comply with any prescribed environmental management standards or practices.	The columns detailing the mitigation and management objectives, mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 12 (Page 18-82) of this EMPr.
3) The environmental management programme must, where appropriate- a) set out time periods within which the measures contemplated in the environmental management programme must be implemented; b) contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of polluted or extraneous water or ecological degradation which may occur inside and outside the boundaries of the operations in question; and c) develop an environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 12 (Page 18-82) of this EMPr. Section 11 (Page 58-61) of this EMPr includes an Environmental Awareness Plan.
5) The Minister, the Minister responsible for mineral resources or an MEC may call for additional information and may direct that the environmental management programme in question must be adjusted in such a way as the Minister, the Minister responsible for mineral resources or the MEC may require.	Not applicable at this stage.
6) The Minister, the Minister responsible for mineral resources or an MEC may at any time after he or she has approved an application for an environmental authorisation approve an amended environmental management programme.	Not applicable at this stage.
7) The holder and any person issued with an environmental authorisation- a) must at all times give effect to the general objectives of integrated environmental management laid down in section 23; b) must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment; c) must manage all environmental impacts (i) in accordance with his or her approved environmental management programme, where appropriate; and	Throughout the EMPr

Requirements of Section 24N of NEMA	Where it is included in this EMPr?
(ii) as an integral part of the prospecting or mining, exploration or production operation, unless the Minister responsible for mineral resources directs otherwise; d) must monitor and audit compliance with the requirements of the environmental management programme; e) must, as far as is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and f) is responsible for any environmental damage, pollution, pumping and treatment of polluted or extraneous water or ecological degradation as a result of his or her operations to which such right, permit or environmental authorisation relates.	
8) Notwithstanding the Companies Act, 2008 (Act No. 71 of 2008), or the Close Corporations Act, 1984 (Act No. 69 of 1984), the directors of a company or members of a close corporation are jointly and severally liable for any negative impact on the environment, whether advertently or inadvertently caused by the company or close corporation which they represent, including damage, degradation or pollution.	Section 3 (Page 15) details the responsibility of the Project Applicant.

Table 5: Compliance with Appendix 4 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017)

Requirements of Appendix 4 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017 in GN R326)	Where it is included in this EMPr?
1. (1) An EMPr must comply with section 24N of the Act and include: a) details of: (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.2 (Page 7) of this EMPr and Appendices A and E of the **BA Report**. Appendices A and E of the **BA Report** includes the Curriculum Vitae of the Environmental Assessment Practitioners and specialists respectively.
b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1 and Section 1.1 (Page 3-7)
c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Appendix A and Appendix B of this EMPr (Page 87-90).
d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including: (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Section 1.3 Page 8-9) and the columns detailing the impact description, mitigation and management objectives, and mitigation and management actions in Sections 4 to 12 (Page 18-82) of this EMPr.
e) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to: (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	The columns detailing the mitigation and management actions in Sections 4 to 12 (Page 18-82) of this EMPr.

Requirements of Appendix 4 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017 in GN R326)	Where it is included in this EMPr?
f) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	The columns detailing the monitoring methodology in Sections 4 to 12 (Page 18-82) of this EMPr.
g) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	The columns detailing the monitoring frequency in Sections 4 to 12 (Page 18-82) of this EMPr.
h) an indication of the persons who will be responsible for the implementation of the impact management actions;	The columns detailing the monitoring responsibility in Sections 4 to 12 (Page 18-82) of this EMPr.
i) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	The columns detailing the mitigation and management actions, and the monitoring methodology and frequency in Sections 4 to 12 (Page 18-82) of this EMPr.
j) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 12 (Page 18-82) of this EMPr.
k) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 4 to 12 (Page 18-82) of the EMPr, including the requirements for monitoring and reporting on compliance and the responsible parties noted in Section 3.
l) an environmental awareness plan describing the manner in which: (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 11 (Page 58-61) of this EMPr.
m) any specific information that may be required by the competent authority.	Section 2.2 (Page 12-13) and the management objectives and management actions in Sections 4 to 11 (Page 18-82). It should be noted that this is based on previous renewable energy projects and corresponding feedback from the DEA.
(2) Where a government notice *gazetted* by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Not Applicable

2.2 COMPLIANCE WITH DEA REQUIREMENTS

The EMPr is structured in such a way to comply with the requirements of the DEA and to ensure that the mitigation and management measures that have been identified during the BA Process are included in the respective plans. These requirements are detailed in Table 6 below. It is important to note that other project specific aspects (such as the findings and recommendations of the specialist studies), in addition to those covered by the plans normally required by the DEA, have been included in Section 12 of the EMPr.

Table 6: DEA Requirements for the EMPr

DEA Requirements	Relevant Section in the EMPr
All recommendations and mitigation measures recorded in the BA Report and the specialist studies conducted.	Recommended mitigation measures and monitoring actions as noted in the BA Report and specialist studies have been included in this EMPr, where relevant.
The final site layout map	Refer to Appendix A of this EMPr for the site layout map. Refer to Section 1.1 (Page 3-7) of this EMPr for a description of the proposed project infrastructure.
Measures as dictated by the final site layout map and micro-siting.	Refer to Appendix A (Page 84) of this EMPr for the site layout map. Refer to Section 1.1

DEA Requirements	Relevant Section in the EMPr
	(Page 3-7) of this EMPr for a description of the proposed project infrastructure and information regarding the final siting of the proposed infrastructure, which will take place during the detailed engineering phase (taking into consideration the findings of the specialists in terms of environmental sensitivity).
An environmental sensitivity map indicating environmental sensitive areas and features identified during the BA Process.	Refer to Appendix B (Page 87) of this EMPr for an environmental sensitivity map. Refer to Section 1.1 (Page 3-7)of this EMPr for a description of the approach followed to identify the environmental sensitivities.
A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	Refer to Appendix B (Page 87) of this EMPr for a combined environmental sensitivity and layout map.
An alien invasive management plan to be implemented during the construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.	Refer to Section 4 (Page 18-22) of this EMPr.
A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase.	Refer to Section 5 (Page 23-41) of this EMPr. It should be noted that faunal protection and habitat rehabilitation has also been included in this section.
A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.	Refer to Section 5 (Page 23-41) of this EMPr. It should be noted that faunal protection and habitat rehabilitation has also been included in this section.
An open space management plan to be implemented during the construction and operation of the facility.	Refer to Section 6 (Page 42-44) of this EMPr.
A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimise impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.	Refer to Section 7 (Page 45-47) of this EMPr.
A transportation plan for the transport of components, main assembly cranes and other large pieces of equipment.	Refer to Section 7 (Page 45-47) of this EMPr.
A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.	Refer to Section 8 (Page 48-51) of this EMPr.
A fire management plan to be implemented during the construction and operation of the facility.	Refer to Section 11 (Page 58-61) of this EMPr. It should be noted that this has been combined with an Environmental Awareness Plan.
An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.	Refer to Section 9 (Page 52-54) of this EMPr.
An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the	Refer to Section 10 (Page 55-58) of this EMPr.

DEA Requirements	Relevant Section in the EMPr
possibility of oil and other toxic liquids from entering the soil or storm water systems	
Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.	Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments have been included throughout the EMPr, such as Sections 8 (Page 48-51), 9 (Page 52-54) and 10 (Page 55-58).

2.3 CONTENTS OF THE EMPr

Where applicable, each section of the EMPr is divided into the following four phases of the project cycle:

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

The EMPr includes the findings and recommendations of the BA Process and specialists studies. Furthermore, as noted above, the EMPr is considered a “living” document and must be updated with additional information or actions during the design, construction, operational and decommissioning phases if applicable.

The EMPr follows an approach of identifying an over-arching goal and objectives, accompanied by management actions that are aimed at achieving these objectives. The management actions are presented in a table format in order to show the links between the goal and associated objectives, actions, responsibilities, and monitoring requirements and targets.

The management plans for the design, construction, operational and decommissioning phases consist of the following components:

- **Impact:** The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated.
- **Objectives:** The objectives necessary in order to meet the goal; these take into account the findings of the specialist studies.
- **Mitigation/Management Actions**: The actions needed to achieve the objectives of enhancing, mitigating or eliminating impacts; taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.
- **Monitoring**: The key monitoring actions required to check whether the objectives are being achieved, taking into consideration methodology, frequency and responsibility.

2.4 GOAL FOR ENVIRONMENTAL MANAGEMENT

The overall goal for environmental management for the proposed Skeerhok Transmission Line project is to construct and operate the project in a manner that:

- Minimises the ecological footprint of the project on the local environment;

- Minimises impacts on fauna, flora and freshwater ecosystems;
- Facilitates harmonious co-existence between the project and other land uses in the area; and
- Contributes to the environmental baseline and understanding of environmental impacts of SEFs and associated supporting electrical infrastructure in a South African context.

3 ROLES AND RESPONSIBILITIES

For the purposes of the EMPr, the generic roles that need to be defined are those of the:

- Project Owner;
- Environmental Control Officer; and
- Construction Manager (Lead Contractor).

It is acknowledged that the specific titles for these functions will vary from project to project. The intent of this section is to give a generic outline of what these roles typically require. It is expected that this will be appropriately defined at a later stage.

3.1 PROJECT OWNER

The Project Owner (i.e. juwi Renewable Energies) is the current 'owner' of the project and, as such, is responsible for ensuring that the conditions of the EA issued in terms of NEMA (should the project receive such authorisation) are fully adhered to, as well as ensuring that any other necessary permits or licenses are obtained and complied with. It is expected that the Project Owner at the point of construction will appoint the Environmental Control Officer and the Lead Contractor.

3.2 ENVIRONMENTAL CONTROL OFFICER

An independent Environmental Control Officer (ECO) must be appointed to monitor the compliance of the proposed project with the conditions of EA (should such authorisation be granted by the DEA) are complied with at all times. The ECO must also monitor compliance of the proposed project with environmental legislation and recommendations of the EMPr, as well as oversee the implementation of the EMPr during the phases of the project, monitor environmental impacts, undertake record-keeping.

The ECO will be responsible for updating the EMPr as and when necessary, and compiling a monitoring checklist based on the EMPr. The roles and responsibilities of the ECO should include the following:

- The ECO must undertake periodic environmental audits during the relevant phases of the proposed project in order to monitor and record environmental impacts and non-conformances, and to monitor site activities to ensure adherence to the specifications contained in the EMPr, using a monitoring checklist. The timeframes for environmental audits will be indicated in the EA (should such authorisation be granted by the DEA).
- Environmental compliance/audit reports must be compiled and submitted by the ECO to the Competent Authority (i.e. DEA and/or Provincial Department of Environment and Nature

Conservation) on a regular basis (i.e. at intervals as indicated in the EA (should such authorisation be granted by the DEA)).

- The ECO must maintain a diary of site visits and audits, a copy of the Environmental Authorisation (should such authorisation be granted by the DEA) and relevant permits for reference purposes, a non-conformance register, a public complaint register, and a copy of previous environmental audits undertaken.
- Prior to the commencement of construction, the ECO must meet on site with the Contractor to confirm the construction procedure and designated construction areas and work activity zones.
- Reporting of any non-conformances within 48 hours of identification of such non-conformance to the relevant agents.
- Conducting an environmental inspection on completion of the construction period and 'signing off' the construction process with the Contractor.
- Ensure that records are kept of all monitoring activities and results.
- Conducting an environmental inspection on completion of decommissioning and 'signing off' the site rehabilitation process.

- The ECO must undertake periodic environmental audits during the relevant phases of the proposed project in order to monitor and record environmental impacts and non-conformances, and to monitor site activities to ensure adherence to the specifications contained in the EMPr, using a monitoring checklist. The timeframes for environmental audits will be indicated in the EA (should such authorisation be granted by the DEA).
- Environmental compliance/audit reports must be compiled and submitted by the ECO to the Competent Authority (i.e. DEA and/or the relevant provincial environmental departments) on a regular basis (i.e. at intervals as indicated in the EA (should such authorisation be granted by the DEA)).
- The ECO must maintain a diary of site visits and audits, a copy of the EA (should such authorisation be granted by the DEA) and relevant permits for reference purposes, a non-conformance register, a public complaint register, and a copy of previous environmental audits undertaken.
- Prior to the commencement of construction, the ECO must meet on site with the Contractor to confirm the construction procedure and designated construction areas and work activity zones.
- Reporting of any non-conformances within 48 hours of identification of such non-conformance to the relevant agents.
- Conducting an environmental inspection on completion of the construction period and 'signing off' the construction process with the Contractor.
- Ensure that records are kept of all monitoring activities and results.
- Conducting an environmental inspection on completion of decommissioning and 'signing off' the site rehabilitation process.

The Lead Contractor and sub-contractors may have their own Environmental Officers, or designate Environmental Officer functions to certain personnel.

3.3 CONSTRUCTION MANAGER

The Construction Manager will be responsible for the following:

- Ensure that all appointed contractors and sub-contractors are aware of the EMPr and their respective responsibilities;
- Prior to the commencement of construction, the Construction Manager must meet on site with the ECO in order to confirm the construction procedure and designated construction areas and work activity zones.
- Ensure that each sub-contractor employs an Environmental Officer (or employs a designated suitably qualified individual to fulfil the role of an Environmental Officer) to monitor and report on the daily activities on-site during the construction period;
- Implementation of the overall construction programme, project delivery and quality control for the construction for the proposed electrical grid infrastructure project;
- Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project management related to project construction;
- Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and stress to all employees and contractors and sub-contractors the importance that the project proponent attaches to safety and the environment;
- Ensuring that safe, environmentally acceptable working methods and practices are implemented and that sufficient plant and equipment is made available properly operated and maintained, to facilitate proper access and enable any operational to be carried out safely;
- Ensuring that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in the EMPr, to the satisfaction of the Project Owner's ECO;
- Implement the Traffic Management Plan (Section 7), Transportation Plan (Section 7) and Storm Water Management Plan (Section 8).

4 ALIEN INVASIVE VEGETATION MANAGEMENT PLAN

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. DESIGN PHASE					
4.1. Impacts due to establishment and increases in the prevalence of exotic and invasive plants.	Reduce proliferation of alien and invasive species, which is expected within any disturbed areas particularly as there is a degree of alien and invasive species within the study area at present.	4.1.1. Ensure compliance with relevant Environmental Specifications (amendments to the regulations under the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) and Section 28 of the NEMA) for the control and removal of alien invasive plant species. 4.1.2. Seek guidance from a suitably qualified specialist or contact relevant authorities on the removal of the alien vegetation on site. 4.1.3. Compile exotic weed, and alien and invasive control plan for the proposed project site to ensure that these species are eradicated and controlled to prevent their spread beyond the project footprint. Alien plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, has to be controlled.	▪ Appoint a suitable specialist/ Contractor or contact the relevant authorities to seek guidance on the removal of the planted alien invasive species. ▪ Appoint a suitable specialist to identify dominant weed species within the region and compile approach and management plan for exotic weed control during and post construction. ▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the design phase. ▪ Once-off during the design phase (i.e. prior to commencement). ▪ Once-off during the design phase.	▪ Project Owner ▪ Project Owner and ECO ▪ ECO
B. CONSTRUCTION PHASE					
4.2. 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	Reduce the opportunity for invasive plant material to establish on site, primarily arising through the import of fill and related materials.	4.2.1. Undertake exotic weed control, vegetation control and broader vegetation management of source materials and the construction site through monitoring during the construction phase and identifying the source of fill materials. 4.2.2. Identify any exotic plant material in the fill material and remove and dispose. Monitor the point of infilling and address any emergent exotic plant material.	▪ Monitor the source of fill material, the importing of such material to the construction site, the presence of alien invasive plants in the fill material, as well as recurrence of these species in the area of infilling during the construction phase via visual inspections and take action to remove and control these species.	▪ Ongoing during the construction phase.	▪ ECO and Contractor

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
serve to alter habitat form and structure.					
4.3. Increased presence of exotic and disturbance driven plant species. With increasing levels of anthropogenic activity on site and within the surrounding area (50 km radius), 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. This is a cumulative impact.	Reduce the opportunity for invasive plant material to establish on site as a result of increased anthropogenic activity.	4.3.1. 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.	▪ Undertake site and visual inspections and report any non-compliance.	▪ On-going	▪ ECO and Contractor
4.4. Increases in the prevalence of alien and invasive plants.	Ensure the appropriate removal of alien invasive vegetation from the proposed project area and prevent the establishment and spread of alien invasive plants due to the project activities.	4.4.1. Ensure compliance with relevant Environmental Specifications (amendments to the regulations under the CARA and Section 28 of the NEMA for the control and removal of alien invasive plant species. Implement correct choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used. 4.4.2. Implement the exotic weed, and alien and invasive control plan. Undertake regular visual monitoring and redress of exotic weeds in and around site, particularly during construction. Ensure that alien invasive vegetation found on site, within the proposed project footprint, is immediately controlled and removed promptly, in a scheduled manner throughout the construction phase.	▪ Implement intermittent but regular weed control initiatives. ▪ Undertake site and visual inspections and report any non-compliance. ▪ Carry out visual inspections and site visits to ensure that the footprint of the area associated with alien plant species removal is kept as small as possible. Monitor and manage vegetation clearing by undertaking visual inspections to ensure minimal disturbance and to restrict activities to within demarcated areas. ▪ Demarcate sensitive drainage and riparian areas during eradication to restrict vehicle access.	▪ As necessary during the construction phase. ▪ Ongoing during the construction phase. ▪ Ongoing during the construction phase. ▪ Prior to construction and during construction phase following monitoring. ▪ Prior to the commencement of construction	▪ Project Owner, ECO / ▪ Contractors and ECO ▪ Contractors and ECO ▪ Project Owner and ECO ▪ Project Owner, ECO and Specialist Contractor ▪ ECO ▪ Contractors and ECO

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		4.4.3. Ensure footprint areas are kept as small as possible when removing alien plant species. Keep clearance and disturbance of indigenous vegetation to a minimum. The entire width of the distribution line servitude should not be cleared of vegetation and should be cleared below the distribution line and from either side of the centre line based on the requirements of Eskom and standard operating procedures. 4.4.4. No vehicles should be allowed to drive through designated sensitive drainage line and riparian areas during the eradication of alien and weed species. 4.4.5. All alien vegetation identified should be removed from rehabilitated areas and reseeded with indigenous vegetation as specified by a suitably qualified specialist (ecologist). 4.4.6. The removed alien invasive vegetation should be immediately disposed at a suitable waste disposal facility and should not be kept on site for prolonged periods of time, as this will enhance the spread of these species. 4.4.7. All soils compacted as a result of construction activities falling outside of the project footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all construction and rehabilitation phases to prevent loss of floral habitat. 4.4.8. Ensure that the footprint required for the proposed project activities (such as temporary stockpiling, earthworks, storage areas, site establishment etc.) is kept at a minimum. 4.4.9. All construction machinery and plant equipment delivered to site for use during the construction phase should be cleaned in order to limit the introduction of alien species.	▪ Ensure that a suitably qualified specialist is contacted with regards to the re-seeding process. ECO to ensure that this is taken into consideration and implemented. ▪ Monitor the removal of the alien vegetation found on site via visual inspections. ▪ Monitor the presence of alien invasive plants via visual inspections and take action to remove, control, and rehabilitate these species. ▪ Verify that the proposed project area is determined and outlined prior to the commencement of the construction phase by undertaking visual inspections. ▪ ECO to conduct visual inspections to verify that machinery and equipment are cleaned, and report any non-compliance.	▪ As necessary during the construction phase. ▪ On-going ▪ Once-off prior to construction and as required during the construction process. ▪ As necessary during the construction phase.	▪ Contractors and ECO ▪ Contractors and ECO

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
C. OPERATIONAL PHASE					
4.5. Increased spread and introduction of exotic vegetation as a result of the movement of vehicles within the study area, particularly along the transmission line and service road, which may change or alter the local ecology.	To prevent the excessive growth and propagation of exotic weeds on disturbed lands that form part of the power line. Reduce the establishment and spread of alien invasive plants. To remove exotic weeds as and when they may arise and thereby prevent alteration of local and adjacent habitat forms.	4.5.1. Implement vegetation management and conservation operations such as control of exotic vegetation along roads and the transmission line, and avoid unnecessary disturbance to the ground which promotes exotic weed invasion and vegetation change. 4.5.2. Review the vegetation composition around the project site. 4.5.3. Undertake removal of exotic vegetation using approved and appropriate herbicides. 4.5.4. Implement management actions in Section 4.4 above as applicable.	▪ Carry out inspections to monitor the presence of exotic vegetation, and the level of disturbance, as well as the implementation of interventions. ▪ Undertake annual routine weed control. ▪ Monitor the use of herbicide sprays for removal of alien vegetation by undertaking visual inspections and reporting any non-compliance. ▪ Maintain register of weed spraying activities and ensure that herbicide use is recorded.	▪ Monthly	▪ Project Owner
D. DECOMMISSIONING PHASE					
4.6. Exotic weed invasion of the decommissioned site resulting in ecological change	To prevent the excessive growth and propagation of exotic weeds on disturbed lands that formed a portion of the proposed electrical infrastructure.	4.6.1. All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction. 4.6.2. Exotic weed control measures to be instituted through weed control programme. Regular redress of exotic weed through the use of herbicides. 4.6.3. Ensure the stabilization of site, once decommissioning and removal of infrastructure has arisen. 4.6.4. Implement management actions in Section 4.4 above for the decommissioning phase, as applicable.	▪ Final external audit of area to confirm that area is rehabilitated to an acceptable level. ▪ Undertake weed eradication according to weed eradication programme, along disturbance sites following dismantling of structures. ▪ Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established after decommissioning and rehabilitation. ▪ Monitor the condition of the distribution line route via site	▪ Once off ▪ Once-off ▪ During the decommissioning phase ▪ During the decommissioning phase ▪ During the decommissioning phase ▪ Implement monitoring	▪ Lead Contractor with advice from specialist ▪ Project Owner and ECO ▪ Project Owner and ECO ▪ Project Owner/ Contractor ▪ ECO ▪ Implement monitoring responsibility in

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			inspections throughout the decommissioning phase and at the end to verify that the site is stabilized and all infrastructure has been removed. Record non-compliance and incidents. ▪ Implement monitoring methodology in Section 4.4 above for the decommissioning phase, as applicable.	frequency in Section 4.4 above for the decommissioning phase, as applicable.	Section 4.4 above for the decommissioning phase, as applicable.

5 PLANT RESCUE AND PROTECTION PLAN INCLUDING RE-VEGETATION AND HABITAT REHABILITATION PLAN (INCLUDING AQUATIC ECOLOGY, FRESHWATER RESOURCES, AND TERRESTRIAL AND AQUATIC FAUNA AND FLORA)

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. DESIGN PHASE					
5.1. Alteration of surface water quality on account of construction activities that lead to change in water chemistry.	To reduce the potential of contamination of soils and local water resources and change in ecological structure. To ensure that as far as possible all infrastructure is placed outside of water resource areas and their respective buffer zones.	5.1.1. Ensure that as far as possible all infrastructure is placed outside of water resource areas and their respective 32 m buffer zones. If these measures cannot be adhered to, strict mitigation measures will be required to minimise the impact on the receiving watercourses. 5.1.2. 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 where the linear development (i.e. transmission lines) spans the relevant watercourse, and every effort should be made to prevent/avoid placement of monopoles 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. 5.1.3. Careful planning of the location of the substations. The applicable zone of regulation around the freshwater resources in terms of	▪ Ensure that the 32 m zone of regulation is taken into consideration in the final layout of the proposed electrical infrastructure. Ensure that this is taken into account, where possible and as feasible, and that the recommended mitigation measures are implemented as required. ▪ Monitor the placement of the monopoles to ensure minimal interference with riparian habitat. ▪ Monitor the placement of the substation to be 32 m away from watercourses.	▪ Once-off prior to the commencement of construction.	▪ Project Owner and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		NEMA is 32 m, and this must be adhered to, in order to assist in minimising impacts on the freshwater resources in close proximity to the proposed substations.			
5.2. Impact on avian behavior and avian species as a result of collision with transmission line and associated electrical infrastructure.	To reduce impact on avifauna	5.2.1. The most important mitigation measure is to select the optimal route for the new power line. As discussed in detail in Section 4 of Appendix E3 of the BA Report, it is recommended that either Skeerhok Alternative 2 or 3 transmission line be selected. 5.2.2. A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site. If any such sites are found case specific mitigation measures will need to be designed.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing.	▪ Once during the design and planning phase.	▪ Project Owner and Contractor (and Ornithologist for the walk-through)
B. CONSTRUCTION PHASE					
5.3. 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 stringing of the transmission line, as well as earthworks.	Reduce points of vegetation clearance and unnecessary clearance of vegetation.	5.3.1. Conduct a site survey, habitat identification and relocation prior to construction. Carry out a survey of all the proposed transmission 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. 5.3.2. Undertake a site review and fauna and plant search and rescue prior to the commencement of the construction phase, and possible removal/relocation 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)). 5.3.3. Ensure the necessary permits or licences are identified and applied for as applicable for removal of protected, indigenous vegetation. Await response and provision of permit (as	▪ Appoint a suitably qualified Ecologist to conduct a pre-construction survey of the construction corridor. ▪ Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports. ▪ Appoint a suitable contractor to complete the search and rescue. Identify the plants that may need to be relocated or rescued. Contact the relevant Authorities if any protected species are found during the search and rescue. Review permits prior to undertaking search and rescue. Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports.	▪ Once-off, prior to construction. ▪ Once-off, prior to construction. ▪ At commencement ▪ Prior to commencement of construction and search and rescue. ▪ Once-off prior to construction. ▪ Once-off prior to construction and implementation during construction.	▪ Project Owner, Construction Manager, ECO and Ecologist ▪ Project Owner, Search and Rescue Contractor, and ECO ▪ Project Owner and ECO ▪ Project Owner and ECO ▪ ECO ▪ Project Owner, Construction Manager, ECO and Ecologist

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		required) from the relevant Authorities prior to the removal of the indigenous species (if required). Once these permits are obtained, search and rescue must be undertaken for the indigenous species. Efforts should be made to minimise impacts on protected trees (if any) by avoiding areas where such species may occur. 5.3.4. Ensure that demarcation of the construction area is undertaken prior to the commencement of construction and that it is maintained throughout. 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). 5.3.5. 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. 5.3.6. Ensure that lithic environments are incorporated or avoided during the construction phase. 5.3.7. Stringing of towers may be performed using aerial methods (e.g. helicopter) if and where possible, to avoid undue disturbance to habitat.	▪ Ensure that a suitable specialist is appointed to compile a Vegetation Rehabilitation Plan. ▪ Verify that the proposed project construction area is determined and outlined prior to the commencement of the construction phase by reviewing signed minutes of meetings or signed reports. ▪ Verify that the proposed access routes are determined and outlined prior to the commencement of the construction phase by reviewing signed minutes of meetings or signed reports. Ensure that vegetation removal is kept to a minimum by reviewing and contributing to the approved site plan. ▪ Ensure that significant lithic environments and features, in proximity to the proposed project area, are demarcated as no-go areas so that they can be avoided. ▪ Ensure that suitable methods for the stringing of the power line are taken into consideration and adopted as required.	▪ Once-off prior to construction. ▪ Once-off prior to construction. ▪ Once-off prior to construction. ▪ Once-off prior to construction.	▪ Project Owner and ECO ▪ Project Owner and ECO ▪ Project Owner and ECO ▪ Project Owner and ECO
5.4. The disturbance of fauna and loss of vegetation/habitat through anthropogenic activities, disturbance of refugia and general change in habitat.	To reduce change in faunal populations and faunal ethos within the region and/associated development area.	5.4.1. Undertake survey of sites prior to construction Carry out a survey of all the proposed transmission line tower points and development footprint prior to the construction phase, taking measures to avoid more sensitive terrain, while meeting stringing distance between towers. 5.4.2. A pre-construction site walk-through should be undertaken shortly before commencement of	▪ Appoint a suitably qualified Ecologist to conduct a pre-construction survey of the final site and development footprint. ▪ The specific impact of construction on these species should be noted and the	▪ Once-off, prior to construction. ▪ Once-off, prior to construction. ▪ Once-off, prior to construction.	▪ Project Owner, Construction Manager, ECO and Ecologist ▪ Project Owner, Construction

<table>
<tr><th rowspan="2">Impact</th><th rowspan="2">Mitigation/Management Objectives</th><th rowspan="2">Mitigation/Management Actions</th><th colspan="3">Monitoring</th></tr>
<tr><th>Methodology</th><th>Frequency</th><th>Responsibility</th></tr>
<tr><td></td><td></td><td>construction in order to identify any important faunal communities that may have relocated to the line route.
5.4.3. 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).
5.4.4. 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).</td><td>possibility of relocation of species may be considered.
▪ Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports.
▪ Appoint a suitable contractor to complete the search and rescue. Identify the plants that may need to be relocated or rescued.
▪ Contact the relevant Authorities if any protected species are found during the search and rescue. Review permits prior to undertaking search and rescue. Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports.
▪ Verify that the proposed project construction area is determined and outlined prior to the commencement of the construction phase by reviewing signed minutes of meetings or signed reports.</td><td>▪ At commencement
▪ Prior to commencement of construction and search and rescue.
▪ Once-off, prior to construction.
▪ Once-off, prior to construction.</td><td>Manager, ECO and Ecologist
▪ Project Owner, Search and Rescue Contractor, and ECO
▪ Project Owner and ECO
▪ Project Owner and ECO
▪ Project Owner and ECO</td></tr>
<tr><td>5.5. 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 and 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</td><td>Identify affected points of lithic or eco-geomorphological importance within the development footprint or adjacent to the development footprint.</td><td>5.5.1. Undertake survey of sites prior to construction Carry out a survey of all the proposed power line tower points and development footprint prior to the construction phase, taking measures to avoid more sensitive terrain, while meeting stringing distance between towers.
5.5.2. 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).
5.5.3. 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).</td><td>▪ Appoint a suitably qualified Ecologist to conduct a pre-construction survey of the final site and development footprint.
▪ Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports.
▪ Appoint a suitable contractor to complete the search and rescue. Identify the plants that may need to be relocated or rescued.
▪ Contact the relevant Authorities if any protected species are found during the search and rescue. Review permits prior to undertaking search and</td><td>▪ Once-off, prior to construction.
▪ Once-off, prior to construction.
▪ At commencement
▪ Prior to commencement of construction and search and rescue.
▪ Once-off, prior to construction.
▪ Once-off, prior to construction.</td><td>▪ Project Owner, Construction Manager, ECO and Ecologist
▪ Project Owner, Search and Rescue Contractor, and ECO
▪ Project Owner and ECO
▪ Project Owner and ECO
▪ Project Owner and ECO</td></tr>
</table>

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
species and change in ecosystem function).		5.5.4. Ensure that lithic environments are incorporated or avoided during the construction phase. Ensure that these features are cordoned off or demarcated, if required. 5.5.5. Postpone construction activities (in the affected specific area) and consult with a suitably qualified Ecologist, where refugia are utilised by gravid or rearing of juveniles.	rescue. Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports. ▪ Verify that the proposed project construction area is determined and outlined prior to the commencement of the construction phase by reviewing signed minutes of meetings or signed reports. ▪ Ensure that significant lithic environments and features, in proximity to the proposed project area, are demarcated as no-go areas so that they can be avoided. ▪ Consult with a suitably qualified Ecologist where refugia are utilised by gravid or rearing of juveniles within the development footprint.		▪ Project Owner and ECO ▪ Project Owner, Construction Manager, ECO and Ecologist
5.6. 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.	To reduce the risk to fauna in respect of activities within construction footprints and activities that may arise in and around construction areas.	5.6.1. Ensure proper management of traffic movement and construction labour conduct is implemented. The construction personnel and staff should be made aware of the presence of fauna within the proposed project area. The construction personnel and staff must also be made aware of the general speed limits on site and must be alert at all times for potential crossings. 5.6.2. Develop protocols in respect of management of wildlife within and adjacent to construction sites. 5.6.3. Undertake pre operations assessment of the construction site to identify the presence of fauna within work areas. Address and relocate any fauna identified. Establish a recording method in order to monitor the construction activities, including species presence within site, mortalities and sitings.	▪ Carry out Environmental Awareness Training with a discussion on the management of terrestrial fauna and flora on site, and traffic movement in this regard. Place signage to inform and educate the construction staff regarding this. ▪ Conduct audits of the signed attendance registers. ▪ Place signage to inform and educate the construction staff regarding the management of terrestrial fauna and flora on site. ▪ Undertake inspections of the construction site to verify the presence of fauna, monitor mortalities and identify the cause if encountered, as well as to relocate the identified fauna (if applicable).	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly ▪ Intermittent during the construction phase ▪	▪ Contractor/ECO ▪ ECO ▪ Project Owner, Contractor and ECO ▪ Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
5.7. 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). This is also linked to a cumulative impact as a result of increased levels of areas dominated by built structures (within a 50 km radius).	Reduce changes in surface hydrology associated with construction activities.	5.7.1. Implement ripping of disturbed areas and compacted soils, and create a managed environment. 5.7.2. Implement measures to attenuate or decelerate surface flow, where required.	▪ Identify areas of compaction and rip or remediate. ▪ Identify changes in surface topography and implement deceleration mechanisms if and where required. Ensure that this is taken into consideration in the Method Statement for Stormwater Management during the construction phase.	▪ Ongoing during the construction phase, with a weekly evaluation in response to the commencement and progression of construction work. ▪ As required during the construction phase	▪ ECO and Contractor ▪ ECO and Contractor
5.8. Change in habitat structure due to general erosion primarily as a result of 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.	Reduce the likelihood of excessive erosion arising from construction traffic and plant operations.	5.8.1. Ensure site management and timeous redress of evident wind and water erosion. Identify points of rilling and address through ripping or infilling. 5.8.2. Identify alteration in surface topography and address through sculpting or remediation of surface flow.	▪ Undertake monitoring of the construction site and access routes to the construction site. Identify points of rilling and implement mechanisms to rectify it, if and where required. Ensure that this is taken into consideration in the Method Statement for Erosion Management during the construction phase. ▪ Identify changes in surface topography and implement sculpting or remediation of surface flow, if and where required. Ensure that this is taken into consideration in the Method Statement for Stormwater	▪ Weekly	▪ Project Owner, ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			Management during the construction phase.		
5.9. 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.	To reduce the impact of solid waste materials on particular fauna. The containment and disposal of solid waste is required in order to avert behavioural change in local fauna as well as general pollution impacts on terrestrial habitat.	5.9.1. Reduce the amount of material packaging imported to sites. Monitor site for materials (small metallic objects, off cuts, wire etc.) that may be within and around the construction area. 5.9.2. Ensure that waste disposal systems are present on site. 5.9.3. Ensure that waste generated on site is contained in order to prevent access by terrestrial fauna and avifauna. 5.9.4. Remove waste from site on a regular basis, following by safe disposal at a licensed waste disposal facility.	▪ Conduct audits to ensure that a waste disposal system is compiled and abided by, and updated as required. ▪ Conduct audits to ensure that receptacles for waste are available at all sites of operation and that these are sealed off and contained. Record and report any non-compliance. ▪ Conduct audits and site inspections to ensure that regular cleaning operations are undertaken on site, and that this includes the clearance of waste materials. Record and report any non-compliance.	▪ Daily	▪ Project Owner and ECO ▪ Contractor and ECO ▪ Contractor and ECO
5.10. 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.	Identify points where surface run off and related disposals may arise and reduce potential for change in habitat by identifying habitat form and nature and taking avoidance actions.	5.10.1. Compile and implement a Vegetation Rehabilitation Plan for the construction phase. 5.10.2. Conduct a site survey of the final development footprint prior to construction and identify points of significance or the overall significance of the site. 5.10.3. Containment and demarcation of the construction area, labour workforce and related activities. Construction activities should be confined to the laydown area and construction footprints. 5.10.4. Cordon off any significant features if required, or take remedial measures to avoid area if required. 5.10.5. Implementation of control measures relating to the conduct of construction staff and contractors on site and in relation to the prevailing natural environment. Construction	▪ Ensure that a suitable specialist is appointed to compile a Vegetation Rehabilitation Plan. Review signed minutes of meetings or signed reports. ▪ Appoint a suitably qualified Ecologist to conduct a pre-construction survey of the final site and development footprint. ▪ Verify that the proposed project construction area is determined and outlined prior to the commencement of the construction phase by reviewing signed minutes of meetings or signed reports. ▪ Ensure that significant lithic environments and features, in proximity to the proposed project	▪ Prior to the commencement of construction. ▪ Prior to construction ▪ Once-off, prior to the commencement of construction ▪ Once-off, prior to the commencement of construction ▪ Once-off, prior to the commencement of construction	▪ Project Owner, Construction Manager, ECO and Ecologist ▪ Project Owner, Construction Manager, ECO and Ecologist ▪ Project Owner and ECO ▪ Project Owner and ECO ▪ Contractor/ECO ▪ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		staff should be managed and maintained within construction areas, and educated on waste management and conduct on site. 5.10.6. 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). 5.10.7. Ensure a well-managed and timeous construction schedule to avoid prolonged period of construction and disturbance.	area, are demarcated as no-go areas so that they can be avoided. ▪ Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers. ▪ Conduct audits to ensure that a waste disposal system is compiled and abided by, and updated as required. ▪ Carry out audits to verify if the construction process is being managed efficiently with the aim of avoiding unnecessary delays, which may have an impact on the surrounding environment.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly ▪ Daily ▪ Weekly	▪ ECO and Contractor ▪ ECO and Contractor
5.11. 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.	Changes in factors around the proposed on-site substation and transmission line areas (e.g. noise, human presence etc.), changes to the localized ecology and through extension affects corridors and the broader ecology of the region.	5.11.1. Refer to management measures in Sections 5.9.1 to 5.9.8 above and implement them for this potential impact, along with the associated monitoring methodology, frequency, and responsibility. 5.11.2. Identify areas that may show increased faunal presence (streams, rivers, pans etc.). 5.11.3. Identify mitigation measures to reduce impacts on faunal movement, access to water points etc.	▪ Consider site topography and nature using ecological assessment techniques. Ensure that a suitable specialist is appointed in this regard. ▪ Identify the proposed project site in relation to the broader habitat. ▪ Introduce specific management measures to mitigate against noise, light and human presence.	▪ Prior to and during construction	▪ Construction Manager and ECO (and Ecologist once-off)
5.12. 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	To reduce the impact of increased ELP on nocturnal species, resulting in alteration of ecological processes.	5.12.1. 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.).	▪ Ensure that these lighting requirements are taken into consideration and included in the contract specifications. Verify this by undertaking site audits and recording and reporting any non-compliance.	▪ Once-off, prior to the commencement of construction	▪ Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
within the 50 km radius (cumulative impact). 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).					
5.13. Increased and expanded anthropogenic influences across the region (within a 50 km radius), with the likely influence of ousting particular species of fauna. Increased noise pollution levels with concomitant impact on faunal behaviour in respect of smaller mammals and other fauna that utilise sound in their various behavioural patterns (prey detection, social interaction). These are cumulative impacts.	To reduce the likelihood of ousting of fauna and impact on faunal behaviour as a result of increased and expanded anthropogenic influences and noise pollution.	5.13.1. Control and management procedures relating to construction activities in and around the transmission line and associated infrastructure to be implemented (i.e. management relating to disturbance of flora and fauna).	▪ Carry out visual inspections to ensure strict control over the disturbance of flora and fauna.	▪ Weekly	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
5.14. 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 (i.e. change in ecological processes and habitat). These are cumulative impacts.	To reduce the impact of vegetation and habitat alteration and the likelihood of recruitment and behavioural change in fauna.	5.14.1. 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.	▪ Ensure that a suitable specialist is appointed to compile a Vegetation Rehabilitation Plan. Review signed minutes of meetings or signed reports.	▪ Once-off prior to construction and implementation during construction.	▪ Project Owner, Construction Manager, ECO and Ecologist
5.15. Increased dissection of habitat on account of increasing levels of infrastructure resulting in changes in plant community structure and species composition. This is a cumulative impact.	Reduce dissection of habitat.	5.15.1. Implementation of control measures relating to conduct of staff and contractors on site and in relation to the prevailing natural environment.	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor and ECO ▪ ECO

5.16. 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.	To reduce the potential of loss of freshwater habitat and ecological structure and associated impacts.	5.16.1. All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction vehicles and personnel. 5.16.2. 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. 5.16.3. 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 32 m NEMA zone of regulation. 5.16.4. Contractor laydown areas must not be permitted within the 32 m NEMA zone of regulation around the identified freshwater resources. 5.16.5. Minimize construction footprints and edge effects of construction activities. Edge effects of activities, particularly erosion and alien/weed control need to be strictly managed. 5.16.6. 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. 5.16.7. All development footprint areas should remain as small as possible and should not encroach onto surrounding more sensitive areas. It must be ensured that the freshwater resources, and their associated regulatory zones are off-limits to construction vehicles and personnel. The	▪ Ensure that the 32 m zone of regulation is taken into consideration in the final layout of the proposed electrical infrastructure. Ensure that this is taken into account, where possible and as feasible (as recommended by the Aquatic Ecology Specialist), and that the recommended mitigation measures are implemented as required. ▪ Ensure that flow connectivity is retained if it is not avoidable to place infrastructure within riparian habitat, and that fragmentation is prevented. Ensure that these measures are implemented by undertaking site audits and reporting any non-compliance. ▪ Undertake site audits and inspections to ensure that vegetation removal and vehicle driving occurs on demarcated routes and that all sensitive areas are regarded as no-go areas. Ensure that the contractor demarcates sensitive areas and dedicated access routes for construction personnel. Monitor and report any non-compliance. ▪ Ensure that the limits of the construction boundary and temporary access roads are confirmed and that the construction area and vegetation removal is kept to a minimum. Conduct site audits and inspections to verify if this is undertaken and record and report any non-compliance. ▪ Ensure that these management actions are taken into consideration during the construction phase via site audits and inspections, and record and report any non-compliance.	▪ Once-off prior to the commencement of construction. ▪ Weekly ▪ Once-off prior to construction for demarcation and weekly to ensure these demarcated areas are respected. ▪ Weekly ▪ Weekly	▪ Project Owner and ECO ▪ ECO and Contractor ▪ ECO and Contractor ▪ ECO and Contractor ▪ ECO and Contractor

		boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas. 5.16.8. Planning of temporary access routes should take the site sensitivity plan into consideration, and wherever possible, existing roads should be utilised. If additional roads are required, such as in the form of jeep tracks, then wherever feasible such "roads" should be constructed a distance from the more sensitive riparian areas and not directly adjacent thereto. If crossings are required they should cross the system at right angles, as far as possible to minimise impacts in the receiving environment, and any areas where bank failure is observed due to the effects of such crossings should be immediately repaired by reducing the gradient of the banks to a maximum of a 1:3 slope and where needed necessary, installing support structures. This should only be necessary if existing access roads are not utilised. 5.16.9. Implement alien vegetation control program; and promote indigenous vegetation growth to protect soils. 5.16.10. Construction activities should occur in the low flow season/ dry season to avoid sedimentation and minimize disturbance to hydraulic function. The duration of possible impacts on the riverine system should be minimised as far as possible by ensuring that the duration of time in which possible flow alteration and sedimentation will take place is minimised. 5.16.11. 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. 5.16.12. Limit excavations to ensure that drainage patterns return to normal after construction. 5.16.13. 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. 5.16.14. Rehabilitate disturbed areas following completion of construction activities through reprofiling and revegetation. 5.16.15. 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. 5.16.16. Strict erosion control and soil management measures must be implemented during the construction and operational phases, particularly in areas where vegetation has been removed. 5.16.17. Stockpiled soil must be levelled as required during construction and post-construction to avoid sedimentation from runoff, and revegetated with indigenous vegetation. 5.16.18. Compacted soil should be ripped, reprofiled and reseeded with indigenous vegetation following completion of construction activities.			

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
5.17. Disturbance of terrestrial fauna and flora on site due to construction workers and activities.	To advise construction staff of the requirements in respect of management of flora and fauna on site during the construction phase.	5.17.1. Conduct an Environmental Awareness Training and induction for all construction staff and personnel.	▪ Carry out Environmental Awareness Training with a discussion on the management of terrestrial fauna and flora on site. ▪ Conduct audits of the signed attendance registers.	▪ Prior to construction and as required by the ECO. Ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ ECO
C. OPERATIONAL PHASE					
5.18. Change in ecological processes and habitat due to disturbance as a result of general activities associated with the maintenance operations around the transmission line, which will include replacing of parts and infrastructure, as well as use of materials such as hydrocarbons.	Reduce impacts on terrestrial fauna and flora as a result of the operation of the proposed on-site substation.	5.18.1. 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. 5.18.2. Ensure that containment of maintenance activities is achieved to within the on-site substation to avoid unnecessary disturbance outside of the footprint. 5.18.3. 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. 5.18.4. 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. 5.18.5. 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).	▪ Ensure that these factors are taken into consideration by undertaking site audits and visits and recording any non-compliance.	▪ Ongoing	▪ Project Owner

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		5.18.6. Appropriate lighting of the on-site substation should be provided in order to avoid unnecessary illumination of the surrounding environment. 5.18.7. 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. 5.18.8. Monitoring of the fence line on a ongoing basis will alleviate impacts on smaller fauna, such as tortoise, that may become entrapped by the electric fence.			
5.19. Change in ecological processes and habitat, disturbance of emergent and established vegetation, changes in edaphics and other drivers, ousting of fauna in and around the site and particularly adjacent to the transmission line, mortalities of species such as tortoise, and changes in biophysical drivers along the proposed transmission line route (soil, vegetation cover, surface hydrology etc.), as a result of general activities during the transmission line and service road maintenance processes.	Reduce impacts on terrestrial fauna and flora as a result of the operation of the proposed transmission line and service road.	5.19.1. Implement sound and appropriate management of points around the proposed towers including storm water management and vegetation control. 5.19.2. Ensure that containment of maintenance activities is achieved to the proposed transmission line servitude and points around towers to avoid unnecessary disturbance outside of the footprint. 5.19.3. 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. 5.19.4. Implement control of all imported material to ensure that materials are managed during operations along the proposed transmission line route. 5.19.5. Control of all waste materials to ensure that all materials are removed from along the proposed transmission line route and disposed of correctly at a licenced facility.	▪ Ensure that these factors are taken into consideration by undertaking site audits and visits and recording any non-compliance.	▪ Ongoing	▪ Project Owner

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
5.20. 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, of the transmission line and service road, as well as increased human and vehicle traffic levels.	The maintenance of the prevailing habitat form and type in areas subject to disturbance during the operational phase.	5.20.1. Implement vegetation management and conservation initiatives which includes exotic weed control; vegetation management along the power line and service road route; and around fence lines and within the site; and monitoring and maintenance of larger plant associations in proximity to infrastructure. 5.20.2. Undertake regular review of vegetation and habitat in and around the towers and substation. 5.20.3. Specific consideration of habitat change indicated by moribund state, rapid change in structure and composition of vegetation etc.	▪ Undertake monitoring via visual inspections of the site, and record and report non-compliance and recommend methods to rectify any areas of concern.	▪ Monthly	▪ Project Owner
5.21. Increase in terrestrial mortalities through the movement of vehicles along the 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).	To reduce the risk to fauna due to activities associated with the operations of the proposed infrastructure.	5.21.1. Develop protocols in respect of management of wildlife within and immediately adjacent to the operational area. 5.21.2. Undertake a regular assessment of the operational site to identify the presence of fauna within work areas. Address and relocate any fauna identified. 5.21.3. Log any identified mortalities and identify the cause of such, along with remedial actions.	▪ Monitor mortalities and identify the associated cause if encountered. Record the number of faunal mortalities and ensure that remedial actions are implemented.	▪ Ongoing	▪ Project Owner
5.22. 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	To manage impacts on faunal behaviour and associated ecological aspects associated with ELP and operations.	5.22.1. Develop protocols in respect of management of wildlife within and immediately adjacent to the operational area. 5.22.2. Undertake a regular assessment of the operational site to identify the presence of fauna within work areas. Address and relocate any fauna identified.	▪ Identify points of excessive noise or light and consider mitigation measures, if possible; and monitor and log changes and faunal mortalities that are identified from time to time.	▪ Daily to intermittent	▪ Project Owner

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
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. Increased ELP levels is also listed as a cumulative impact.		5.22.3. Ensure that nuisance factors, in particular noise and light are mitigated and minimised. 5.22.4. 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.).			
5.23. Birds nesting on transmission line or on-site substation.	To reduce conflict with infrastructure management and fire risks of nests. Reduce nesting of birds on the electrical infrastructure	5.23.1. Nest management on a case by case under the supervision of an Ornithologist, and in conformance with all relevant national and provincial legislation. 5.23.2. The operational phase EMP must include provision for application to the provincial authority for permits for any necessary nest management.	▪ Nest relocation or removal should be done under permit from the provincial authority.	▪ As required	▪ ECO
D. DECOMMISSIONING PHASE					
5.24. Recruitment and behavioural change in fauna resulting in change in ecological processes and habitat.	To manage impacts on faunal behaviour and associated ecological aspects during decommissioning activities.	5.24.1. Develop protocols in respect of management of wildlife within and adjacent to the site designated for decommissioning. 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.	▪ Appoint a suitable specialist to undertake a final site evaluation and to complete the search and rescue. Identify the plants that may need to be relocated or rescued. ▪ Ensure that a suitable specialist is appointed to compile a Vegetation Rehabilitation Plan. Review signed minutes of meetings or signed reports.	▪ Prior to demolition and/or decommissioning ▪ Prior to demolition and/or decommissioning ▪ Daily	▪ Project Owner and ECO ▪ Project Owner, Ecologist and ECO ▪ ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		5.24.2. Undertake regular assessment of sites to identify the presence of fauna within work areas prior to and post construction. Address and relocate any fauna identified prior to demolition. 5.24.3. Ensure that nuisance factors, in particular noise and light are mitigated and minimised during removal.	▪ Undertake site audits and record and report any non-compliance.		
5.25. 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.	The containment and correct disposal of solid waste is required in order to avert behavioural change in local fauna as well as general pollution impacts on the terrestrial habitat.	5.25.1. Ensure that waste generated on site is contained in order to prevent access by terrestrial fauna and avifauna. 5.25.2. Remove waste from site on a regular basis, following by safe disposal at a licensed waste disposal facility. 5.25.3. 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.	▪ Conduct audits to ensure that receptacles for waste are available at all sites of operation and that these are sealed off and contained. Record and report any non-compliance. ▪ Conduct audits and site inspections to ensure that regular cleaning operations are undertaken on site, and that this includes the clearance of waste materials. Record and report any non-compliance. ▪ Conduct a final external audit to confirm that area is left in a suitable condition.	▪ Daily ▪ Daily ▪ At the end of the decommissioning phase	▪ Contractor and ECO ▪ Contractor and ECO ▪ Project Owner and ECO
5.26. Vegetation and habitat alteration and reversion to secondary habitat structure at transformed sites. Removal of the proposed transmission 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	Reinstatement of vegetation and habitat following closure of site or decommissioning of operations.	5.26.1. Remove all structures and relocate material off site and dispose of waste materials correctly. 5.26.2. 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. Ensure that the site is revegetated. 5.26.3. Monitor and address any exotic plant establishment. 5.26.4. Compile and implement a Vegetation Rehabilitation Plan in order to improve habitat	▪ Carry out site inspections and audits to review the site and ensure that all structures are removed from site and correctly disposed (as required and where applicable). ▪ Carry out inspections and site audits to ensure that the site is ripped and sculpted to conform to the prevailing topography, and that the site is re-vegetated, if and where required. Monitor the management measures to verify if they are implemented successfully in order to ensure plant re-vegetation. ▪ Carry out visual inspections to verify the removal of exotic plant species	▪ Once-off operation ▪ Throughout the decommissioning phase. ▪ Throughout the decommissioning phase. ▪ Once-off prior to decommissioning and implementation during decommissioning.	▪ Project Owner and ECO ▪ Project Owner and ECO ▪ Project Owner and ECO ▪ Project Owner, Decommissioning Manager, ECO and Ecologist

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
edaphics, lithic or other factors.		diversity. Establish rehabilitation protocols and management interventions for site that would include post construction remediation and rehabilitation. 5.26.5. Undertake management of secondary emergent vegetation communities to ensure that emergent vegetation is aligned to prevailing habitat.	and record and report any non-compliance. ▪ Ensure that a suitable specialist is appointed to compile a Vegetation Rehabilitation Plan. Review signed minutes of meetings or signed reports.		
5.27. Rehabilitation of flora on site	Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction.	5.27.1. All damaged areas shall be rehabilitated upon completion of the contract. 5.27.2. All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction. 5.27.3. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.	▪ Conduct a final external audit to confirm that area is rehabilitated to an acceptable level.	▪ Once off	▪ Project Owner with feedback and input from an appropriate specialist.

6 OPEN SPACE MANAGEMENT PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. DESIGN PHASE					
6.1. Loss of vegetation and habitat fragmentation.	Keeping the area cleared of vegetation to a minimum.	6.1.1. Clearing of vegetation should be kept to a minimum and take into consideration the sensitivities on site shown in Appendix B of this EMPr.	▪ Ensure that design and layout is uniform and well-adapted to the surrounding environment and that no unnecessary areas are cleared of vegetation.	▪ Once-off during design	▪ Project Owner
6.2. Impacts due to establishment of alien invasive plants.	Ensure the appropriate removal of alien invasive vegetation from the proposed project area and prevent the establishment and spread of alien invasive plants due to the project activities.	6.2.1. Ensure compliance with relevant Environmental Specifications for the control and removal of alien invasive plant species. 6.2.2. Appoint a specialist or contact relevant authorities to seek guidance on the removal of the alien vegetation on site. 6.2.3. Compile and finalise an alien weed eradication programme.	▪ Appoint a suitable specialist/ Contractor or contact the relevant authorities to seek guidance on the removal of the planted alien invasive species. ▪ Appoint a suitable specialist to compile an alien invasive vegetation eradication plan. ▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the design phase. ▪ Once-off during the design phase. ▪ Once-off during the design phase.	▪ Project Owner ▪ Project Owner ▪ ECO
6.3. Permanent barriers to animal movement and habitat fragmentation.	To reduce the impact that permanent barriers (as a result of construction activities and the proposed infrastructure) will have on animal movement within the area.	6.3.1. Fencing should allow for the passage of small and medium sized mammals and all forms of mesh fencing should be avoided. 6.3.2. All remaining areas that are not impacted upon by the proposed development footprint should remain unfenced to allow for movement corridors between the remainder of the farm.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports. ▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase	▪ Project Owner ▪ Project Owner
B. CONSTRUCTION PHASE					
6.4. Permanent barriers to animal movement and habitat fragmentation.	The reduction in the impact that permanent barriers (as a result of construction activities will have on animal movement within the area.	6.4.1. Fencing should allow for the passage of small and medium sized mammals and all forms of mesh fencing should be avoided.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase	▪ Project Owner

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
6.5. Loss of vegetation and habitat fragmentation.	Keeping the area cleared of vegetation to a minimum.	6.5.1. Clearing of vegetation should be kept to a minimum, keeping the width and length of the earthworks to a minimum.	▪ Monitor activities and record and report non-compliance.	▪ Daily	▪ ECO and Contractor
6.6. Increases in the prevalence of exotic and invasive plants.	Reduce area of disturbance and decrease the level of exotic plants within or around the site.	6.6.1. Regular monitoring through visual inspection and redress of exotic weeds in and around site, particularly during construction. 6.6.2. Avoidance of excessive earthworks and sculpting of land.	▪ Monitor the presence of alien invasive species on the development site. ▪ Maintenance of vegetation and avoidance of unnecessary clearance of route.	▪ Ongoing, and as when required. ▪ Ongoing	▪ ECO and Contractor ▪ ECO and Contractor
C. OPERATIONAL PHASE					
6.7. Increased risk of alien plant invasion.	Ensure that the site is kept free from alien invasive species.	6.7.1. Monitor the site and remove alien invasive species that are found.	▪ Implement intermittent but regular weed control initiatives on the development site.	▪ Reporting frequency depends on legal compliance framework.	▪ Project Owner
6.8. Increased animal road mortality.	Minimise loss of fauna as a result of road mortalities.	6.8.1. Create awareness during staff induction programmes. Staff must be made aware of the general speed limits as well as the potential animals that may cross and how to react in these situations.	▪ Conduct staff awareness training programmes.	▪ Once-off training and ensure all new staff are inducted.	▪ Project Owner
D. DECOMMISSIONING PHASE					
6.9. No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-	To manage impacts on the surrounding environment during the operational phase.	6.9.1. Disturbed and transformed areas should be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes	▪ Final external audit of area to confirm that area is rehabilitated to an acceptable level	▪ Once off	▪ Project Owner
		6.9.2. Stockpiled topsoil should be reapplied to disturbed areas and these areas should be re-vegetated using a mix of native species in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape.	▪ Final external audit of area to confirm that area is rehabilitated to an acceptable level	▪ Once off	▪ Project Owner

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
going occupation of the area.		6.9.3. Edges of re-vegetated areas should be feathered to reduce form and line contrasts with surrounding undisturbed landscape.	▪ Final external audit of area to confirm that area is rehabilitated to an acceptable level	▪ Once off	▪ Project Owner

7 TRAFFIC MANAGEMENT PLAN INCLUDING TRANSPORTATION PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. DESIGN PHASE					
7.1. Increased traffic generation	Manage impact that additional traffic generation will have on road network	7.1.1. If abnormal loads need to be transported by road to the site, a permit needs to be obtained from the relevant provincial government department.	▪ Ensure that the permits are applied for and obtained prior to commencement. ▪ Verify that this has been undertaken by reviewing approved permits.	▪ Once-off during the design phase ▪ Once-off during the design phase.	▪ Contractor ▪ ECO
B. CONSTRUCTION PHASE					
7.2. Increased traffic generation during the construction phase resulting in a reduction of road based level of service	Reduce the amount of road based traffic during the construction phase.	7.2.1. Well maintained vehicles should be used together with well-trained drivers during the construction phase. Vehicle maintenance and driver competency should be monitored. Proof of driver competency as well as the vehicle checks should be verified and undertaken to ensure that vehicles are roadworthy and hence, do not pose a safety risk. The Contractors must ensure that construction vehicles are roadworthy, properly serviced and maintained, and respect the vehicle safety standards implemented by the Project Owner. 7.2.2. During the construction phase, suitable parking areas should be designated for trucks and vehicles. 7.2.3. The use of public transport (buses and/or minibus taxis) to convey construction personnel to the site should be encouraged. 7.2.4. It is recommended that vehicles are not overloaded during the construction phase in order to reduce impacts on the road structures, particularly the access roads leading to the site. Random visual inspection of vehicles should be undertaken in order to	▪ Carry out random checks of driver licenses and conduct random visual inspections of construction vehicles for roadworthiness. ▪ Monitor the placement of the designated parking area for trucks and vehicles via visual inspections and record and report any non-compliance. ▪ Contractor may record arrival and departure times as well as number of workers using minibuses. ▪ Perform visual inspection of vehicles during the construction phase.	▪ Random visual inspection of vehicles weekly. ▪ Once-off prior to construction and as required during the construction phase. ▪ Once a month on a randomly selected day. ▪ Random visual inspection of vehicles weekly.	▪ Contractor ▪ Project Owner and ECO ▪ Contractor ▪ Contractor

<table>
<tr><th rowspan="2">Impact</th><th rowspan="2">Mitigation/Management Objectives</th><th rowspan="2">Mitigation/Management Actions</th><th colspan="3">Monitoring</th></tr>
<tr><th>Methodology</th><th>Frequency</th><th>Responsibility</th></tr>
<tr><td></td><td></td><td>monitor for overloading. The inspections should also verify if the trucks are covered with appropriate material (such as tarpaulin) if and where possible.</td><td></td><td></td><td></td></tr>
<tr><td>7.3. Increased level of road accidents (involving pedestrians, animals, other motorists on the surrounding tarred/ gravel road network) due to increased traffic during construction.</td><td>Minimise the impact of the construction activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding tarred/ gravel roads.

Reduce number of road accidents due to increased traffic during construction.</td><td>7.3.1. Well maintained vehicles should be used together with well-trained drivers during the construction phase. Vehicle maintenance and driver competency should be monitored. Proof of driver competency as well as the vehicle checks should be verified and undertaken to ensure that vehicles are roadworthy and hence, do not pose a safety risk. The Contractors must ensure that construction vehicles are roadworthy, properly serviced and maintained, and respect the vehicle safety standards implemented by the Project Owner.
7.3.2. Road mortality monitoring programme (inclusive of wildlife collisions record keeping) should be established.
7.3.3. Adhere to all speed limits applicable to all roads used.
7.3.4. Implement clear and visible signage and signals indicating movement of vehicles within and around site, especially along access roads and intersections with public and private roads.</td><td>▪ Carry out random checks of driver licenses and conduct random visual inspections of construction vehicles for roadworthiness.
▪ Appropriate monitoring should be undertaken.
▪ Ensure that speed limits are adhered to.
▪ Carry out random visual inspections to verify speed limits and general awareness of vehicle drivers.
▪ Implement clear signalisation.
▪ Carry out random inspections to verify whether proper construction signage is being implemented.</td><td>▪ Random visual inspection of vehicles weekly.
▪ Weekly
▪ Daily
▪ Random during the construction phase
▪ On-going
▪ Random during the construction phase</td><td>▪ Contractor
▪ Contractor and ECO
▪ Contractor and ECO
▪ ECO
▪ Contractor and ECO
▪ ECO</td></tr>
<tr><td colspan="6">C. OPERATIONAL PHASE</td></tr>
<tr><td>7.4. Increased level of road accidents (involving pedestrians, animals, other motorists on the surrounding tarred/ gravel road network) due to traffic on the maintenance road</td><td>Minimise the impact of the operational activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding tarred/ gravel roads.</td><td>7.4.1. Adhere to all speed limits applicable to all roads used.
7.4.2. Implement clear and visible signage and signals indicating movement of vehicles at the intersection with the Transnet Service Road to ensure safe entry and exit.</td><td>▪ Ensure that speed limits are adhered to.
▪ Carry out random visual inspections to verify speed limits and general awareness of vehicle drivers.
▪ Implement clear signalisation.</td><td>▪ Daily
▪ Random during the operational phase
▪ Ongoing</td><td>▪ Project Owner
▪ Project Owner</td></tr>
</table>

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
during the operational phase.	Reduce number of road accidents due to traffic during the operational phase.		▪ Carry out random inspections to verify whether proper operational signage is being implemented.	▪ Random during the operational phase	
D. DECOMMISSIONING PHASE					
7.5. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.					

8 STORM WATER MANAGEMENT PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. DESIGN PHASE					
8.1. Impact of the project if a detailed storm water management plan is not correctly prepared.	To limit the effect of uncontrolled storm water run-off from developed areas onto natural areas.	8.1.1. Prepare a detailed stormwater management plan outlining appropriate treatment measures to address runoff from disturbed portions of the site, such that they do not: ▪ result in concentrated flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural water courses; ▪ result in any necessity for concrete or other lining of natural water courses to protect them from concentrated flows of the development; ▪ divert flows out of their natural flow pathways, thus depriving downstream watercourses of water.	▪ Check compliance with specified conditions. ▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during design followed by regular control ▪ During the design phase	▪ Contractor ▪ ECO
B. CONSTRUCTION PHASE					
8.2. Diversion and impedance surface water flows - changes to the hydrological regime and increased	Prevent interference with natural run-off patterns, diverting flows and increasing the velocity of surface water flows.	8.2.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the construction phase. 8.2.2. Erosion and sedimentation into water bodies must be minimised through the effective stabilisation (gabions and Reno	▪ Compile a Method Statement for Stormwater Management during the construction phase. ▪ Inspect and verify if a Method Statement for Stormwater Management has been compiled by	▪ Prior to the construction phase. ▪ Once-off prior to the commencement of the construction phase.	▪ Contractor ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
potential for erosion. Diversion and increased velocity of surface water flows – reduction in permeable surfaces.		mattresses or similar) and the re-vegetation of any disturbed riverbanks. 8.2.3. Place energy dissipation structures in a manner that allows the management of flows prior to being discharged into the natural environment, thus not only preventing erosion, but supporting the maintenance of natural base flows within these systems i.e. hydrological regime (water quantity and quality) is maintained. 8.2.4. Reinforce soil slopes to minimise erosion during rehabilitation (as needed, and once construction in a specific area has ceased). 8.2.5. Drainage along the sides of the roads should be designed so that it does not result in concentrated flows into watercourses. 8.2.6. Perform periodic inspections and maintenance of soil erosion measures and stormwater control structures.	the Contractor via audits prior to the commencement of the construction phase. ▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement. ▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement. ▪ Monitor activities and record and report non-compliance. ▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement. ▪ Monitor activities and record and report non-compliance.	▪ Weekly or Bi-weekly ▪ Weekly or bi-weekly ▪ As needed during the construction phase ▪ Weekly or bi-weekly ▪ As needed during the construction phase	▪ ECO ▪ ECO ▪ ECO ▪ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
8.3. Pollution of the surrounding environment as a result of the contamination of stormwater. Contamination could result from the spillage of chemicals, oils, fuels, sewage, solid waste, litter etc.	To prevent contaminated stormwater from entering into and adversely impacting on freshwater ecosystems and reducing the water quality. To reduce sedimentation of nearby water systems. To apply best practice principles in managing risks to storm water pollution.	8.3.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the construction phase. 8.3.2. Provide secure storage for fuel, oil, chemicals and other waste materials to prevent contamination of stormwater runoff. Fuels and chemicals (i.e. any hazardous materials and dangerous goods) used during the construction phase must be stored safely on site and in bunded areas. Fuel and chemical storage containers must be inspected to ensure that any leaks are detected early. 8.3.3. All stockpiles must be protected from erosion and stored on flat areas where run-off will be minimised. Erosion and sedimentation into water bodies must be minimised through effective stabilisation. No stockpiling should take place within a watercourse. 8.3.4. Stockpiles must be located away from river channels i.e. greater than 32 m. 8.3.5. Littering and contamination of water resources during construction must be prevented by effective construction camp management. 8.3.6. Emergency plans must be in place to deal with potential spillages (especially those leading to any watercourses). 8.3.7. Erosion and sedimentation into water bodies must be minimised through the effective stabilisation (gabions and Reno mattresses or similar) and the re-vegetation of any disturbed riverbanks. 8.3.8. Ensure that the temporary site camp and ablution facilities are established at least	▪ Compile a Method Statement for Stormwater Management during the construction phase. ▪ Inspect and verify if a Method Statement for Stormwater Management has been compiled by the Contractor via audits prior to the commencement of the construction phase. ▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents. Monitor if spillages have taken place and if they are removed correctly. ▪ Monitor the excavations and stockpiling process throughout the construction phase via visual site inspections. Record non-compliance and incidents. ▪ Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections). ▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement. ▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement. ▪ Monitor the placement of the site camp via visual inspections, and record and report any non-compliance.	▪ Prior to the construction phase. ▪ Once-off prior to the commencement of the construction phase. ▪ Weekly ▪ Daily ▪ Weekly ▪ Weekly or Bi-weekly ▪ Weekly or Bi-weekly ▪ Once-off prior to construction and as required during the construction phase.	▪ Contractor ▪ ECO ▪ ECO ▪ ECO ▪ Contractor and ECO ▪ ECO ▪ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		32 m away from the banks of the major drainage lines. 8.3.9. Ensure that there is no ad-hoc crossing of channels by vehicles during the construction phase. Access routes across the site should be strictly demarcated and selected with a view to minimise impacts on drainage lines. 8.3.10. Ensure that no waste materials or sediments are left in the surrounding drainage lines (as a result of the construction). 8.3.11. Regular inspections of stormwater infrastructure should be undertaken to ensure that it is kept clear of all debris and weeds.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement. ▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement. ▪ Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections).	▪ Weekly or Bi-weekly ▪ Weekly or Bi-weekly ▪ Weekly	▪ ECO ▪ ECO ▪ Contractor and ECO
C. DECOMMISSIONING PHASE					
8.4. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.					

9 EROSION MANAGEMENT PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. CONSTRUCTION PHASE					
9.1. Increased wind erosion and resultant deposition of dust.	Prevent wind erosion and resultant deposition of dust on surrounding indigenous vegetation.	9.1.1. Sand, stone and cement should be stored in demarcated areas, and covered or sealed to prevent wind erosion and resultant deposition of dust on the surrounding indigenous vegetation. 9.1.2. During construction, efforts should be made to retain as much natural vegetation as possible on the site, to reduce disturbed areas and maintain plant cover, thus reducing erosion risks. 9.1.3. All stockpiles must be protected from erosion and stored on flat areas where run-off will be minimised. Erosion and sedimentation into water bodies must be minimised through effective stabilisation.	▪ Undertake regular inspections of the via site audits to verify that sand, stone and cement are stored and handled as instructed. ▪ Monitor activities via site inspections and record and report non-compliance. ▪ Monitor the stockpiling process throughout the construction phase via visual site inspections. Record non-compliance and incidents.	▪ Daily ▪ Daily ▪ Daily	▪ ECO and Contractor ▪ ECO and Contractor ▪ ECO
9.2. Sedimentation of the surrounding drainage lines as a result of stormwater runoff and stockpiling of excavated material during the construction phase. The excavated material could potentially be washed into the drainage lines via stormwater. This could also impact on avifauna.	Reduce sedimentation as a result of erosion caused by stockpiling and stormwater runoff.	9.2.1. All material that is excavated during the construction phase must be stored appropriately on site in order to minimise impacts on the surrounding aquatic environment. 9.2.2. Exposed soil surfaces should be graded to minimise runoff and increase infiltration. 9.2.3. Where possible, sandbags (or similar) should be placed at the bases of the stockpiled material in order to prevent erosion of the material. 9.2.4. Undertake periodic inspections and maintenance of soil erosion measures and stormwater control structures.	▪ Monitor activities via site inspections and record and report non-compliance.	▪ Daily	▪ ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		9.2.5. Stockpiles must be located at least 32 m away from the drainage lines, on flat areas where run-off will be minimised. 9.2.6. During periods of strong winds and heavy rain (in line with relevant rainfall patterns), the stockpiles should be covered with appropriate material (e.g. cloth, tarpaulin etc.).			
B. OPERATIONAL PHASE					
9.3. Excessive loss of natural vegetation in the development footprint area and resulting impacts on Species of Special Concern (SSC), faunal habitat and habitat fragmentation.	Prevent loss of natural vegetation and minimise habitat fragmentation and the loss of connectivity as a result of erosion.	9.3.1. To prevent erosion, indigenous grasses that seed themselves should (where possible) be left to form a ground cover and kept short. 9.3.2. The use of silt fences, sand bags or other suitable methods must be implemented in areas that are susceptible to erosion. Other erosion control measures that can be implemented are as follows: 1) Brush packing with cleared vegetation, 2) Planting of vegetation, 3) Hydro seeding/hand sowing. All erosion control mechanisms need to be regularly maintained. 9.3.3. Conduct regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. Ensure that all erosion problems are rectified as soon as possible.	▪ ECO to advise on seed to be used. ▪ Monitor efficiency of erosion control measures. ▪ Undertake regular monitoring for erosion to ensure is reduced and rectified as soon as possible.	▪ Prior to re-vegetation. ▪ Weekly or monthly ▪ Monthly	▪ Project Owner ▪ Project Owner ▪ Project Owner
9.4. Increased wind erosion and resultant deposition of dust.	Prevent wind erosion and resultant deposition of dust on surrounding indigenous vegetation.	9.4.1. Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.	▪ Include periodic site inspections in environmental performance reporting that inspects the effectiveness and integrity of the run-off control system and specifically records occurrence or non-occurrence of any erosion on site or downstream. Corrective action must be implemented to the	▪ Quarterly	▪ Project Owner

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			run-off control system in the event of any erosion occurring.		
C. DECOMMISSIONING PHASE					
9.5. No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. Monitoring: Final external audit of area to confirm that area is rehabilitated to an acceptable level (once off event to be conducted by ECO).					

10 HAZARDOUS SUBSTANCES LEAKAGE OR SPILLAGE MONITORING SYSTEM

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. CONSTRUCTION PHASE					
10.1. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of concrete and cement.	To control concrete and cement batching activities in order to reduce spillages and resulting contamination of soil, groundwater and the vegetation and/or fauna.	10.1.1. If any concrete mixing takes placed on site, this must be carried out in a clearly marked, designated area at the site camp on an impermeable surface (such as on boards or plastic sheeting and/or within a bunded area with an impermeable surface). 10.1.2. Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains. 10.1.3. A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted. 10.1.4. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes. 10.1.5. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. Empty cement bags must be collected from the construction area at the end of every day. Sand and aggregates containing cement must be kept damp to prevent the generation of dust. 10.1.6. Any excess sand, stone and cement must be removed from site at the completion of the construction period and disposed at a licenced waste disposal facility. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents. ▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Daily ▪ Daily ▪ Daily ▪ Daily ▪ Monthly ▪ Daily ▪ Daily ▪ Monthly	▪ Project Owner, Contractor and ECO ▪ Project Owner, Contractor and ECO ▪ Project Owner, Contractor and ECO ▪ Project Owner, Contractor and ECO ▪ ECO ▪ Project Owner, Contractor and ECO ▪ Project Owner, Contractor and ECO ▪ ECO

10.2. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of fuels and oils.	To control and eliminate fuel and oil spillages which may result in soil contamination and damage to vegetation and/or fauna.	10.2.1. Ensure that adequate containment structures are provided for the temporary storage of liquid dangerous goods and hazardous materials on site (such as chemicals, oil, fuel, hydraulic fluids, lubricating oils etc.). Appropriate bund areas must be provided for the storage of these materials at the site camp. Bund areas should contain an impervious surface in order to prevent spillages from entering the ground. Bund areas should have a capacity of 110 % of the volume of the largest tank in the bund (tanks include storage of fuel/diesel). It must be ensured that all hazardous storage containers and storage areas comply with the relevant South African Bureau of Standards (SABS) standards to prevent leakage. 10.2.2. Monitor and inspect construction equipment and vehicles to ensure that no fuel spillage takes place. Ensure that drip trays are provided for construction equipment and vehicles as required. 10.2.3. Contractor to compile a Method Statement for refuelling activities under normal and emergency situations. If on-site servicing and refuelling is required in emergency situations, a designated area must be created at the construction site camp for this purpose (i.e. refuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil). Drip trays or similar impervious materials must be used during these procedures. All vehicles must be regularly inspected for leaks. 10.2.4. Spilled fuel, oil or grease must be retrieved and the contaminated soil removed, cleaned and replaced or treated accordingly. 10.2.5. Contaminated soil to be collected by the Contractor (under observation of the ECO) and disposed of at a registered waste facility designated for this purpose. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents. ▪ Monitor the construction equipment and vehicles and monitor the occurrence of spills and the management process thereof. ▪ Record all spills and lessons learnt. ▪ Verify if a Method Statement is compiled by reviewing approved and signed off reports. ▪ Monitor the refuelling/ servicing process and record the occurrence of any spillages. ▪ Monitor the handling and storage of fuels and oils via site audits and monitor if spillages have taken place and if so, are removed correctly. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents. ▪ Monitor the correct removal of contaminated soil. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Weekly ▪ Daily ▪ During spill events ▪ Once-off prior to commencemen t of construction. ▪ During emergency refuelling and servicing activities. ▪ Daily (or during spills) ▪ Daily (or during spills)	▪ Contractor and ECO ▪ Contractor and ECO ▪ ECO ▪ ECO ▪ ECO ▪ Contractor and ECO ▪ Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		10.2.6. A Spill Response Method Statement must be compiled by the Contractor for the construction phase in order to manage potential spill events. 10.2.7. The Contractor must ensure that adequate spill containment and clean-up equipment are provided on site for use during spill events. 10.2.8. Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required. 10.2.9. In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree and level of contamination, excavation and removal to a hazardous waste disposal facility could be necessary. If the spillage is widespread and the soil is considered to be significantly contaminated, a specialist will need to be immediately appointed to address the spillage. This will usually entail the collection of samples of the contaminated soil followed by analysis in terms of the 2014 National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (i.e. GN 331). If the soil is determined to be significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant, including notifying the Minister of Environmental Affairs of the significant contamination. 10.2.10. The Contractor must record and document all significant spill events.	▪ Compile a Spill Response Method Statement. ▪ Audit signed and approved Spill Response Method Statement. ▪ Monitor via site audits and record incidents and non-compliance. ▪ Ensure that a well-maintained portable bioremediation kit is available on site and that construction personnel and contractors are aware of its location and instructions ▪ Ensure that a suitably qualified specialist is appointed to collect and analyse the contaminated soil samples in terms of the 2014 Norms and Standards (i.e. GN 331) in order to determine if the soil is significantly contaminated or not. ▪ If the contaminated soil is considered to be significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant. ▪ Monitor documentation and records of significant spill events via audits and record non-compliance and incidents.	▪ Once-off (and thereafter updated as required during the construction phase). ▪ Once-off (and thereafter as required during the construction phase). ▪ Daily/Weekly ▪ Daily ▪ During spill events ▪ During spill events	▪ Contractor and Project Owner ▪ ECO ▪ ECO and Contractor ▪ Contractor and ECO ▪ Project Owner ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
B. DECOMMISSIONING PHASE					
10.3. No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area.					

11 ENVIRONMENTAL AWARENESS AND FIRE MANAGEMENT PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. DESIGN PHASE					
11.1. Potential impacts resulting from the lack of overall compliance with the conditions of the EA (issued by the DEA).	Ensure compliance with all environmental conditions of approval (issued by DEA as part of the EA).	11.1.1. Audit the implementation of the EMPr requirements. 11.1.2. Establish clear and transparent reporting of the activities undertaken with regard to all recommendations included in the EMPr.	▪ Audit report on compliance with actions and monitoring requirements. ▪ Audit report on compliance with actions and monitoring requirements.	▪ Weekly ▪ Based on EA conditions	▪ Project Owner ▪ Project Owner and ECO
B. CONSTRUCTION PHASE					
11.2. Potential risk of fire due to construction activities or behaviour of staff on site during the construction phase.	Prevent fire on site resulting from workers smoking or starting fires (i.e. cooking, heating purposes).	11.2.1. Designate smoking areas, as well as areas for cooking, where the fire hazard could be regarded as insignificant. 11.2.2. Educate workers on the dangers of open and/or unattended fires.	▪ Ad-hoc checks to ensure workers are smoking or cooking in designated areas only. ▪ Ensure fire safety requirements are well understood and respected by construction personnel. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Daily ▪ Ongoing. ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ ECO and Contractor ▪ Contractor/ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		11.2.3. Open fires must be prohibited. No informal fires should be permitted in or near the construction areas. Appropriate fire safety training should also be provided to staff that are to be on the site for the duration of the construction phase. 11.2.4. Ensure that cooking takes place in a designated area shown on the site map. Ensure that no firewood or kindling may be gathered from the site or surrounds. 11.2.5. Fire-fighting equipment must be made available at appropriate locations on the construction site.	▪ Ensure fire safety requirements are well understood and respected by construction personnel. Provide basic fire safety training. ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Ensure fire safety requirements are well understood and respected by workers. ▪ Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company.	▪ On-going ▪ On-going ▪ On-going ▪ Bi-annually	▪ ECO and Contractor ▪ ECO and Contractors ▪ ECO and Contractor ▪ Contractor
11.3. Inappropriate behaviour of civil contractors and sub-contractors during the construction phase.	Prevent unnecessary impacts on the surrounding environment by ensuring that contractors are aware of the requirements of the EMPr. Ensure that contractors and sub-contractors do not induce impacts on the surrounding environment as a result of unplanned pollution on site. Ensure that actions by on-site contractors and sub-contractors and workers are properly managed in order to minimise impacts to surrounding environment.	11.3.1. Ensure that the EMPr and the EA (should it be granted by the DEA), are included in all tender documentation and contractors and sub-contractors contracts. 11.3.2. Contractors and sub-contractors must use the ablution facilities situated in a designated area within the site; and no bathing/washing should be permitted outside the designated area. 11.3.3. All litter will be deposited in a clearly labelled, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste. 11.3.4. No person other than a qualified specialist or personnel authorised by the Project Owner, will disturb or remove plants outside the demarcated construction area. 11.3.5. No person other than a qualified specialist or personnel authorised by the Project Owner, will disturb animals on the site. 11.3.6. Educate workers on site about suitable behaviour on site and initiate	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ On-going ▪ On-going ▪ On-going ▪ On-going ▪ On-going ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractors ▪ ECO and Contractors ▪ ECO and Contractors ▪ ECO and Contractors ▪ ECO and Contractors ▪ Contractor/ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		environmental awareness. Staff must be informed that no trapping, snaring or feeding of any animal will be allowed.			
11.4. Inappropriate planning of site camp establishment.	Ensure that environmental issues are taken into consideration in the planning for site establishment.	11.4.1. All construction activities, materials, equipment and personnel must be restricted to the actual construction area specified (as required to undertake the construction work). The construction area must be demarcated by the Contractor. 11.4.2. The Contractor should install and maintain Construction Site Information Boards in the position, quantity, design and dimensions specified by the Project Owner. 11.4.3. General building materials should be stored in appropriate designated areas on site such that there will be no runoff from these areas towards sensitive systems. The site camp must be removed after construction.	▪ Monitor compliance and record non-compliance and incidents. ▪ Monitor compliance and record non-compliance and incidents. ▪ Monitor compliance and record non-compliance and incidents.	▪ Before construction ▪ Before construction ▪ Before construction	▪ ECO ▪ ECO ▪ ECO
11.5. Increased animal road mortality.	Reduction in animal mortality.	11.5.1. The construction staff should be made aware of the presence of fauna and within the proposed project area. The construction personnel and staff must also be made aware of the general speed limits on site and must be alert at all times for potential crossings, and should be trained on how to react in these situations. 11.5.2. To ensure that animals are not attracted to the site (and potentially resulting in increased road mortality), the waste collection bins and skips should be covered with suitable material, where appropriate, and the site camp must be kept clean on a daily basis. 11.5.3. Establish a monitoring programme to record the number of faunal road mortalities and collisions. If it is established that the	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers. ▪ Monitor the activities via visual inspections, and record and report any non-compliance. ▪ Appropriate monitoring and recording should be undertaken. ▪ Exclusion fences should be considered, if needed to direct animals to safe road crossings.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly ▪ Daily ▪ Weekly ▪ As required	▪ Contractor/ ECO ▪ ECO ▪ Contractor and ECO ▪ ECO ▪ ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		number of collisions and faunal fatalities increase within an area, particularly with regards to smaller species (reptiles), then measures such as exclusion fences within these areas only should be considered.			
11.6. Increased energy consumption during the construction phase.	Reduce energy consumption where possible.	11.6.1. Encourage the use of energy saving equipment at the site camp site (such as low voltage lights and low pressure taps) and promote recycling. Construction personnel must be made aware of energy conservation practices as part of the Environmental Awareness Training programme.	▪ Contractor to monitor energy usage via audits. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Monthly ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor ▪ Contractor/ ECO ▪ ECO
11.7. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during the construction phase.	11.7.1. Water conservation should be practiced as follows: ▪ Cleaning methods utilised for cleaning vehicles, floors, etc. should aim to minimise water use (e.g. sweep before wash-down). ▪ Ensure that regular audits of water systems are conducted to identify possible water leakages. 11.7.2. Avoid the use of potable water for dust suppression during the construction phase and consider the use of alternative approved sources, where possible. 11.7.3. Make construction personnel aware of the importance of limiting water wastage, as well as reducing water use.	▪ Monitor via site audits and record non-compliance and incidents. ▪ Carry out Environmental Awareness Training with a discussion on water usage and conservation. ▪ Conduct audits of the signed attendance registers.	▪ Monthly ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO ▪ Contractor/ ECO ▪ ECO
C. DECOMMISSIONING PHASE					
11.8. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.					

12 SPECIFIC PROJECT RELATED ENVIRONMENTAL IMPACTS

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. DESIGN PHASE					
A.1. TERRESTRIAL ECOLOGY IMPACTS					
12.1. Potential impact on terrestrial ecology as a result of the proposed infrastructure.	Change in habitat through clearance of vegetation, habitat modification and related factors.	12.1.1. Ensure that a Rehabilitation Plan is compiled that identifies tasks and procedures to be instituted at specific sites where transformation of habitat has arisen. 12.1.2. Detailed design and incorporation of habitat and features into the routing of the proposed transmission line.	▪ Ensure that this is taken into consideration during the planning and design phase, and that a suitable specialist is appointed to compile a Rehabilitation Plan. Review signed minutes of meetings or signed reports. ▪ Ensure that this is taken into consideration during the planning and design phase.	▪ During design cycle and before construction commences.	▪ Project Owner and Appointed Specialist ▪ Project Owner/ECO
A.2. AQUATIC ECOLOGY (FRESHWATER) IMPACTS					
12.2. Changes in the geomorphological state of drainage lines	To reduce the impact of the proposed development on the surrounding drainage lines and freshwater features.	12.2.1. Ensure that the sensitivity maps guide the design and layout of the proposed development. In terms of the applicable legislation, a 32m zone of regulation in terms of the NEMA is stipulated around all freshwater features; and these should be respected where possible and as much as feasible. In addition, 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 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. However, the 32 m zone of regulation around the freshwater features must be adhered to in the vicinity	▪ Ensure that the 32 m zone of regulation is taken into consideration in the final layout of the proposed electrical infrastructure. Ensure that this is taken into account, where possible and as feasible (as recommended by the Aquatic Ecology Specialist), and that the recommended mitigation measures are implemented as required. ▪ Ensure that the requirements of the DWS are considered during the planning and design phase and prior to	▪ Once-off prior to the commencement of construction. ▪ Once-off prior to the commencement of construction, in consultation with the DWS (based on the requirements for a WULA). ▪ Ongoing	▪ Project Owner and ECO ▪ Project Owner and ECO ▪ Contractors and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		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. 12.2.2. In terms of Section 21 (c) and (i) of the National Water Act (Act 36 of 1998) (NWA), the relevant authorisation must be obtained from the Department of Water and Sanitation (DWS) for any and all any activities that take place within the watercourses. It is recommended that the relevant DWS officials be consulted in this regard to ensure that all legislative requirements are complied with. Overall, the relevant authorisations required for 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. 12.2.3. Maintenance of a high level of housekeeping on route of the proposed transmission line during the construction phase.	construction. Ensure that the application for a Water Use Licence (WULA) is submitted and approved prior to the commencement of construction (if required), based on the requirements of the DWS. It should be noted that in most cases, the DWS will only require submission of WULA documentation if the proposed SEF and associated electrical infrastructure receives preferred bidder status in terms of the REIPPPP. Conduct audits to verify if this has been undertaken and record and report any non-compliance. ▪ Inspection of drainage features immediately outside of the footprint of the proposed transmission line and undertake removal of solid waste and litter on a regular basis.		
A.3. VISUAL IMPACTS					
12.3. Potential visual intrusion of construction activities on existing views of sensitive visual receptors	Reduce visual intrusion of construction activities project wide.	12.3.1. Ensure plans are in place to minimise fire hazards and dust generation. 12.3.2. Ensure plans are in place to rehabilitate temporary cleared areas as soon as possible. 12.3.3. Ensure plans are in place to control and minimise erosion risks. 12.3.4. Structure style (e.g. power line pylons/towers) should be the same as for other similar developments along the same route where possible (taking into consideration other specialist recommendations and specifications).	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ During design cycle and before construction commences.	▪ Project Owner ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A.4. HERITAGE IMPACTS (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
12.4. Impacts on archaeological remains and palaeontological material.	Achieve a layout that minimizes the potential later impacts to archaeological remains and palaeontological material.	12.4.1. Ensure that the project layout avoids significant palaeontological and archaeological sites that were identified in the Heritage Impact Assessment (Appendix E2 of the BA Report). These sites should be identified on project maps and regarded as no-go zones with buffers of at least 30 m around all associated features.	▪ Take cognizance of the archaeological remains and palaeontological material reported in the HIA when designing layout and routing. ▪ Ensure and verify that the significant palaeontological and archaeological sites identified in the Heritage Impact Assessment (Appendix E2 of the BA Report) are included on project maps and regarded as no-go zones with buffers during the planning and design phase. Review the site layout plan, and signed minutes of meetings or signed reports.	▪ Once-off ▪ Once-off	▪ Project Owner ▪ ECO
A.5. IMPACT ON AVIFAUNA					
12.5. Impacts on avifauna.	To reduce disturbance on avifauna and collisions with the earthwire of the proposed transmission line.	12.5.1. Ensure the use of the optimal route for the transmission line to mitigate for bird collisions. The optimal route is Skeerhok Alternative 2, as recommended by the Avifauna Specialist. It is important to note that Skeerhok Alternative 3 is also an acceptable route. 12.5.2. Ensure that the proposed power line design includes the best available anti -bird collision line marking devices in order to make the cables more visible to birds, as recommended by the Avifauna Specialist.	▪ Ensure that this is taken into consideration during the planning and design phase. ▪ Ensure that the design phase takes cognizance of the Specialists' recommendations.	▪ Once-off before construction commences.	▪ Avifaunal specialist and Project Owner
B. CONSTRUCTION PHASE					
B.1. AQUATIC ECOLOGY (FRESHWATER) IMPACTS					

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
12.6. Impact on surface water resources.	To reduce the impact of the proposed development on the surrounding surface water features and rivers.	12.6.1. Permit only essential construction personnel within 32m of the freshwater habitat, if absolutely necessary that they enter the regulatory zone. 12.6.2. Limit the footprint area of the construction activities to what is only essential in order to minimise environmental damage. 12.6.3. Implement effective waste management in order to prevent construction related waste from entering the freshwater environments. 12.6.4. Rehabilitate all wetland and riparian habitat areas affected by the proposed electrical infrastructure to ensure that the ecology of these areas is re-instated during all phases. 12.6.5. As far as possible, all rehabilitation activities should occur in the low flow season, during the drier summer months. 12.6.6. As much vegetation growth as possible should be promoted within the proposed electrical infrastructure construction area in order to protect soils. 12.6.7. All areas affected by the electrical infrastructure construction should be rehabilitated upon completion of the electrical infrastructure construction. 12.6.8. Riparian vegetation cover should be monitored to ensure that sufficient vegetation is present to bind the bankside soils and prevent bankside erosion and incision. 12.6.9. It is recommended that a detailed rehabilitation plan be developed by a suitably qualified ecologist in order to address specific rehabilitation requirements.	▪ Carry out visual inspections and site audits to verify if these management actions are undertaken, and record and report any non-compliance.	▪ Weekly	▪ ECO
B.2. VISUAL IMPACTS					
12.7. Potential visual intrusion of construction	Prevent unnecessary visual clutter and focusing attention of surrounding visual	12.7.1. Parking areas should be demarcated and strictly controlled so that vehicles are limited to specific areas only.	▪ Carry out visual inspections to ensure the construction parking area is demarcated	▪ Weekly ▪ Weekly	▪ ECO ▪ ECO

<table>
<tr><th rowspan="2">Impact</th><th rowspan="2">Mitigation/Management Objectives</th><th rowspan="2">Mitigation/Management Actions</th><th colspan="3">Monitoring</th></tr>
<tr><th>Methodology</th><th>Frequency</th><th>Responsibility</th></tr>
<tr><td>activities on existing views of sensitive visual receptors.</td><td>receptors on the proposed development.</td><td>12.7.2. 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.
12.7.3. Night time construction should be avoided where possible (however some construction work on electrical components may need to occur after dark).
12.7.4. Night lighting of the construction sites should be minimised within requirements of safety and efficiency.
12.7.5. Maintain good housekeeping on site to avoid litter and minimize waste.
12.7.6. Monitor construction sites for strict adherence to demarcated boundaries and minimise areas of vegetation, ground and surface disturbance. Existing clearings should be used where possible and where required.
12.7.7. Monitor that existing roads will be used for access as far as possible and that construction of new access roads is minimised.
12.7.8. Monitor that topsoil from the site is stripped, stockpiled, and stabilised before excavating earth for the proposed construction.
12.7.9. Monitor that vegetation material from vegetation removal is mulched and spread over fresh soil disturbances to aid in the rehabilitation process.</td><td>clearly, and record and report any non-compliance.
▪ Carry out visual inspections to ensure strict control over the parking of construction vehicles and access routes in order to restrict activities to within demarcated areas.
▪ Ensure that this is taken into consideration for the siting of the proposed construction site camp and laydown area. Carry out visual inspections to ensure the construction camp and laydown area are demarcated clearly, and record and report any non-compliance.
▪ Carry out visual inspections to ensure strict control over the boundary of the site camp and laydown area in order to restrict activities to within demarcated areas.
▪ Construction operation times to be monitored and managed (as well as included in the tender contract).
▪ Complaints about night lights should be investigated and documented in a register.
▪ Carry out site visits and inspections of the construction sites and ensure good housekeeping is maintained. Record and report any non-compliance.</td><td>▪ Weekly
▪ Weekly
▪ Weekly
▪ Weekly or bi-weekly
▪ Daily
▪ Daily
▪ Daily
▪ Daily
▪ Daily
▪ Daily and as complaints arise.
▪ Daily
▪ Daily
▪ Daily</td><td>▪ ECO
▪ ECO
▪ ECO
▪ Contractor and ECO
▪ Construction Manager and ECO</td></tr>
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Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		12.7.10. Monitor adherence to lighting plan. 12.7.11. Monitor adherence to rehabilitation plan (i.e. where cleared areas are rehabilitated as soon as possible). 12.7.12. Monitor adherence to erosion control plan. 12.7.13. Monitor adherence to dust and fire control plans.	▪ Carry out site visits and record and report any non-compliance. ▪ Carry out site visits and inspections of the access routes. Record and report any non-compliance. ▪ Carry out site visits and inspections of the topsoil management process. Record and report any non-compliance. ▪ Carry out site visits and inspections of the re-vegetation process. Record and report any non-compliance. ▪ Complaints about night lights should be investigated and documented in a register. Investigate any complaints about night lights and document it in a register. ▪ Visit sites requiring rehabilitation. ▪ Carry out site visits and record and report any non-compliance. ▪ Carry out site visits and record and report any non-compliance.		
B.3. HERITAGE IMPACTS (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE) (These are direct and cumulative impacts)					
12.8. Destruction of archaeological remains or graves as a result of the	Minimise the chances of significant archaeological sites being disturbed.	12.8.1. The Contractor and ECO must be informed of the possibility of any heritage material (i.e. ensure that all personnel are aware of the potential of encountering	▪ Carry out Environmental Awareness Training to ensure that the Contractors are informed of the possible type	▪ Once-off training and ensure that all new staff are	▪ Contractor/ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
construction of the proposed transmission line. Direct impacts to archaeological resources may also occur when construction vehicles move through the area and when foundation excavations are made.	Minimise the chances of impacts to other heritage resources located outside of the proposed route of the electrical grid infrastructure.	graves and what to do if this occurs (i.e. to report any suspicious stone features prior to disturbance)). 12.8.2. Ensure that a suitably qualified archaeologist is appointed to carry out a pre-construction survey of the sections of the final alignment that were not surveyed in order to locate any sites that need to be avoided or mitigated. Note that this requirement pertains to un-surveyed parts of the assessed routes as well as to any alterations to the routing made after completion of the Heritage Impact Assessment. 12.8.3. The probability of uncovering graves during construction anywhere in the surrounding landscape is extremely unlikely. If any of the graves or potential graves found on site cannot be avoided then an archaeologist should be contracted to conduct a test excavation to determine the status of the feature. If it is determined to be a grave, then exhumation would need to occur (if necessary) with the permission of SAHRA (and in accordance with any requirements that SAHRA might impose at the time). Record significant sites within the project footprint that cannot be avoided. 12.8.4. Avoid and protect all identified archaeological sites if possible. Ensure that all sensitive areas are cordoned off and protected prior to the start of construction with the buffers as stated in the Heritage Impact Assessment. 12.8.5. The no-go sites should be examined periodically by the ECO during the construction phase to ensure that they are being avoided. 12.8.6. If any archaeological material is encountered during any phase of the project, work in the immediate area should be halted, and the find should be protected *in situ* and reported to an appropriate specialist and/or to the relevant heritage resources authority (i.e. the South African Heritage Resources Agency (SAHRA)) so that a decision can be made as to how to proceed (i.e. it may require inspection by an archaeologist). Such heritage is the property of the state and may require excavation and curation in an approved institution. Sufficient time	of heritage features that may be encountered during the construction phase. ▪ Appoint a suitably qualified archaeologist to conduct a pre-construction survey. ▪ Appoint a professional archaeologist to conduct a test excavation to determine if the sites are graves. Conduct an audit to verify that the necessary permits are obtained by the archaeologist for the test excavation, if required. ▪ Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports. ▪ Monitor and verify if any significant sites are found within the project footprint that cannot be avoided, subsequent to the pre-construction survey. Ensure that this is taken into consideration in the site plan. ▪ Identify and cordon off sites with appropriate barriers. Carry out visual inspections and site visits to ensure strict control over the demarcation of no-go areas. Record and report any non-compliance. ▪ Carry out visual inspections and site visits to ensure strict control over the demarcation of no-go areas. Record and report any non-compliance.	▪ Once-off, 6 months prior to start of construction. ▪ As potential graves are encountered ▪ Once-off, prior to start of construction. ▪ Once-off, prior to start of construction. ▪ Once-off, prior to start of construction and weekly during construction. ▪ Weekly ▪ Daily or during excavations. ▪ As required/necessary during the construction phase. ▪ Weekly	▪ Project Owner, ECO and Archaeologist ▪ Project Owner ▪ ECO ▪ ECO and Archaeologist ▪ ECO ▪ ECO ▪ Contractor and ECO ▪ Project Owner ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		should be allowed to remove/collect such material. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit, must be alerted immediately. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required. 12.8.7. Ensure that no activity takes place outside of the authorized construction footprint (and construction vehicles should remain within the construction corridor).	▪ Monitor excavations and construction activities for archaeological materials via visual inspections and report the finds accordingly. ▪ Contact the heritage authorities and the identified archaeologist if any heritage features are uncovered. ▪ Carry out visual inspections to ensure strict control over the behaviour of construction staff in order to restrict activities to within demarcated areas.		
12.9. Alteration of the cultural landscape as a result of the construction of the proposed transmission line electrical infrastructure. 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.	Minimise the chances of the cultural landscape being disturbed.	12.9.1. Ensure use of existing roads as far as possible.	▪ Ensure that this is taken into consideration by reviewing signed minutes of meetings or signed reports, and the approved site layout.	▪ Once-off, prior to start of construction.	▪ ECO and Project Owner
12.10. Disturbance, damage or destruction of scientifically important fossils at	Reporting, conservation, recording and judicious sampling of scientifically important fossil material exposed during the	12.10.1. Reporting chance fossil finds to SAHRA for possible professional mitigation.	▪ Monitoring of all substantial excavations into sedimentary bedrocks for fossil material (e.g. vertebrate bones & teeth, fossilized wood, shells)	▪ Throughout the construction phase. ▪ Throughout the construction phase.	▪ ECO ▪ ECO ▪ Qualified palaeontologist

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
or beneath the ground surface as a result of surface clearance and excavations.	construction phase of development (The paleontological sensitivity of the site is reported as Very Low in the Palaeontological Study).	12.10.2. Recording and sampling of fossil material and associated geological data (only necessary for chance fossil finds made during the proposed development).	▪ Safeguarding of chance fossil finds, preferably in situ.in the original assessment. ▪ Application by a qualified palaeontologist for fossil collection permit from SAHRA. ▪ Palaeontologist to undertake field study of fossil finds in situ on site. Photography and sampling of important finds. ▪ Curation of fossils collected in an approved repository (museum/of significant chance fossil finds.	▪ Following alert of chance fossil finds on site (It is important to note that there is no need for on-site palaeontological monitoring unless new fossil finds are made during development).	appointed and commissioned by the Project Owner ▪ Qualified palaeontologist appointed and commissioned by the Project Owner ▪ Qualified palaeontologist appointed and commissioned by the Project Owner
B.4. AVIFAUNA IMPACTS					
12.11. Disturbance of birds and displacement effects.	To reduce disturbance of birds, in particular breeding birds.	12.11.1. A site-specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, so as to ensure that no sensitive bird species have started breeding on or near site.	▪ If any such sites are found case specific mitigation measures will need to be designed.	▪ Once-off prior to construction .	▪ ECO/Ornithologist ▪
12.12. Bird collision with transmission line.	To reduce the risk of bird collisions.	12.12.1. The transmission line should be fitted with the best available (at the time of construction) anti bird collision line marking devices in order to make the overhead cables more visible to birds. More specifically: • Devices should be fitted on the entire length of the power line as collision risk is high all along the alignment for nomadic species such as Ludwig's Bustard. • Devices should be fitted on the earth wire/s. • On each span, the full span should be fitted with marking devices (i.e. not only the middle	▪ Verify that this is undertaken by reviewing the signed approved designs.	▪ Once-off	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		60% as done previously by Eskom). Research has shown that collisions occur even close to pylons (Shaw, 2013). • Light and dark colour devices should be alternated so as to provide contrast against both dark and light backgrounds. • These devices should be fitted as soon as the earth wires are strung as collision risk begins immediately, not only once the line is commissioned and live. • The power line owner will be responsible for ensuring that the marking devices remain in place and effective on the power line for its' full lifespan. Any device failures must be rectified immediately by replacement with new devices.			
12.13. Electrocution of birds on transmission line and on-site substation.	Prevent any electrocutions of avifauna during construction of the proposed transmission line.	12.13.1. The proposed tower/pylon structure has not beendecided in detail. It will however be either concrete or steel monopole. It is critically important that sufficient clearance be allowed between phase-phase and phase-earth hardware on the structure. For large eagles these clearances should be a minimum of 1.8m. 12.13.2. In addition the standard Eskom Bird Perch must be installed on every pylon top to provide safe perching substrate for large birds well above the dangerous hardware.	▪ Ensure that this is taken into consideration during the planning and design phase. ▪	▪ Once-off before construction.	▪ Project Owner, ECO and Contractor
B.5. WASTE MANAGEMENT					
12.14. Pollution of the surrounding environment (including drainage features) as a result of the handling, temporary stockpiling and	Reduce environmental impacts such as soil, surface water and groundwater contamination as a result of incorrect storage, handling and disposal of general waste.	12.14.1. General waste (i.e. construction waste, building rubble, discarded concrete, bricks, tiles, wood, glass, window panes, air conditioners, plastic, metal, excavated material, packaging material, paper and domestic waste etc.) generated during the construction phase should be stockpiled temporarily (i.e. once-off) on site in a designated area within suitable waste collection bins and skips (or similar). Waste collection bins and	▪ Monitor the strategic placement of the temporary, designated waste stockpiling area at the site camp via visual inspections, and record and report any non-compliance.	▪ Once-off prior to the commencement of the construction phase and as required as the construction phase process evolves.	▪ ECO and Contractor ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
disposal of general waste.	Minimise the production of waste. Prevent environmental problems (e.g. pollution / change in soil pH) due to solid and liquid wastes disposed of on the site. Ensure compliance with waste management legislation.	skips should be covered with suitable material, where appropriate.	▪ Monitor the temporary storage and handling of general waste on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area).	▪ Daily	
		12.14.2. Should the on-site stockpiling of general waste exceed 100 m^3 and a period of 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.	▪ Record the amount of general waste that is temporarily stockpiled at the designated area on site, as well as the duration and record non-compliance and incidents. ▪ Monitor the duration and amounts of general waste that is temporarily stockpiled at the designated area on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area). ▪ Audit compliance with the Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) if the storage amounts are exceeded (i.e. only if required).	▪ Daily ▪ Weekly ▪ Monthly	▪ Contractor ▪ ECO ▪ Project Owner.
		12.14.3. Ensure that the designated stockpiling area for general waste (i.e. skips and waste collection bins) is inspected on a daily basis to verify its condition and integrity, particularly after rainfall events.	▪ Monitor the temporary, designated waste stockpiling area at the site camp, as well as the handling of general waste on site via site audits and record non-compliance and incidents.	▪ Daily	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		12.14.4. Ensure that general waste generated during the construction phase is removed from the site on a regular basis, and safely disposed of at an appropriate, licenced waste disposal facility by an approved waste management Contractor. Waste disposal slips or waybills should be kept on file as proof of disposal. As a general principle, waste manifests must be obtained to prove legal disposal of waste.	▪ Ensure that a suitable Waste Management Contractor is appointed to remove and dispose the general waste at an appropriate, licenced waste disposal facility. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Once-off prior to the construction phase. ▪ Weekly	▪ Project Owner/ Contractor ▪ ECO
		12.14.5. Ensure that the construction site is kept clean at all times and that construction personnel are made aware of correct waste disposal methods. Littering must be prevented through effective site camp management.	▪ Monitor the condition of the site camp throughout the construction phase via visual site inspections. Record non-compliance and incidents. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Daily ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ ECO and Contractor ▪ ECO
		12.14.6. Sufficient general waste disposal bins must also be provided for use by construction personnel throughout the site. These bins must be emptied on a regular basis.	▪ Monitor general waste generation by construction staff and collection via audits throughout the construction phase.	▪ Daily or Weekly	▪ ECO and Contractor.
		12.14.7. Ensure that all general waste emanating from the construction phase is removed from site prior to the commencement of the rehabilitation and operational phases.	▪ Undertake a final inspection at the end of the construction phase in order to verify and ensure that all general waste is removed from site and correctly disposed, prior to the commencement of the rehabilitation and operational phases.	▪ At the end of the construction phase.	▪ ECO and Contractor.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		12.14.8. Promote waste reduction, re-use, and recycling opportunities on site during the construction phase.	▪ Monitor waste generation and collection throughout construction. ▪ Investigate if any complaints have been expressed by the surrounding community regarding waste handling.	▪ Weekly or bi-weekly	▪ ECO and Contractor
		12.14.9. Ensure an adequate and sustainable use of resources.	▪ Monitor waste generation and collection throughout construction.	▪ Weekly or bi-weekly	▪ ECO and Contractor
		12.14.10. Control and implement waste management plans provided by contractors. Ensure that relevant legislative requirements are respected.	▪ Control of waste management practices throughout construction phase	▪ Weekly or bi-weekly	▪ ECO and Contractor
		12.14.11. Normal sewage management practices should be implemented. These include ensuring that portable sanitation facilities are regularly emptied and the resulting sewage is contained and transported safely (by an appointed (suitable) service provider) for correct disposal at an appropriate, licenced facility. Proof of disposal (in the form of waste disposal slips or waybills) should be retained on file for auditing purposes. No waste water must be discharged to the natural environment. 12.14.12. As part of the Environmental Awareness Training, all construction personnel should be made aware of the sewage management practices.	▪ Monitor the placement of sanitation facilities during the construction phase via visual site inspections. Record non-compliance and incidents. ▪ Ensure that a suitable Contractor is appointed to remove and dispose the sewage at an appropriate, licenced facility. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Weekly ▪ During construction ▪ Weekly ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ ECO ▪ ECO ▪ ECO and Contractor ▪ ECO
12.15. Pollution of the surrounding	Reduce environmental impacts such as soil, surface	12.15.1. Hazardous waste (i.e. empty tins, oils, fuel spillages, spilled materials and chemicals etc.) generated during	▪ Monitor the strategic placement of the temporary,	▪ Once-off prior to the commencement of	▪ ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
environment as a result of the handling, temporary stockpiling and disposal of hazardous waste.	water and groundwater contamination as a result of incorrect storage, handling and disposal of hazardous waste.	the construction phase should be stockpiled temporarily (i.e. once-off) on site in a designated area in suitable waste collection bins and leak-proof storage skips (or similar). Waste collection bins and skips should be covered with suitable material, where appropriate. Hazardous waste must be stored separately from all other general waste. The designated stockpiling area must be labelled correctly.	designated waste stockpiling area at the site camp via visual inspections, and record and report any non-compliance. ▪ Monitor the temporary storage and handling of hazardous waste on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area).	the construction phase and as required as the construction process evolves. ▪ Daily	▪ ECO
		12.15.2. Should the on-site stockpiling of hazardous waste exceed 80 m^3, then the National Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) must be adhered to.	▪ Record the amount of hazardous waste that is temporarily stockpiled at the designated area on site, as well as the duration and record non-compliance and incidents. ▪ Monitor the duration and amounts of hazardous waste that is temporarily stockpiled at the designated area on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area). ▪ Audit compliance with the Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) if the storage amounts are exceeded (i.e. only if required).	▪ Daily ▪ Weekly ▪ Monthly	▪ Contractor ▪ ECO ▪ Project Owner.
		12.15.3. Ensure that the designated stockpiling area for hazardous waste (i.e. leak proof skips and waste	▪ Monitor the temporary, designated waste stockpiling	▪ Daily	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		collection bins) is inspected on a daily basis to verify its condition and integrity, particularly after rainfall events.	area at the site camp, as well as the handling of hazardous waste on site via site audits and record non-compliance and incidents.		
		12.15.4. Ensure that all hazardous waste is removed from the site on a regular basis, and safely disposed at an appropriate, licenced hazardous waste disposal facility by an approved waste management Contractor.	▪ Ensure that a suitable Waste Management Contractor is appointed to remove and dispose the hazardous waste at an appropriate, licenced hazardous waste disposal facility. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Once-off prior to the construction phase. ▪ Weekly	▪ Project Owner/ Contractor ▪ ECO
		12.15.5. Refer to the management actions in Section 12.14.5 and 12.14.7 of this Section of the EMPr and implement them for hazardous waste as well.	▪ Refer to the monitoring methodology in Section 12.15.5 and 12.15.7 of this Section of the EMPr and implement them for hazardous waste as well.	▪ Refer to the monitoring frequency in Section 12.15.5 and 12.15.7 of this Section of the EMPr and implement them for hazardous waste as well.	▪ Construction Manager/ECO
		12.15.6. All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of by appropriate means.	▪ Waste removal and disposal to be monitored throughout construction	▪ Weekly or bi-weekly	▪ ECO and Contractor
		12.15.7. Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.	▪ Waste removal and disposal to be monitored throughout construction	▪ Weekly or bi-weekly	▪ ECO and Contractor
		12.15.8. Waste water from construction and painting activities must be collected in a designated container and disposed of at a suitable disposal point off site.	▪ Waste removal and disposal to be monitored throughout construction	▪ Weekly or bi-weekly	▪ ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		12.15.9. Control and implement waste management plans provided by contractors. Ensure that relevant legislative requirements are respected.	▪ Control of waste management practices throughout construction phase	▪ Weekly or bi-weekly	▪ ECO and Contractor
C. OPERATIONAL PHASE					
C.1. HERITAGE IMPACTS (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
12.16. Destruction of archaeological remains as a result of the existence and maintenance of the proposed transmission line, on-site substation and service road.	Minimise the chances of significant archaeological sites and/or graves being disturbed.	12.16.1. Ensure that all vehicles remain on the service road at all times and ensure that no activity takes place outside of the authorized operational footprint.	▪ Carry out visual inspections to ensure strict control over the behaviour of operational staff in order to restrict activities to within demarcated areas.	▪ Monthly	▪ ECO
12.17. Destruction of palaeontological material as a result of the existence and maintenance of the proposed transmission line, on-site substation and service road.	Minimise the chances of significant fossil material or palaeontological sites being disturbed.	12.17.1. Ensure that all vehicles remain on the service road at all times and ensure that no activity takes place outside of the authorized operational footprint.	▪ Carry out visual inspections to ensure strict control over the behaviour of operational staff in order to restrict activities to within demarcated areas.	▪ Weekly	▪ ECO
C.2. AVIFAUNA IMPACTS					
12.18. Bird collision with transmission line.	To reduce the risk of bird collisions.	. 12.18.1. The transmission line should be fitted with the best available (at the time of construction) anti- bird collision line marking devices in order to make the overhead cables more visible to birds. More specifically:	▪ Verify that this is undertaken by reviewing the signed approved designs.	▪ Once-off	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		• Devices should be fitted on the entire length of the power line as collision risk is high all along the alignment for nomadic species such as Ludwig's Bustard. • Devices should be fitted on the earth wire/s. • On each span, the full span should be fitted with marking devices (i.e. not only the middle 60% as done previously by Eskom). Research has shown that collisions occur even close to pylons (Shaw, 2013). • Light and dark colour devices should be alternated so as to provide contrast against both dark and light backgrounds. • These devices should be fitted as soon as the earth wires are strung as collision risk begins immediately, not only once the line is commissioned and live. 12.18.2. The power line owner will be responsible for ensuring that the marking devices remain in place and effective on the power line for its' full lifespan. Any device failures must be rectified immediately by replacement with new devices.			
12.19. Electrocution of birds on transmission line and on-site substation.	Prevent any electrocutions of avifauna during the operation of the proposed transmission line.	12.19.1. The proposed tower/pylon structure has not been decided in detail. It will however be either concrete or steel monopole. It is critically important that sufficient clearance be allowed between phase-phase and phase-earth hardware on the structure. For large eagles these clearances should be a minimum of 1.8m. 12.19.2. In addition the standard Eskom Bird Perch must be installed on every pylon top to provide safe perching substrate for large birds well above the dangerous hardware.	▪ Ensure that this is taken into consideration during the planning and design phase.	▪ Once-off before construction.	▪ Project Owner, ECO and Contractor
12.20. Bird nesting on transmission line.	To reduce conflict with infrastructure management.	12.20.1. Nest management on a case by case under the supervision of an Ornithologist, and in conformance with all relevant national and provincial legislation.	▪ Nest relocation or removal should be done under permit from the provincial authority	▪ As required	▪ ECO

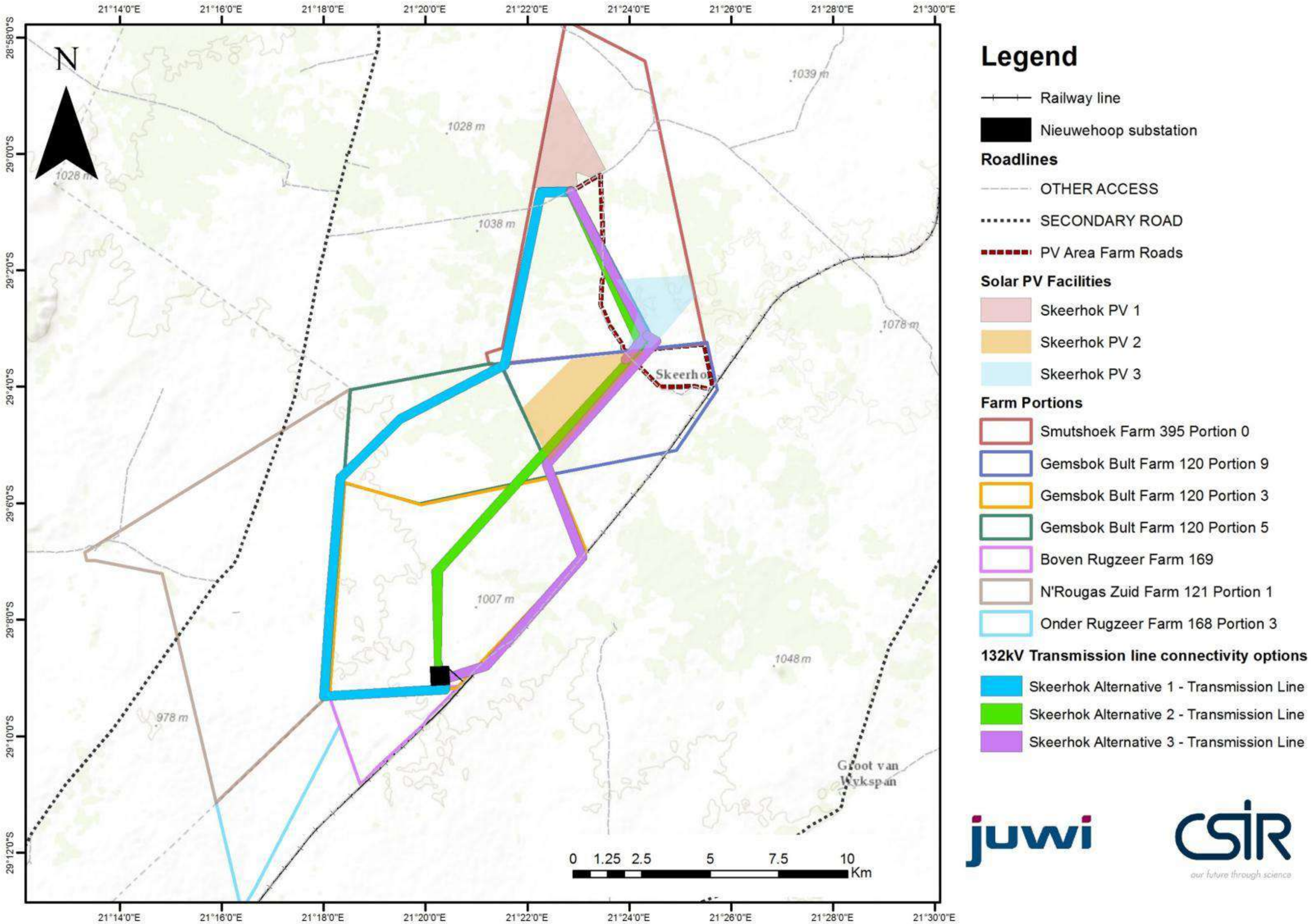
Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		12.20.2. The operational phase EMP must include provision for application to the provincial authority for permits for any necessary nest management.			
D. DECOMMISSIONING PHASE					
D.1. VISUAL IMPACTS					
12.21. Potential visual intrusion of decommissioning activities on existing views of sensitive visual receptors.	Prevent unnecessary visual clutter and focusing attention of surrounding visual receptors on the proposed development.	12.21.1. Disturbed and transformed areas should be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes. 12.21.2. Edges of re-vegetated areas should be feathered to reduce form and line contrasts with surrounding undisturbed landscape.	▪ Conduct visual inspections to ensure that landscaping is following the rehabilitation plan.	▪ Weekly	▪ ECO
		12.21.3. 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.	▪ Ensure that this is taken into consideration for the siting of the proposed site camp and laydown area. Carry out visual inspections to ensure the site camp and laydown area are demarcated clearly, and record and report any non-compliance. ▪ Carry out visual inspections to ensure strict control over the boundary of the site camp and laydown area in order to restrict activities to within demarcated areas.	▪ Weekly ▪ Weekly	▪ ECO ▪ ECO
		12.21.4. 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.	▪ Site visits to ensure that stockpiled topsoil (or appropriate soil for vegetation when stockpiled topsoil is exhausted) is used.	▪ Weekly	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		12.21.5. Night lighting of decommissioning sites should be minimised within requirements of safety and efficiency.	▪ Complaints about night lights should be investigated and documented in a register.	▪ Weekly or bi-weekly	▪ ECO
		12.21.6. Working at night should be avoided where possible.	▪ Operation times for decommissioning activities to be monitored and managed (as well as included in the tender contract).	▪ Weekly	▪ ECO
	Reduce the visual impact of decommissioning activities project wide	12.21.7. Maintain good housekeeping on site to avoid litter and minimize waste. 12.21.8. Monitor sites for strict adherence to demarcated boundaries and minimise areas of vegetation, ground and surface disturbance. Existing clearings should be used where possible and where required. 12.21.9. Monitor that existing roads will be used for access as far as possible. 12.21.10. Monitor that topsoil from the site is stripped, stockpiled, and stabilised before excavating earth. 12.21.11. Monitor that vegetation material from vegetation removal is mulched and spread over fresh soil disturbances to aid in the rehabilitation process. 12.21.12. Monitor adherence to lighting plan. 12.21.13. Monitor adherence to rehabilitation plan (i.e. where cleared areas are rehabilitated as soon as possible). 12.21.14. Monitor adherence to erosion control plan. 12.21.15. Monitor adherence to dust and fire control plans.	▪ Carry out site visits and inspections of the sites and ensure good housekeeping is maintained. Record and report any non-compliance. ▪ Carry out site visits and record and report any non-compliance. ▪ Carry out site visits and inspections of the access routes. Record and report any non-compliance. ▪ Carry out site visits and inspections of the topsoil management process. Record and report any non-compliance. ▪ Carry out site visits and inspections of the re-vegetation process. Record and report any non-compliance. ▪ Complaints about night lights should be investigated and documented in a register. Investigate any complaints about night lights and document it in a register.	▪ Daily ▪ Daily ▪ Daily ▪ Daily ▪ Daily ▪ Daily and as complaints arise. ▪ Daily ▪ Daily ▪ Daily	▪ Decommissioning Manager and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			▪ Visit sites requiring rehabilitation. ▪ Carry out site visits and record and report any non-compliance. ▪ Carry out site visits and record and report any non-compliance.		
D.2. HERITAGE IMPACTS (PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
12.22. Destruction of archaeological remains as a result of the removal of the proposed transmission line, on-site substation and rehabilitation of the service road.	Minimise the chances of significant archaeological sites and/or graves being disturbed.	12.22.1. Ensure that all vehicles remain on the service road at all times and ensure that no activity takes place outside of the decommissioning footprint.	▪ Carry out visual inspections to ensure strict control over the behaviour of decommissioning contractors and staff in order to restrict activities to within demarcated areas.	▪ Weekly	▪ ECO and Contractor
12.23. Alteration of the cultural landscape as a result of the removal of the proposed transmission line, on-site substation and rehabilitation of the service road.	Minimise the impact on the cultural landscape as a result of the presence of vehicles in the rural landscape during the decommissioning process.	12.23.1. Ensure that rehabilitation is effective and that no landscape scarring remains visible from long distances.	▪ Carry out visual inspections to ensure that the rehabilitation process is effective and record and report any non-compliance.	▪ Weekly	▪ ECO and Contractor
12.24. Destruction of palaeontological material as a result of the removal of the proposed transmission line, on-site substation	Minimise the chances of significant fossil material or palaeontological sites being disturbed.	12.24.1. Ensure that all vehicles remain on the service road at all times and ensure that no activity takes place outside of the decommissioning footprint.	▪ Carry out visual inspections to ensure strict control over the behaviour of decommissioning contractors and staff in order to restrict activities to within demarcated areas.	▪ Weekly	▪ ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
and rehabilitation of the service road.					
D.3. AVIFAUNA IMPACTS					
12.25. Disturbance of avifauna and displacement effects.	To reduce impact on avifauna.	12.25.1. A site specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to decommissioning, so as to ensure that no sensitive bird species have started breeding on or near site.	▪ If any such sites are found case specific mitigation measures will need to be designed. Appointment of Rehabilitation Specialist to develop a Habitat Restoration Plan and ensure that it is approved by auditing the final and signed report acceptance.	▪ Once-off prior to the start of decommissioning.	▪ ECO and Ornithologist
D.4. WASTE MANAGEMENT					
12.26. Generation of waste due to disassembly of the transmission line and associated structures.	Avoid substantial negative impacts at the decommissioning phase due to insufficient planning.	12.26.1. Suitable receptacles must be provided for the temporary storage of various waste types such as scrap metal and concrete, until it is removed to the nearest licensed landfill.	▪ Audit the implementation of mitigation measures recommended for the decommissioning phase.	▪ During the decommissioning phase	▪ ECO
		12.26.2. Waste separation is encouraged and therefore receptacles should be labelled to reflect the different waste types.	▪ Audit the implementation of mitigation measures recommended for the decommissioning phase.	▪ During the decommissioning phase	▪ ECO
		12.26.3. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.	▪ Audit the implementation of mitigation measures recommended for the decommissioning phase.	▪ During the decommissioning phase	▪ ECO

13 APPENDIX A – SITE LAYOUT MAP



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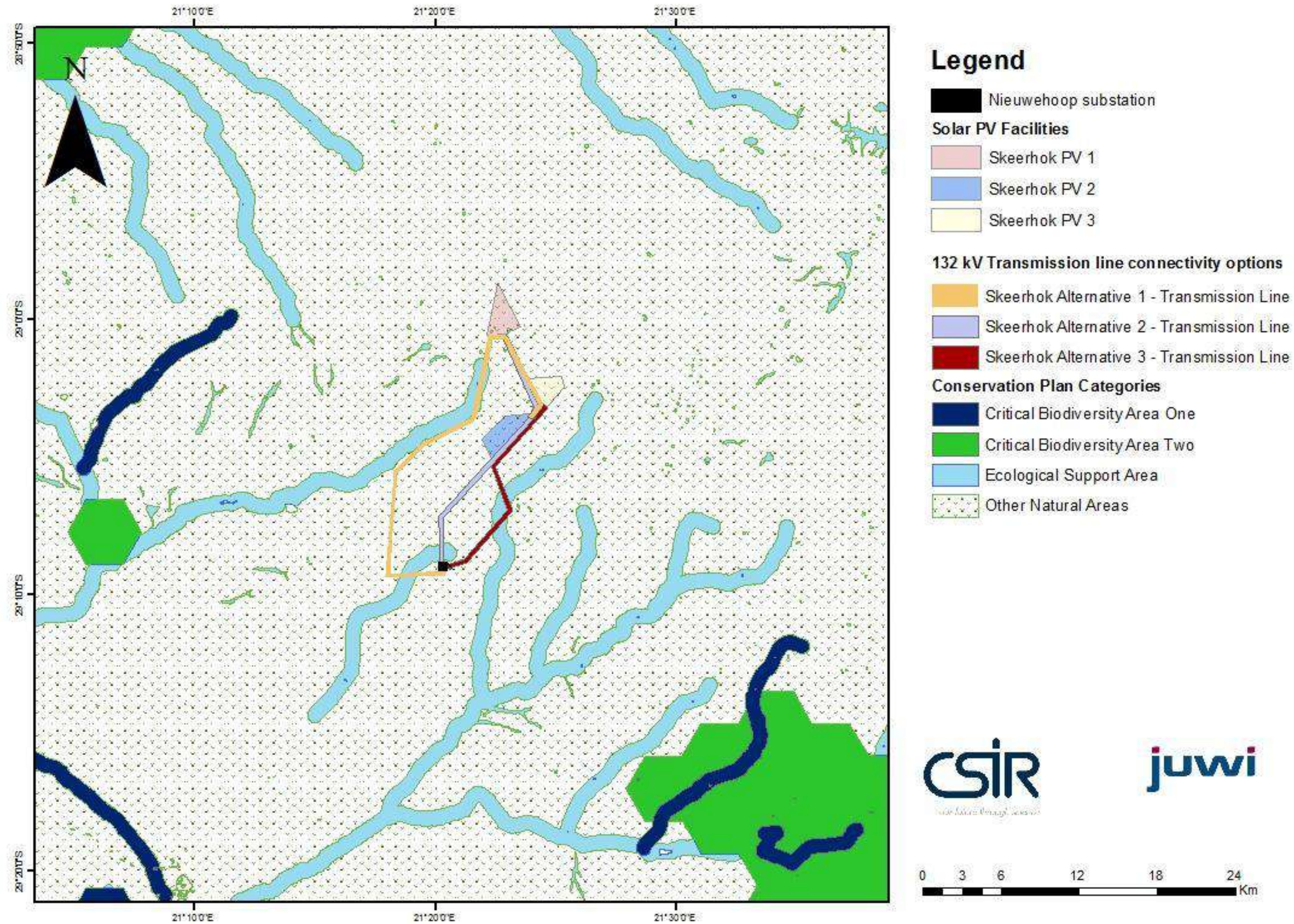
14 APPENDIX B – CONSERVATION PLAN AND ENVIRONMENTAL SENSITIVITY MAPS

Conservation Plan Map



Environmental Sensitivity Map