ABO WIND

Basic Assessment for the proposed development of a 115 MW Solar Photovoltaic Facility (Vryburg Solar 1) and associated electrical infrastructure near Vryburg in the North West Province:

DRAFT BASIC ASSESSMENT REPORT

Prepared for:
Vryburg Solar 1 (Pty) Ltd

Prepared by:
CSIR

August 2018

CSIR
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BASIC ASSESSMENT PROCESS

for the Proposed Development of the Vryburg Solar 1 and associated electrical infrastructure, Vryburg, North West Province

DRAFT BASIC ASSESSMENT REPORT

August 2018

Prepared for:
ABO Wind Renewable Energies (Pty) Ltd

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REPORT DETAILS

Title:	Basic Assessment Report for the Proposed Development of the Vryburg Solar 1 and associated electrical infrastructure, Vryburg, North West Province
Purpose of this report:	Basic Assessment Report for the Proposed Development of the Vryburg Solar 1 and associated electrical infrastructure, Vryburg, North West Province. 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 (15 August – 14 September 2018). 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.
Prepared for:	ABO Wind Renewable Energies (Pty) Ltd
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INTRODUCTION

ABO Wind Renewable Energies (Pty) Ltd (the project developer) with support from Veroniva (Pty) Ltd, are proposing to develop three 115 MW Solar Photovoltaic (PV) Facilities and associated electrical infrastructure (including a 132 kV distribution line from each PV Facility to the Eskom Mookodi Substation), near Vryburg in the North West Province. The proposed projects are referred to as "Vryburg Solar 1, Vryburg Solar 2, and Vryburg Solar 3".

This Basic Assessment (BA) Report has been compiled to provide an assessment on the **Vryburg Solar 1 and associated electrical infrastructure.** Since the three BA projects are located within the same geographical area and constitute the same type of activity (i.e. generation and distribution of electricity generated from a solar resource), an integrated Public Participation Process (PPP) is being undertaken for the proposed BA projects. However, separate BA Reports and specialist studies were compiled for each project. **These reports are available for public review from 15 August 2018- 14 September 2018.** All comments received during the 30-day review period are included in the finalised BA Report as applicable and where necessary. This 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).

PROJECT BA TEAM

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended, GN R326), the Applicant has appointed the CSIR to undertake the separate BA Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed development. The project team, including the relevant specialists, are indicated in the table below:

Name	Organisation	Role/ Specialist Study/Input
CSIR Project Team		
Surina Laurie	CSIR	EAP (*Pr. Sci. Nat*.)
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Rohaida Abed	CSIR	Technical Advisor and Quality Assurance
Babalwa Mqokeli	CSIR	Project Officer
Specialists		
Henry Holland	Private	Visual Impact Assessment
Dr Johan van Schalkwyk	Private	Heritage Impact Assessment
Dr Francois Durand	Skarab cc	Palaeontological Impact Assessment
Johann Lanz	Private	Soils and Agricultural Impact Assessment
Reinier Terblanche	Anthene Ecological cc	Ecological Impact Assessment (Terrestrial and Aquatic)
Chris van Rooyen	Chris van Rooyen Consulting	Avifauna Impact Assessment
Rudolph du Toit	Applied Science Associates (Pty) Ltd	Social Impact Assessment
Julian Conrad	GEOSS	Geohydrological Desktop Assessment
Surina Laurie Peer reviewed: Christo Bredenhann	CSIR WSP	Traffic Impact Statement

PROJECT DESCRIPTION

The Applicant is proposing to develop three solar PV facilities and associated electrical infrastructure near Vryburg in the North West Province. The facilities will be developed with a possible maximum installed capacity of 115 MW Direct Current (DC) each which produces about 100 MW Alternating Current (AC) of electricity from PV solar energy. Each solar PV facility will contain a on-site collector substation that will connect to the Eskom Mookodi Substation via an overhead 132 kV distribution line proposed within a Power Corridor.

The proposed project will take place on Portion 2 of Frankfort Farm 672 (Surveyor General 21-Digit (SG21) Code: T OIN00000000067200002), the access road on the Remainder of Frankfort Farm 672 (SG21 Code: TOIN00000000067200000) and the distribution line will traverse Portion 2 of Frankfort Farm 672, Portion 1 of Frankfurt Number Farm 672 (SG21 Code: TOIN00000000067200001) and Remainder of Rosendal Farm 673 (SG21 Code: TOIN00000000067300000).

The following project components are proposed as part of the project:

Project component	Specifications (dimensions, height and/or length)
Solar Facility	
Solar Field • PV Modules; • Single Axis Tracking structures (aligned north-south), Fixed Axis Tracking (aligned east-west), or Fixed Tilt Mounting Structure (all options will be considered in the design); • Solar module mounting structures comprised of galvanised steel and aluminium; and • Solar module substructure foundations will likely be drilled into the ground, filled and then posts fixed inside them. **Building Infrastructure** • Offices; • Operational and maintenance control centre; • Warehouse/workshop; • Ablution facilities; • 35-45 Central Inverter stations; • On-site substation building (including lighting conductor poles); and • Guard Houses. **Associated Infrastructure** • On-site substation; • Internal distribution lines of up to 33 kV; • Underground low voltage cables or cable trays; • Internal gravel roads; • Fencing; • Panel maintenance and cleaning area; • Stormwater channels • Temporary work area during the construction phase	300ha and 10m high(and up to 25m for the lightning conductor poles)
Power Corridor	
• 132 kV overhead distribution line (single or double circuit) to connect to the existing Eskom Mookodi substation	Located in a 300m wide corridor to be developed in a 31m wide servitude

Project component	Specifications (dimensions, height and/or length)
	8km in length and 30m high
• Gravel service road beneath the 132 kV power line	6m wide
• Associated electrical infrastructure at the Eskom Mookodi Substation (including but not limited to feeders and busbars at the Eskom Mookodi Substation)	Within the Mookodi Substation's footprint
Additional infrastructure	
• Access road to the site	6m wide

NEED FOR THE BA

The proposed projects fall entirely within the Renewable Energy Zone (REDZ) 6 (i.e. Vryburg REDZ), that was Gazetted in February 2018 by the Minister of Environmental Affairs. The REDZs represent areas where wind and solar photovoltaic development is being incentivised from resource, socio-economic and environmental perspectives. The Wind and Solar Strategic Environmental Assessment (SEA) identified REDZs in five provinces, namely the Eastern Cape, Western Cape, Northern Cape, Free State and North West, as defined in Notice No. 114 – Notice for Renewable Energy Development Activities procedure to apply for Environmental Authorisation (EA) - in Government Gazette No 41445 of 16 February 2018. Wind and solar PV projects located within a REDZs are subject to a Basic Assessment (BA) and reduced decision-making period by the authorities.

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

IMPACT ASSESSMENT

Seven specialist studies were carried out as part of the BA Process. In addition, two specialist inputs were obtained on specific issues, namely, geohydrology (to confirm the presence of groundwater on site) and traffic (to understand the traffic generation implications of the development of the proposed project.

A summary of the specialist studies are outlined below.

Visual Impact Assessment

The landscape surrounding the proposed site has a peri-urban character which is typified by a mixture of urban and rural elements such as buildings, electrical infrastructure, commercial farming, as well as large scale developments which do not fit into an urban landscape. The landscape is also transitional and changes as the town expands.

Visual intrusion on the existing views of highly sensitive visual receptors by the introduction of a solar energy facility into the landscape will be moderate since the development will be noticed but the quality of views is already compromised by existing structures associated with an urban and peri-urban landscape. The significance of this visual impact is expected to be 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 significance of the impact of night lighting of the facility on the nightscape (during the operational phase) is likely to be moderate since the nightscape is relatively dark and new lights will be introduced. Mitigation measures will reduce the potential for light pollution and glare, and should lower the significance of the potential impact to low.

The significance of cumulative impacts on the surrounding landscape character is very low since the landscape character most likely to be affected is peri-urban which should be able to absorb the proposed developments without changing significantly. The significance of the cumulative visual impact on sensitive visual receptors is low due to the limited potential for scenic or highly valued views in the region.

It is the opinion of the visual specialist that this project should be authorised with adherence to mitigation measures as set out in this report, since the significance of the overall visual impact of the project is expected to be low.

Heritage Impact Assessment

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) occupation and a much later colonial (farmer) component. The second component is an urban one consisting of a number of smaller towns, most of which developed during the last 150 years or less.

Identified sites:

- Stone tools were identified to occur on a low ridge to the east of the substation. It mostly dates to the Middle Stone Age, although some smaller ones might date to the Later Stone Age. Cores, tools and flakes (debitage) were identified, indicating that the tools were manufactured on site.
- Originally some graves (c. 6) occurred west of the substation. They were very old and only marked with low stone cairns. As they were located next to the laydown area for the construction of the substation, they were fenced off. They could not be located during the current site visit (possibly due to incorrect coordinates). It is also possible that they were relocated during the construction activities.

It is calculated that the potential impact of the proposed development on these sites would be low. Therefore, no heritage permits are required, unless indicated otherwise by SAHRA.

From a heritage point of view, it is recommended that the development be allowed to continue on acceptance of the mitigation measures included in the assessment.

Palaeontological Impact Assessment

The proposed development of the PV facility will take place in an area which is considered to have mostly a High Palaeontological Sensitivity for the PV facility site, and areas of Medium, High and Very High Palaeontological Sensitivity within the corridor for the distribution power lines. A Chance Find Procedure should be followed if fossils are uncovered during construction in this section.

The overall impact to palaeontology, following the implementation of the required mitigation measures is considered to be moderate for the eastern part of the Power corridor during the construction, very low for any impact to fossils during the operational and decommissioning phases and a moderate cumulative impact.

Soils and Agricultural Impact Assessment

All impacts were assessed as having low or very low significance. Cumulative impact is also assessed as low, predominantly because of the low agricultural potential of the area. The development is located within a REDZ which has been declared precisely because it is an environment that can

accommodate numerous renewable energy developments without exceeding acceptable levels of agricultural land use loss.

Due to the low agricultural potential of the site, and the consequent low agricultural impact, there are no restrictions relating to agriculture which preclude authorisation of the proposed development and therefore, from an agricultural impact point of view, the development should be authorised.

Ecological Impact Assessment (Terrestrial and Aquatic)

The footprint proposed for the development is not part of a threatened ecosystem or freshwater ecosystem priority area. Presence of resident Threatened or Near Threatened plants, mammals, reptiles, amphibians and invertebrates at the site is unlikely. A Protected tree species, which is not Threatened but listed as Declining, *Vachellia erioloba* (Camel Thorn) occurs in relatively low numbers (average 0,08 trees/ha) at the site. Camel Thorn forests or any large Camel Thorn individuals of note are absent at the site. Overall the sensitivity at the site appears to be moderate apart from a small wetland depression which with its buffer zone will be regarded as high sensitivity and accordingly is set aside as a no-go zone for any developments. **Overall negative impacts on habitat loss, sensitive species and connectivity appear to be moderate and within scope of mitigations. In cases such as the study where proposed footprints are relatively small parts of fairly similar habitat in the larger area, there is no distinct reason why the proposed developments cannot take place and reprieve pressure** to use other energy sources which are perhaps more detrimental to sensitive environments. A key issue, if the development is approved, is to avoid the establishment of alien invasive plant species in particular Declared Weeds such as Prosopis (Mesquite).

Avifauna Impact Assessment

The overall negative impact to avifauna, following the implementation of the required mitigation measures are considered to be low to very low. The proposed facility should have a low to very low impact on avifauna, provided the management recommendations listed in this report and the EMPr are strictly implemented. No fatal flaws were identified from an avifaunal perspective – **it is therefore recommended that the project is authorised to go ahead.**

Social Impact Assessment

The overall social impact, post mitigation, is considered to be low (negative) during the contruction and decommissioning phases and very low (positive) during the operational phase. The cumulative impacts identified for the proposed project revolve around the social change process likely to occur should more than one renewable energy project be developed within the proposed project area. The primary concern in this regard is the cumulative change that existing social structures might be exposed to due to influxes of large construction teams and job seekers, as well as the cumulative impact such influxes might have on the local HIV/AIDS infection rate. Conversely, the key positive cumulative impact is the combined benefit likely to vest in the local community as a result of the community trusts of various renewable energy projects being developed in the area.

In light of the overall low significance (post mitigation) rating of identified negative impacts, and having regard to the nature of such impacts, and the status quo socio-economic conditions present in the Naledi Local Municipality; the socio-economic benefits of the project appear to outweigh its impacts. Should the mitigation measures be implemented as prescribed in this assessment; it is recommended that the proposed development be awarded environmental authorisation.

EAP'S RECOMMENDATION

No negative impacts have been identified within this BA that, in the opinion of the EAP 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.

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).

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.

Based on the findings of the specialist studies, the proposed project is considered to have an overall low negative environmental impact and an overall low 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 if the recommended mitigation measures are implemented. 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 Vryburg region. 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.

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	**Yes**	**Section A of the report includes the Introduction, legislative review, alternatives assessment and needs and desirability** **Section D includes a summary of the specialist studies and associated impact assessments undertaken**

Appendix 1	YES / NO	SECTION IN BA REPORT
(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.		
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**
(b) the location of the activity, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	**Yes**	**Section A.3.2**
(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.3.2**
(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.8**
(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.8**

Appendix 1	YES / NO	SECTION IN BA REPORT
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.10**
(g) a motivation for the preferred site, activity and technology alternative;	**Yes**	**Section A.9**
(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**	**Section A.9**
(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**	**Section C**
(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**	**Section C (to be updated following review of draft report)**
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**Yes**	**Section A.9**
(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**	**Section A.9**
(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.9**
(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	**Yes**	**Section A.9**

Appendix 1	YES / NO	SECTION IN BA REPORT
risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;		
(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	**Yes**	**Section D**
(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**
(I) 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 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**
(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 E**
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	**Yes**	**Please refer to each specialist study included in Appendix D**
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	**Yes**	**Section E**
(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;	**N/A**	
(r) an undertaking under oath or affirmation by the EAP in relation to -	**Yes**	**Appendix H**

Appendix 1	YES / NO	SECTION IN BA REPORT
(i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and		
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	**X**	
(t) any specific information that may be required by the competent authority; and	**X**	
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	**X**	
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**	

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DRAFT BASIC ASSESSMENT REPORT

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CONTENTS

SECTION A: INTRODUCTION, PROJECT DESCRIPTION AND LEGISLATIVE REVIEW

A.1 Introduction

ABO Wind Renewable Energies (Pty) Ltd (the project developers) with support from Veroniva (Pty) Ltd, are proposing to develop three 115 MW Solar Photovoltaic (PV) Facilities and associated electrical infrastructure (including a 132 kV distribution line from each PV Facility to the Eskom Mookodi Substation), near Vryburg in the North West Province. The proposed projects are referred to as "Vryburg Solar 1, Vryburg Solar 2, and Vryburg Solar 3".

The proposed projects fall entirely within the Renewable Energy Zone (REDZ) 6 (i.e. Vryburg REDZ), that was Gazetted in February 2018 by the Minister of Environmental Affairs. In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA EIA Regulations promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R324 on 7 April 2017, wind and solar PV projects located within a REDZs are subject to a Basic Assessment (BA) and reduced decision-making period by the authorities. A Basic Assessment (BA) Process in terms of Appendix 1 of the Environmental Impact Assessment (EIA) Regulations (2014, as amended) has therefore been undertaken for the proposed projects. This BA Report has been compiled to provide an assessment on the **Vryburg Solar 1 and associated electrical infrastructure.**

Since the three BA projects are located within the same geographical area and constitute the same type of activity (i.e. generation and distribution of electricity generated from a solar resource), an integrated Public Participation Process (PPP) is being undertaken for the proposed BA projects. However, separate BA Reports and specialist studies were compiled for each project. **These reports are available for public review from 15 August 2018- 14 September 2018.**

A.2 Project team

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended, GN R326), the Applicant has appointed the CSIR to undertake the separate BA Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed development.

The BA is being managed by the Environmental Assessment Practitioner (EAP), Surina Laurie. Surina has more than 7 years of experience in environmental assessment and management and is a Senior EAP in the Environmental Management Services (EMS) group of the CSIR with a Masters degree in Environmental Management from the University of Stellenbosch and a Certificate in Environmental Economics from the University of London. She is a Registered Professional Natural Scientist (Registration Number: 400033/15) with the South African Council for Natural Scientific Professions (SACNASP). Surina has experience in the management and integration of various types of environmental assessments in South Africa for various sectors, including renewable energy, industry and tourism. She has also been part of advisory teams advising on financing, real estate, corporate, construction, environmental and regulatory aspects for various sponsors, developers and lenders during the DOE's first and second bidding windows in 2012 and 2013. Surina has undertaken several

Solar Photovoltaic (PV) and Wind Energy Environmental Assessments (i.e. EIAs, BAs, and Amendment and Appeal Processes) in the Northern Cape, Western Cape and Free State.

Surina is supported by various project members within CSIR and specialists. The team which is involved in this BA Process is listed in Table A.1 below.

Table A.1. The BA Team

Name	Organisation	Role/ Specialist Study
CSIR Project Team		
Surina Laurie	CSIR	EAP (*Pr. Sci. Nat*.)
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Rohaida Abed	CSIR	Technical Advisor and Quality Assurance
Babalwa Mqokeli	CSIR	Project Officer
Specialists		
Henry Holland	Private	Visual Impact Assessment
Dr Johan van Schalkwyk	Private	Heritage Impact Assessment
Dr Francois Durand	Skarab cc	Palaeontological Impact Assessment
Johann Lanz	Private	Soils and Agricultural Impact Assessment
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Chris van Rooyen	Chris van Rooyen Consulting	Avifauna Impact Assessment
Rudolph du Toit	Applied Science Associates (Pty) Ltd	Social Impact Assessment
Julian Conrad	GEOSS	Geohydrological Desktop Assessment
Surina Laurie Peer reviewed: Christo Bredenhann	CSIR WSP	Traffic Impact Statement

A.3 Project overview

A.3.1 General overview

As noted above, the proposed projects fall entirely within the Renewable Energy Zone (REDZ) 6 (i.e. Vryburg REDZ), that was Gazetted in February 2018 by the Minister of Environmental Affairs (Figure A.1). The REDZs represent areas where wind and solar photovoltaic development is being incentivised from resource, socio-economic and environmental perspectives. The Wind and Solar Strategic Environmental Assessment (SEA) identified REDZs in five provinces, namely the Eastern Cape, Western Cape, Northern Cape, Free State and North West, as defined in Notice No. 114 – Notice for Renewable Energy Development Activities procedure to apply for Environmental Authorisation (EA) - in Government Gazette No 41445 of 16 February 2018.

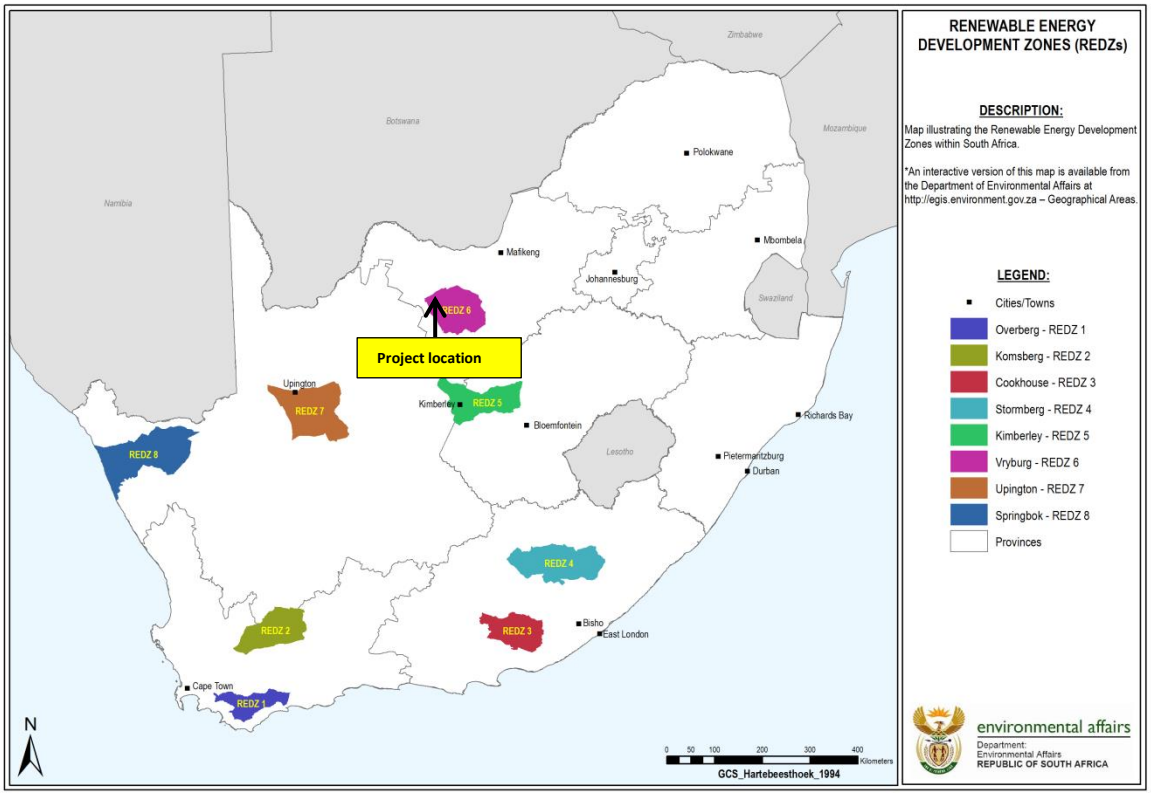

Figure A.1. Projects location in relation to the REDZ 6

The Applicant is proposing to develop three solar PV facilities and associated electrical infrastructure near Vryburg in the North West Province. The facilities will be developed with a possible maximum installed capacity of 115 MW Direct Current (DC) each which produces about 100 MW Alternating Current (AC) of electricity from PV solar energy. Each solar PV facility will contain a on-site collector substation that will connect to the Eskom Mookodi Substation via an overhead 132 kV distribution line.

The locality of the three projects, routing of the distribution lines and the Power Corridor is shown Figure A.2 below. The farm portions affected by the proposed developments are:

- Portion 1 of Retreat Number Farm 671
- Portion 0 (Remaining Extent) of Frankfort Farm 672
- Portion 1 of Frankfort Number Farm 672 (“Edin”)
- Portion 2 of Frankfort Number Farm 672 (“Erica’)
- Remainder of Rosendal Farm 673

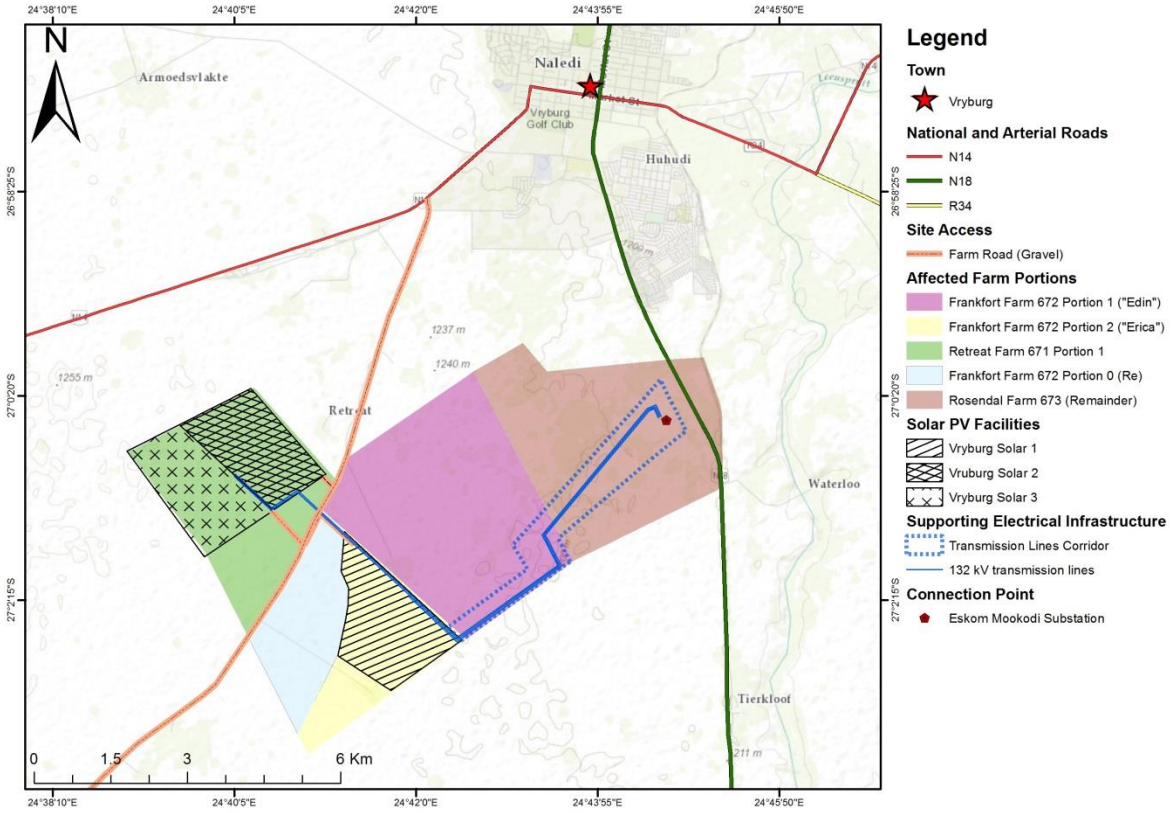

Figure A.2. Projects locality map

A.3.2 Vryburg Solar 1 project

The proposed Vryburg Solar 1 project and associated distribution line will take place on:

- Portion 2 of Frankfort Farm 672 (Surveyor General 21-Digit (SG21) Code: TOIN00000000067200002);
- Remainder of Frankfort Farm 672 (SG21 Code: TOIN00000000067200000);
- Portion 1 of Frankfurt Number Farm 672 (SG21 Code: TOIN00000000067200001); and
- The Remainder of Rosendal Farm 673 (SG21 Code: TOIN00000000067300000).

The co-ordinates of the boundary/corner points of the project site are detailed in Table A.2 below. The co-ordinates of the approximate mid-point of the preferred project site are 27°2'34.02"S and 24°41'41.44"E.

Table A.2. Co-ordinates of the Corner Points of the project site and line routing

Point	Latitude	Longitude	Latitude	Longitude
	Solar Field		Distribution line	
A	27° 1'36.00"S	24°41'14.61"E	27° 2'12.17"S	24°41'54.15"E
B	27° 2'37.59"S	24°42'28.79"E	27° 2'38.42"S	24°42'25.85"E
C	27° 3'5.85"S	24°41'44.01"E	27° 1'56.03"S	24°43'32.09"E
D	27° 2'46.39"S	24°41'10.37"E	27° 1'38.40"S	24°43'22.03"E
E	27° 2'17.89"S	24°41'17.08"E	27° 0'27.63"S	24°44'23.26"E
F	27° 2'8.49"S	24°41'17.22"E	27° 0'25.36"S	24°44'29.81"E
G	27° 1'58.51"S	24°41'12.45"E	27° 0'32.20"S	24°44'33.49"E

A.4 Project description

The proposed solar facility will consist of the following components listed below in Table A.3. The technical information on these components are also discussed within this sub-section. It is however important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of an EA, should such an authorisation be granted for the proposed project) but that the information provided below is seen as the worst-case scenario for the project.

Table A.3. Project components and respective specifications

Project component	Specifications (dimensions, height and/or length)
Solar Facility	
Solar Field • PV Modules; • Single Axis Tracking structures (aligned north-south), Fixed Axis Tracking (aligned east-west), or Fixed Tilt Mounting Structure (all options will be considered in the design); • Solar module mounting structures comprised of galvanised steel and aluminium; and • Solar module substructure foundations will likely be drilled into the ground, filled and then posts fixed inside them. **Building Infrastructure** o Offices; o Operational and maintenance control centre; o Warehouse/workshop; o Ablution facilities; o 35-45 Central Inverter stations; o On-site substation building (including lighting conductor poles); and o Guard Houses.	300ha and 10m high(and up to 25m for the lightning conductor poles)

Associated Infrastructure ○ On-site substation; ○ Internal distribution lines of up to 33 kV; ○ Underground low voltage cables or cable trays; ○ Internal gravel roads; ○ Fencing; ○ Panel maintenance and cleaning area; ○ Stormwater channels ○ Temporary work area during the construction phase	
Electrical infrastructure	
• 132 kV overhead distribution line (single or double circuit) to connect to the existing Eskom Mookodi substation	To be developed in a 31m wide servitude 8km in length and 30m high
• Gravel service road beneath the 132 kV power line	6m wide
• Associated electrical infrastructure at the Eskom Mookodi Substation (including but not limited to feeders and busbars at the Eskom Mookodi Substation)	Within the Mookodi Substation's footprint
Additional infrastructure	
• Access road to the site	6m wide

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

A.4.1 Solar facility

As noted above, the total footprint of the solar facility is estimated to be approximately 300 hectares (ha). This will include the development of the solar field and building and associated infrastructure, as detailed in Table A.**3**. The exact number of solar panels arrays, confirmation of the foundation type and detailed design will follow as the development progresses but a preliminary site layout plan has been included in Section D and Appendix C of this report.

- **PV Modules**

The smallest unit of a PV installation is a cell. A number of cells form a module, and finally a number of modules form the arrays (Figure A.3).

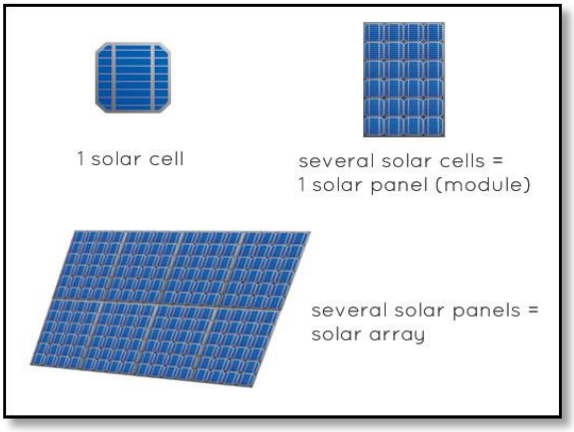

Figure A.3. Components of the Proposed PV Installation

Modules are arranged into strings that form the solar field. Modules are arranged in section sizes of approximately 40 x 5 m called tables and are installed on racks which are made of aluminium or galvanised steel. The arrays and racks will be founded into the ground through either steel or concrete towers (which will be confirmed during the detailed engineering phase), as shown in Figure A.4. The entire structure is not expected to exceed 10 m in height (measured from the ground), which is considered the worst-case. This system may be fixed, or may track the movement of the sun (either by adopting Fixed Axis Tracking, Single Axis Tracking, Dual Axis Tracking or Fixed Tilt Mounting Structures as explained above). All the arrays will be wired to converter/inverter stations that converts DC into AC.

Figure A.4. PV Technology

- **Building Infrastructure**

The buildings are required to support the functioning of the facility and to provide services to personnel that will operate and maintain the facility. The solar field will require:

- Offices (maximum height 7m and footprint 1000 m^2);
- Operational and maintenance control centre (maximum height 7m and footprint 500 m^2);
- Warehouse/workshop (maximum height 7m and footprint 500 m^2);
- Ablution facilities (maximum height 7m and footprint 50 m^2);
- 35-45 Central Inverter stations (height from 2.5m to 7m and footprint 3300 m^2);

- On-site substation building (footprint of up to 20 000 m^2, height up to 15m for the structures and up to 25m for the lightning conductor poles; and
- Guard Houses (height 3m, footprint 40 m^2), possibly including a guard tower up to 10m in height.

- **Associated infrastructure**

Associated infrastructure that will be constructed within the Solar Field's footprint include:

- On-site substation (20 ha);
- Internal distribution lines of up to 33 kV;
- Underground low voltage cables or cable trays ;
- Internal gravel roads (4m wide);
- Fencing (2,4m high);
- Panel maintenance and cleaning area;
- Stormwater channels; and
- Temporary work area during the construction phase (5 ha).

Electrical infrastructure

As mentioned above, the solar arrays are typically connected to each other in strings, which are in turn connected to inverters that convert DC to AC. The strings will be connected to the inverter stations by low voltage underground (internal) DC cables or cable trays. Power from the converter/inverter station will be collected in medium voltage transformers through underground (internal) AC cables, cable trays or AC cables which are pole-mounted depending on voltage level and site conditions.

The inverter stations will in turn be connected to the proposed on-site substation, via medium voltage (33 kV) internal underground cables, which will increase the voltage and transmit the power produced via a 132 kV overhead distribution line into the national grid system via the Eskom Mookodi Substation.

Roads

Internal roads extending approximately 4 m wide will be constructed within the project footprint of the proposed PV plant. A perimeter road will also be constructed along the boundary of the proposed PV plant, which will extend approximately 2.5 m wide.

Panel maintenance and cleaning area

During the operational phase, the accumulation of dust on solar panels generally negatively influences the productivity of solar facilities. As such the panels require regular cleaning.

Stormwater Channels and Water Pipelines

Stormwater channels will be constructed on site to ensure that stormwater run-off from site is appropriately managed. Water from these channels will not contain any chemicals or hazardous substances, and will be released into the surrounding environment based on the natural drainage contours.

ABO Wind has confirmed that a stormwater analysis is being done for the site to inform the layout and design. In particular, it is important to check that the on-site substation is not located in an area of stormwater accumulation, as this would disrupt substation operation. A storm water management plan will be implemented during the construction and operation of the facility. The plan will ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan includes 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 promotes the dissipation of storm water run-off. These actions are incorporated into the EMPr.

A.4.2 Electrical infrastructure

The on-site substation is proposed to be connected via an 132 kV overhead (single or double circuit) distribution line to the Mookodi substation. The electrical infrastructure includes:

- 132 kV overhead distribution line (single or double circuit) to connect to the existing Eskom Mookodi substation;
- Gravel service road of up to 6m width beneath the 132 kV power line; and
- Associated electrical infrastructure at the Eskom Mookodi Substation (including but not limited to feeders and busbars at the Eskom Mookodi Substation).

An overhead 132 kV distribution will be constructed from the solar facility and is expected to extend approximately 8 km in length (between the proposed on-site substation and the Eskom Mookidi Substation), with steel or concrete tower structures (extending approximately 22.5 to 30 m in height). The line will be constructed within a 31m servitude on the farm properties affected by the distribution line.

Each of the three solar PV facilities has a 132 kV distribution line that will connect the proposed facility to the Mookodi Substation. This will ensure that each project (should it receive positive EA), is a viable stand-alone project. This approach is based on the worst case scenario, which has been assessed in this BA Process. It has also been structured accordingly to meet the requirements of the Renewable Energy Independent Power Producer Programme (REI4P) which require separate EAs. However, in terms of the best case scenario, if all three solar PV facilities receive positive EAs, as well as preferred bidder status in terms of the REI4P, and should all three solar PV facilities materialise from a construction perspective, then ABO Wind will not construct three separate distribution lines (and service roads) connecting each solar facility to the Mookodi Substation. Instead, ABO Wind will then opt to construct a single 132 kV distribution line from the proposed facilities to the Mookodi Substation.

A.4.3 Additional infrastructure

The proposed project site can be accessed via the Reivilo road off the N14 from Vryburg to Kuruman. An existing gravel road will be utilised from the Reivilo road to access the site. Access roads from the gravel road to the sites would be constructed mainly by improving the existing farm roads. The improved roads would be up to 6 meters in width.

In terms of traffic generation, a Traffic Impact Statement has included in Section D report. The types of materials that will need to be transported to site during the construction phase include the following:

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.

During the construction phase, approximately 800 x 40ft containers resulting in more or less 450 double axel trucks will come to site during the construction phase (i.e. over a period 12 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. Municipal water will be trucked to site twice per day (estimated at 2 trucks per day). In terms of workers accessing the site, the worst case estimate is that the 300 workers (50 skilled and 250 unskilled, the maximum estimate) will need to come to site on a daily basis. It is however highly unlikely that all 300 workers would need to be on site simultaneously. It is assumed that workers would commute using both personal vehicles and buses. This would amount to an estimated 6 buses and 15 personal vehicles per day to and from site once in the morning and once in the afternoon. It is anticipated that 87 trips (in and out) will be made per day during the construction phase.

During the operational phase, fewer materials will need to be transported to site. Trips will also be generated for the transportation of staff during the construction and operational phases. 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 (if water is sourced from the municipality), the current estimate is that 2 trips per month will be made by a water truck. It is anticipated that 10 trips (in and out) will be made per day.

A.5 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 (summarised in Section D and full studies included Appendix D of this BA Report).

A.5.1 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 REI4P (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 12 to 14 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;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation;
- Creation of employment opportunities;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the solar field, 132 kV distribution line and additional infrastructure.

A.5.2 Operational Phase

The following activities will occur during the operational phase:

- The transmission of electricity generated from the proposed solar facility to the Mookodi Substation via an overhead 132 kV distribution line; and
- Maintenance of the solar field and distribution line.

During the life span of the project (approximately 20 years), on-going maintenance will be required on a scheduled basis.

A.5.3 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 solar facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and the site will be rehabilitated and returned to its pre-construction state.

A.6 Socio-economic

A.6.1 Employment during construction

It is estimated that for each project between 40 and 50 skilled and 200 and 250 unskilled employment opportunities are to be created during the construction phase of the project.

Employment opportunities created during the 14 month construction phase equates to approximately 1 260 – 2 100 person months (for skilled opportunities) and approximately 5 600 - 6 400 person months (for unskilled opportunities) per project. Employment opportunities created during the construction phase of each distribution line project are estimated to range between 1 560 and 1 820 person months. It should be noted that the employment opportunities provided in this report are estimates and is dependent on the final engineering design and the REI4P Request for Proposal provisions at that point in time.

A.6.2 Employment during operations

Approximately 20 skilled and 40 unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility. These unskilled jobs will be linked to services such as panel cleaning, maintenance and security.

Employment opportunities to be created during the operational phase equate to approximately 4 800 person months (for skilled opportunities) and approximately 9 600 person months (for unskilled opportunities) per project (i.e. three 100-115 MW PV projects in total) over the 20 year plant lifespan.

A.6.3 Socio-economic investment and development

The Applicant will ultimately own the project, if successful, and will compile an Economic Development Plan which will be compliant with REI4P requirements and will inter alia set out to achieve the following:

- Create a local community trust or similar (as required by REI4P) which has an equity share in the project life to benefit historically disadvantaged communities;
- Initiate a skills development and training strategy to facilitate future employment from the local community; and
- Give preference to local suppliers for the construction of the facility.
- Support local community upliftment projects and entrepreneurship through socio-economic and enterprise development initiatives.

A.7 Service Provision: Water, Sewage, Waste and Electricity Requirements

ABO Wind will consult with the municipality in order to confirm the supply of services (in terms of water, waste removal, sewage and electricity) for the proposed project. The municipality will be consulted as part of the 30-day public review period of this report and the confirmation services provision will be included in the Final BA Report. However, it must be noted that should the municipality not have adequate capacity for the handling of waste, provision of water and sewage handling provisions available; then ABO Wind will make use of private contractors to ensure that the services are provided. ABO Wind 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).

An outline of the services that will be required are discussed below.

A.7.1 Water Usage

During the construction phase, water will be delivered once every two days using water trucks. The current proposal is that water will be sourced from the municipality and stored in water tanks on site. The capacity of the tanks is estimated to be approximately 10 m^3. In the first 3 months of construction it is estimated that approximately 140 m^3 per day of water will be used for the road upgrades and/or widening. The estimated maximum amount of water required during construction is 10 000 m^3 per year.

During the operational phase, it is proposed that panel cleaning will take place quarterly; however this may be revised should the site conditions warrant more frequent cleaning. It is estimated that the panel washing process will require approximately 5 million to 8 million litres of water per year during operations, to be sourced from municipality and stored on site. If water is not available from the municipality. Alternative sources such as groundwater may be utilised as a secondary option and a desktop Geohydrological Assessment was undertaken to determine whether groundwater can be used by the solar facility. This assessment is included in Appendix J of the report. The assessment found that there are boreholes with predominantly low yields around the project site (not within its boundary) that can potentially be used. Should the municipality not be able to provide water to the project, then the use of boreholes will be investigated further.

A.7.2 Sewage or Liquid Effluent

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

A.7.3 Solid Waste Generation

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

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

Solid waste will be managed via the EMPr (Appendix G of the BA Report), which incorporates waste management principles. General waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed, emptied into trucks, and disposed at a registered

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

A.7.4 Electricity Requirements

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

The project will require sewage services during the construction and operational phases. Low volumes of sewage or liquid effluent are estimated during both phases. Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e. chemical toilets) will be used during the construction and operational phases, which will be regularly serviced and emptied by a suitable (private) contractor on a weekly 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.

In terms of waste generation, general waste generated during the construction and operational phases will be temporarily and safely stored in a skip on site and periodically removed on a regular basis to a licenced waste disposal facility by a suitable contractor. During the construction phase an estimated amount of less than 5 m^3 non-hazardous solid construction waste is likely to be produced per month. In addition, a skip will be placed on site and any damaged or broken PV panels (i.e. those not returned to the supplier) will be stored in this skip. A specialist waste management company will be commissioned to manage and dispose of this waste. During the operational phase after construction, the facility will produce minor amounts of general waste (as a result of the offices).

A.8 Applicable legislation

The scope and content of this BA Report has been informed by the following legislation, guidelines and information series documents (Table A.4). It is important to note that the specialist studies included in Appendix D of this BA Report also include a description of the relevant applicable legislation.

Table A.4. Legislation Applicable to the Proposed Project

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
NEMA (Act 107 of 1998, as amended)	The proposed project will require the implementation of appropriate environmental management practices.	National DEA	19 November 1998
NEMA EIA Regulations published in GN R982, R983, R984 and R985, and as amended on 7 April 2017 in GN R326, R327, R325 and R324	These Regulations provide the procedures that need to be followed for the BA Process.	National DEA	8 December 2014
NEMA EIA Regulations published in Government Notice R983 and R985, and as amended on 7 April 2017 in GN R327 and R324	These Regulations contain the relevant listed activities that are triggered, thus requiring a BA. Please refer to Section A (7) of this BA Report for the complete list of listed activities.	National DEA	8 December 2014 and amended on 7 April 2017
Section 24(5)a and (b) of the NEMA, of the procedure to be followed in applying for EA for large scale wind and solar PV energy development activities identified in terms of Section 24(2)(1) of the NEMA when occurring in geographical areas of strategic importance	This project falls within REDZ 6 and a BA process is therefore required for this project	National DEA	16 February 2018
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
National Forests Act (Act 84 of 1998)	A Protected Tree species, *Vachellia erioloba* (Camel Thorn) (also listed as Declining) is found at the site.	DAFF	1998

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
	Protected Tree species are listed under the National Forests Act No. 84 of 1998. In terms of a part of section 15(1) of Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister. The Applicant for the PV project has commissioned the specialist to obtain this permit for the Camel Thorn trees, and this application is currently in progress.		
National Water Act (NWA) (Act 36 of 1998)	Wetlands or riparian zones is excluded from developments unless these developments are authorised by the Department of Water and Sanitation for water uses which are defined in Section 21(c) or Section 21 (i). General Authorisation apply in terms of Section 39 of the National Water Act (Act No. 365 of 1998) for water uses as defined in Section 21(c) or Section 21(i) (Department of Water and Sanitation Notice 509 of 2016). This general authorisation replaces the need for a water user to apply for a licence in terms of the National Water Act (Act 36 0f 1998) provided that the water use is within limits and conditions of this General Authorisation. A General Authorisation does not apply to any development within a distance of 500 m upstream or downstream from the boundary (outer edge) of any wetland (General Notice 1199, Government Gazette No. 32805 of 2009; Replacement General Authorisation in terms of Section 39 of the National Water Act). It is reasonable that there are no significant impacts that could alter aspects and the nature of the small wetland at the site and given a 100 m buffer zone from the outer edge (boundary) of this wetland so that application of a water use licence may not be necessary. This will be confirmed with DWS.	Department of Water and Sanitation	1998

Title of legislation, policy or guideline	Applicability to the Proposed Project	Administering Authority	Date
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 any fossils or artefacts being removed by professional palaeontologists and archaeologists.	National Department of Arts and Culture	1999
Conservation of Agricultural Resources Act (Act 43 of 1983)	The declared alien invasive plant species *Prosopis glandulosa* (Mesquite) is encountered at some parts of the site. 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.	National Department of Agriculture	1983
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. In addition, the planting and management of exotic plant species on route, if and where required, will be governed by the Alien and Invasive Species (AIS) regulations, which were gazetted in 2014. These regulations compel landowners to manage exotic weeds on land under their jurisdiction and control.	National DEA	September 2004
Subdivision of Agricultural Land Act (Act 70 of 1970)	An application for the change of land use (re-zoning) for the development on agricultural land will be lodged by the Applicant for approval in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA) as required. A servitude for the proposed distribution line will need to be registered on the affected farm portions. Servitude requirements also need to be discussed between the Applicant and Eskom.	Republic of South Africa	1970

A.8.1 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 previously, due to the project being proposed in a REDZ, the proposed project requires a BA Process.

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

Table A.5 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 A.5. Applicable Listed Activities

Listed activity	Description of project activity that may trigger the listed activity
GN R327	
Activity 11: The development of facilities or infrastructure for the distribution and distribution of electricity: (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts or more;	The proposed project will entail the construction and installation of overhead 132 kV distribution line from the PV facility to the Eskom Mookodi Substation, as well as an on-site substation at each PV facility. The proposed project will take place outside of an urban area.
Activity 28: Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture 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	The proposed project will take place outside of an urban area, on several farm portions. It is understood that the land is currently used for agricultural purposes. The proposed 115 MW solar PV facilities, which are considered to be a commercial/industrial development, will have an estimated footprint of approximately 300 ha. The proposed project will also entail the construction of an on-site substation, and distribution line (including towers and pylons). This will constitute infrastructure with a physical footprint of more than 1 ha.
GN R325	
Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development	The proposed project will entail the construction of three 115 MW Solar PV facilities (i.e. facility for the generation of electricity from a renewable resource). The proposed project will take place outside of an

Listed activity	Description of project activity that may trigger the listed activity
of facilities or infrastructure is for photovoltaic installations and occurs within an urban area or on existing infrastructure.	urban area.
Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for: - the undertaking of a linear activity; or - maintenance purposes undertaken in accordance with a maintenance management plan.	The total maximum project footprint is 300 hectares including the PV facility and infrastructure such as roads for each PV facility. As a result, more than 20 ha of indigenous vegetation would be removed for the construction of the proposed Solar PV facilities.
GN R324	
Activity 4 The development of a road wider than 4 metres with a reserve less than 13.5 metres. North-West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;	An access road wider than 4 m in some sections may be constructed for internal movement within the PV Facilities. A gravel service road will be constructed below the proposed 132 kV distribution lines to Mookodi substation, which will be up to 8 km in length and approximately 4 m in width. According to the Ecological Impact Assessment (Appendix D) of the BA Report, according to North West Biodiversity Sector Plan (2015), the proposed Solar PV project sites and a large part of the powerline corridor (western section) are part of "Other Natural Areas" is not part of any Critical Biodiversity Area. This means that the proposed PV footprint and most of the distribution line corridor are in fair ecological condition but fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017). However, a small section of the proposed powerline infrastructure (i.e. the eastern section of the powerline corridor) reaches into an Ecological Support Area 1. This means that this eastern section of the distribution line corridor is currently either good or in fair ecological condition, for which the objective is to retain them in at least fair ecological condition (SANBI, 2017). Additional information is provided in the Ecological Impact Assessment (Appendix D) of the BA Report.
GN R324: Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. h. North West iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;	According to the Ecological Impact Assessment (Appendix D) of the BA Report, according to North West Biodiversity Sector Plan (2015), the proposed Solar PV project sites and a large part of the powerline corridor (western section) are part of "Other Natural Areas" is not part of any Critical Biodiversity Area. This means that the proposed PV footprint and most of the distribution line corridor are in fair ecological condition but fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017).

Listed activity	Description of project activity that may trigger the listed activity
	However, a small section of the proposed powerline infrastructure (i.e. the eastern section of the powerline corridor) reaches into an Ecological Support Area 1 and 300 square meters may be removed as part of the gravel service road below the line. Additional information is provided in the Ecological Impact Assessment (Appendix D) of the BA Report.

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

- **The activities in Listing Notice 2 (GN R325) have been provided above, however as captured in GN 114 of February 2018, a BA Process is required for Renewable Energy Developments in the REDZ.**

- 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 the BA Report).

- Any triggers relating to construction and development of infrastructure within or within 32 metres of a watercourse, measured from the edge of a watercourse are not applicable as the Ecological Impact Assessment (Appendix D of the BA Report) confirmed that there are no wetlands or watercourses within the development footprint areas. However, the Ecological Impact Assessment (Appendix D of the BA Report) determined that one small restricted natural pan depression of approximately 61 m in diameter is present at the site of Vryburg Solar 1, and that no other wetlands are present at the site. The pan has been protected with a 100 m buffer zone, with the pan and buffer regarded as high sensitivity and set aside as a no-go zone for any development. Therefore, the applicable listed activities linked to watercourses are not triggered. However, impacts on the aquatic systems are addressed in the Ecological Impact Assessment (Appendix D of the BA Report).

- Activity 9 and Activity 10 of GN R327 (Listing Notice 1) are not applicable as these are for piping of water and sewage at scale, which the Applicant is not proposing to undertake.

- Activity 21 of GN R327 (Listing Notice 1) is not applicable at this stage of the BA. However, if the Engineering, Procurement and Construction (EPC) contractor in future determines that a borrow pit is required, then the necessary approvals will be obtained.

- Activity 24 and Activity 56 of GN R327 (Listing Notice 1) are not triggered as it is proposed by the Applicant to keep main access roads to less than 8 m wide.

A.9 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.

A.9.1 No-go Alternative

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed solar PV facility and associated infrastructure. This alternative would result in no environmental impacts on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report. The following implications will occur if the "no-go" alternative is implemented:

- No benefits will be derived 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. The proposed 115 MW facility is predicted to generate approximately 200 GW/h per year which could power 20 000 households;
- The "no go" alternative will not contribute to and assist the government in achieving its proposed renewable energy target of 17 800 MW by 2030;
- Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised; and
- The local economic benefits associated with the REI4P 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:

- Only the agricultural land use will remain;
- No destruction of habitat will occur;
- No change to the current landscape will occur;

- No impacts to the cultural heritage will occur;
- No destruction of fossils will occur;
- No avifaunal collisions will occur due to the establishment of the project; and
- No additional traffic will be generated.

As outlined in Section D of this report, all negative impacts identified as part of this assessment can be reduced to low or very low significance with the exception of 'destruction of habitat' identified as part of the ecological and avifaunal assessments. These studies found that the 'destruction of habitat' impact will have a moderate negative impact significance. However, no specialists found that the project should not go ahead i.e. no fatal flaws were identified. The social impact assessment identified positive impacts from a social upliftment perspective. These include benefits to the local community via employment opportunities (moderate significance) and the development of locally-owned industries to support construction related activities (low significance).

Hence, while the "no-go" alternative will not result in any negative environmental impacts; it will also not result in any positive community development or socio-economic benefits. It will also not assist government in addressing climate change, reaching its set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. Hence the "no-go" alternative is not a preferred alternative.

A.9.2 Land-use Alternatives

A.9.2.1 Agriculture

At present the proposed site is zoned for agricultural land-use, and is mainly used for livestock grazing. As noted in Section B of this report, agricultural potential is uniformly low across the preferred and alternative sites and the choice of placement of the proposed facility on the farm therefore has minimal influence on the significance of agricultural impacts. No agriculturally sensitive areas occur within the site (refer to Section D of this report for a summary of the agricultural and soils impact assessment and to Appendix D for the full report). Hence, agricultural land use is not a preferred alternative.

A.9.2.2 Renewable Energy Alternatives

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as "IRP2010") and the IRP Updated Report (2013) proposes to secure 17 800 MW of renewable energy capacity by 2030. The DOE subsequently has entered into a bidding process for the procurement of 3725 MW of renewable energy from IPPs by 2016 and beyond to enable the Department to meet this target. On 18 August 2015, an additional procurement target of 6300 MW to be generated from renewable energy sources was added to the REI4P for the years 2021 - 2025, as published in Government Gazette 39111. The additional target allocated for wind energy, solar PV energy, and solar CSP energy is 3040 MW, 2200 MW, and 600 MW respectively.

In order to submit a bid, the proponent is required to have obtained an EA in terms of the EIA Regulations as well as several additional authorisations or consents. It has been determined that even though the current processes will enable renewable energy to be fed into the national grid, the REI4P does have certain inefficiencies. To this end, the National DEA, in discussion with the DoE, has been mandated by MinMec to undertake a SEA to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The Wind and Solar PV SEA is in support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. The SEA aimed to identify strategic geographical areas best suited for the roll-out

of large scale wind and solar PV energy projects, referred to as REDZs. Through the identification of the REDZs, the key objective of the SEA was to enable strategic planning for the development of large scale wind and solar PV energy facilities in a manner that avoids or minimises significant negative impact on the environment while being commercially attractive and yielding the highest possible social and economic benefit to the country – for example through strategic investment to lower the cost and reduce timeframes of grid access. Following the completion of the SEA, the REDZs were gazetted in February 2018 by the Minister of Environmental Affairs. **The location of the proposed project within a REDZ supports the development of a large scale renewable energy project in the location.**

Based on the above, both wind or solar projects are supported within the REDZ. The CSIR Energy Centre undertook "Wind and Solar Resource Aggregation Study for South Africa" to determine the capacity factor dataset for wind energy development in South Africa. A high capacity factor (>0.425, shown in red) is considered to be an area where, when using a specific type of turbine, wind energy generation potential is high areas shown in orange (0.325-0.375) and green (<0.325) have a lower capacity factor and are therefore less favourable for wind development. The proposed solar PV facility is located in a green area (Figure A.5). Therefore, wind energy development can occur within this area but other localities in South Africa may be favourable for wind energy development.

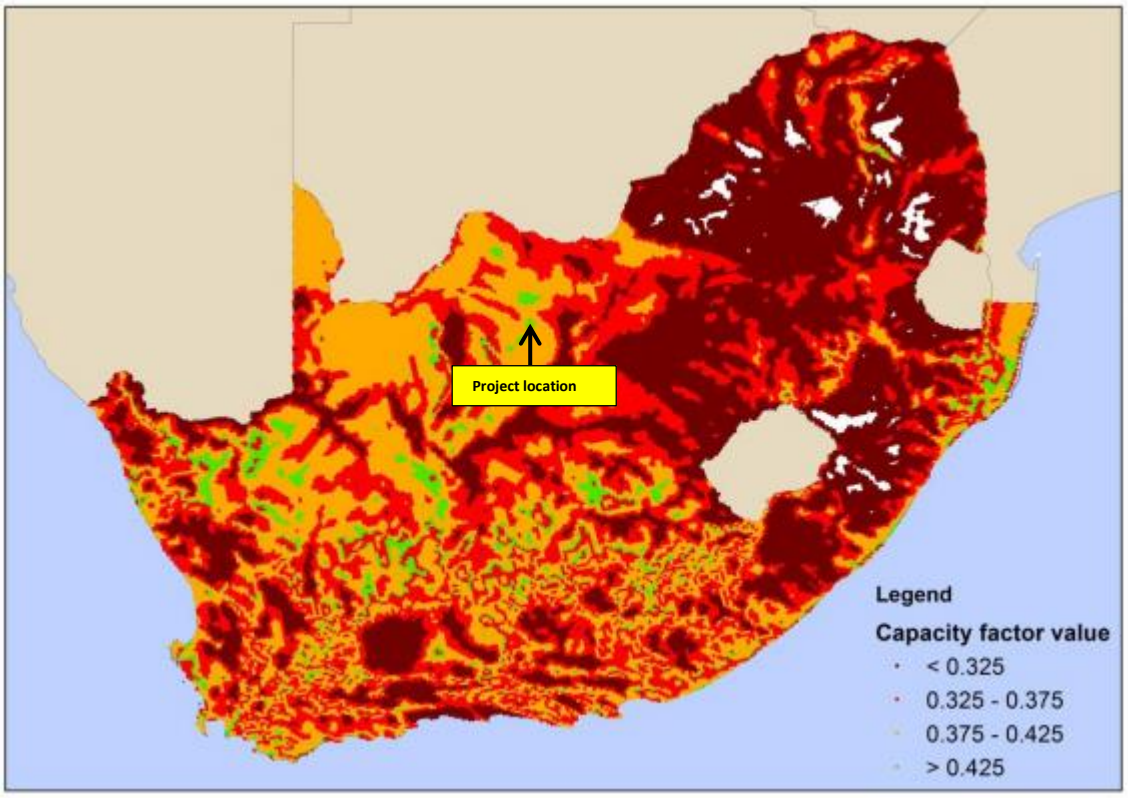

Figure A.5. Capacity Factor dataset for wind energy development (CSIR, 2016)[1]

In terms of the suitability of solar development at this location, the north-western part of South Africa has the highest Global Horizontal Irradiation[2] (GHI), relevant to PV installations (Figure 5.4)

[1] CSIR Energy Centre Wind and Solar Resource Aggregation Study for South Africa, Fraunhofer IWES, 2016.
[2] Global Horizontal Irradiance is the total amount of shortwave radiation received from above by a surface horizontal to the ground

Therefore, this section of South Africa is deemed the most suitable for the construction and operation of solar energy facilities as opposed to other areas and provinces within South Africa. For example, coastal regions within KwaZulu-Natal, Eastern Cape and Western Cape mainly have a solar radiation between 1500 kWh/m^2 and 1700 kWh/m^2 per annum, which is not completely feasible for the proposed projects. According to the Renewable Energy Strategy for the North West (2012), the Free State Province has considerable potential for solar applications, with even higher potential in the Dr Ruth Mompati District Municipality (municipality affected by this project).

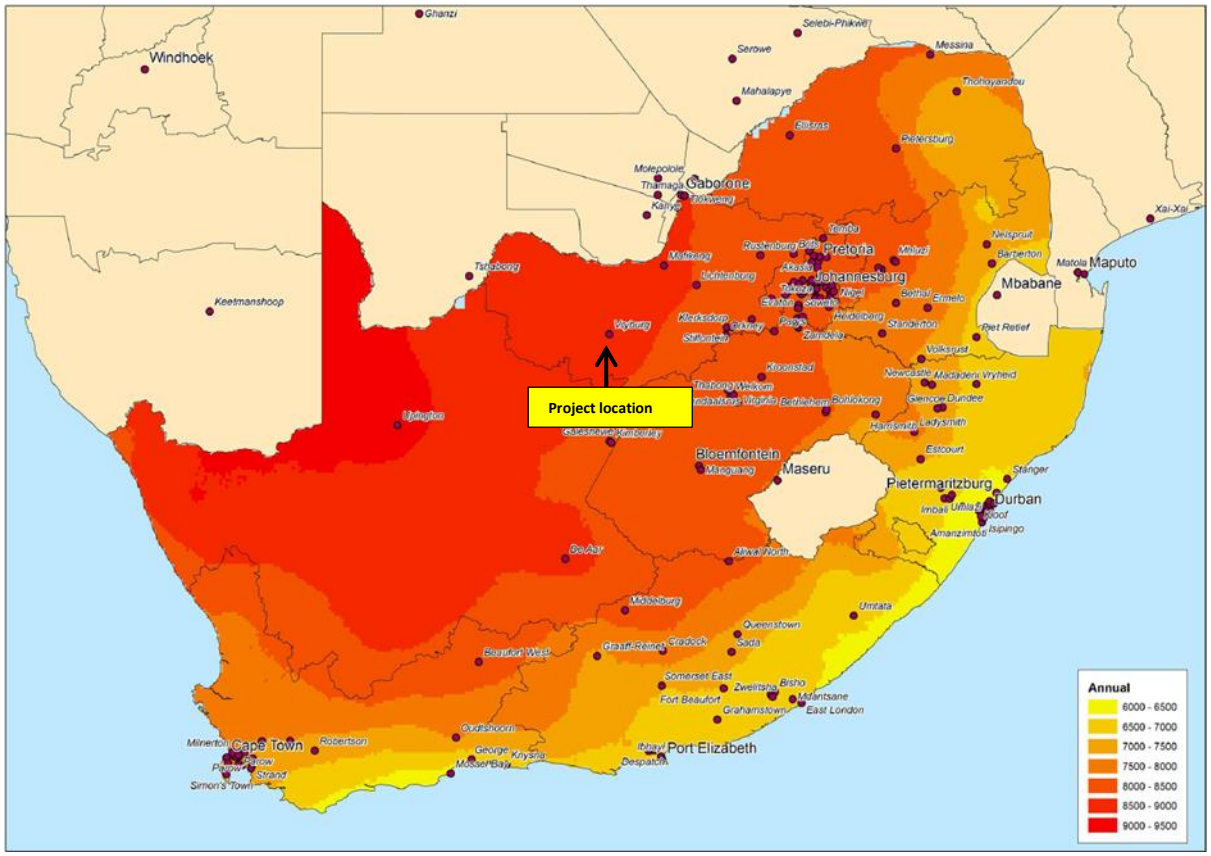

Figure A.6. Solar Resource Availability in South Africa

Therefore, the implementation of a solar energy facility at the proposed project site is more favourable and feasible than wind energy development. Therefore in terms of project and location compatibility, the proposed solar facility is considered to be the most feasible renewable energy land use alternative.

A.9.3 Technology Alternatives

A.9.3.1 Solar Panel Types

Only the PV solar panel type was considered for the BA. Due to the scarcity of water in the proposed project area and the large volume of water required for CSP, this technology is not deemed feasible or sustainable and will not be considered further. Furthermore, CPV technology therefore requires a larger development footprint to obtain the same energy output as PV technology, and it requires active solar tracking to be effective. Furthermore, as noted above, in

Government Gazette 39111 published on 18 August 2015, no additional procurement target was allocated for CPV.

A.9.3.2 Mounting System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The main mounting systems that will be considered as part of the design are:

- Single axis tracking systems;
- Fixed axis tracking systems;
- Dual axis tracking systems; and
- Fixed Tilt Mounting Structure.

A.9.4 Site Alternatives

The preferred sites within the North West was selected based on national level considerations (high solar radiation in the North West, as opposed to other provinces within South Africa) and the fact that the proposed sites currently fall within the REDZ 6 (as discussed in Section 9.2). On a site specific (local) level, the site was deemed suitable due to all the site selection factors (such as land availability, distance to the national grid, site accessibility, topography, fire risk, current land use and landowner willingness) being favourable.

The site selection criteria considered by the Applicant are discussed in detail below Table A.6.

Table A.6. Site selection factors and suitability of the site

FACTOR	SUITABILITY OF THE SITE
Land Availability	An Environmental Screening assessment of Portion 2 of Frankfort Number Farm 672 was undertaken in 2016 to determine whether any fatal flaws are present on site (included in Appendix F of this report). The study found that only a small pan on site has to be regarded as a no-go area. Portion 2 of Frankfort Number Farm 672 ("Erica') is of a suitable size for the proposed project i.e. has 300 ha available for the development. In addition, the Power Corridor that traverses Portion 1 of Frankfort Number Farm 672 ("Edin") and the Remainder of Rosendal Farm 673 has no fatal flaws that will impede on the construction and operation of a distribution line in it.
Irradiation Levels	2100 - 2300 kWh/m^2 (as shown in Figure A.6)
Distance to the Grid	The Mookodi Substation is located 8 km from the site and has capacity to evacuate the electricity generated by the project, should it become operational.
Site Accessibility	The site can be accessed via an existing farm road that would require minimal upgrades to support the project.
Topography	Slope ≤2% (Level to very gentle slope).
Fire Risk	Main vegetation type is Ghaap Plateau Vaalbosveld, low fire risk.
Current Land Use	Agriculture - Grazing
Landowner Willingness	The landowner has signed consent for the use of the land for the proposed projects. This is considered an important aspect of the proposed project in terms of its viability (i.e. this will limit potential appeals during the decision-making process, as the landowner is willing and supportive of the proposed projects being undertaken on the farm).

Furthermore, from an impact and risk assessment perspective, the implementation of a solar PV project on Portion 2 of Frankfort Number Farm 672 ("Erica") will result in fewer risks in comparison

to its implementation at alternate sites within the North West (i.e. regions with similar irradiation levels). The following risks and impacts will be likely in this case:

- There is no guarantee that suitable land will be available for development of a solar PV facility. Site geotechnical conditions, topography, fire potential and ready access to a site might not be suitable, thus resulting in negative environmental implications and reduced financial viability.
- There is no guarantee that the current land use of alternative sites will be flexible in terms of development potential, for example the agricultural potential for alternative sites might be higher and of greater significance.
- There is no guarantee of the willingness of other landowners to allow the implementation of a solar facility on their land and if the landowners strongly object, then the project will not be feasible.
- There is no guarantee that other sites within the Free State will be located close to existing or proposed electrical infrastructure to enable connection to the national grid. The further away a project is from the grid, the higher the potential for significant environmental and economic impacts.

Given the site selection requirements associated with solar energy facilities and the suitability of the land available on Portion 2 of Frankfort Number Farm 672 ("Erica") and no fatal flaws within the Power Corridor that traverses Portion 1 of Frankfort Number Farm 672 ("Edin") and the Remainder of Rosendal Farm 673, therefore no other site alternatives were considered.

A.9.5 Location (layout) Alternatives

As noted previously, an Environmental Screening Study was undertaken in 2016 (report attached in Appendix F) to identify any environmental constraints present on site. As shown in Figure A.7, the site considered for Vryburg Solar 1 facility included a larger area of Portion 2 of Frankfort Number Farm 672. Following the findings of the Screening Study, an area containing a pan (referred to as "small wetland" in the figure below) was excluded from the proposed development. In terms of the routing of the distribution line, the initial proposal, as shown in Figure A.7 below, was to connect to the southern section of the Mookodi Substation. Eskom however indicated that connection to the substation should be from the north. In addition, the Sediba Solar Power Plant and associated infrastructure proposed by Sediba Power Plant (Pty) Ltd has a leasehold on the southern portion of the Remainder of the Rosendal Farm 672 which also meant that the Power Corridor had to be shifted to the north.

A layout alternative was determined based on the outcomes of the Environmental Screening Study and negotiations with Eskom and Sediba Power Plant (Pty) Ltd. This is shown in Figure A.8 and overlain with the comprehensive environmental sensitivity map based on the site visits undertaken by the appointment specialists (discussed in Section D of this report). As shown in the Figure A.8, the solar field avoids the pan identified on site during the Environmental Screening Study but does not avoid the trees identified by the avifaunal specialist as having a "very high sensitivity". In addition, the proposed routing of the distribution line within the Power Corridor traverses over a ridge identified by the heritage specialist to have a high cultural significance. The layout of the solar PV facility and distribution line was therefore deemed **not** to be the preferred alternative. Please refer to Section D of this report for a summary of the specialist studies as well as the preferred layout of the proposed facility and distribution line.

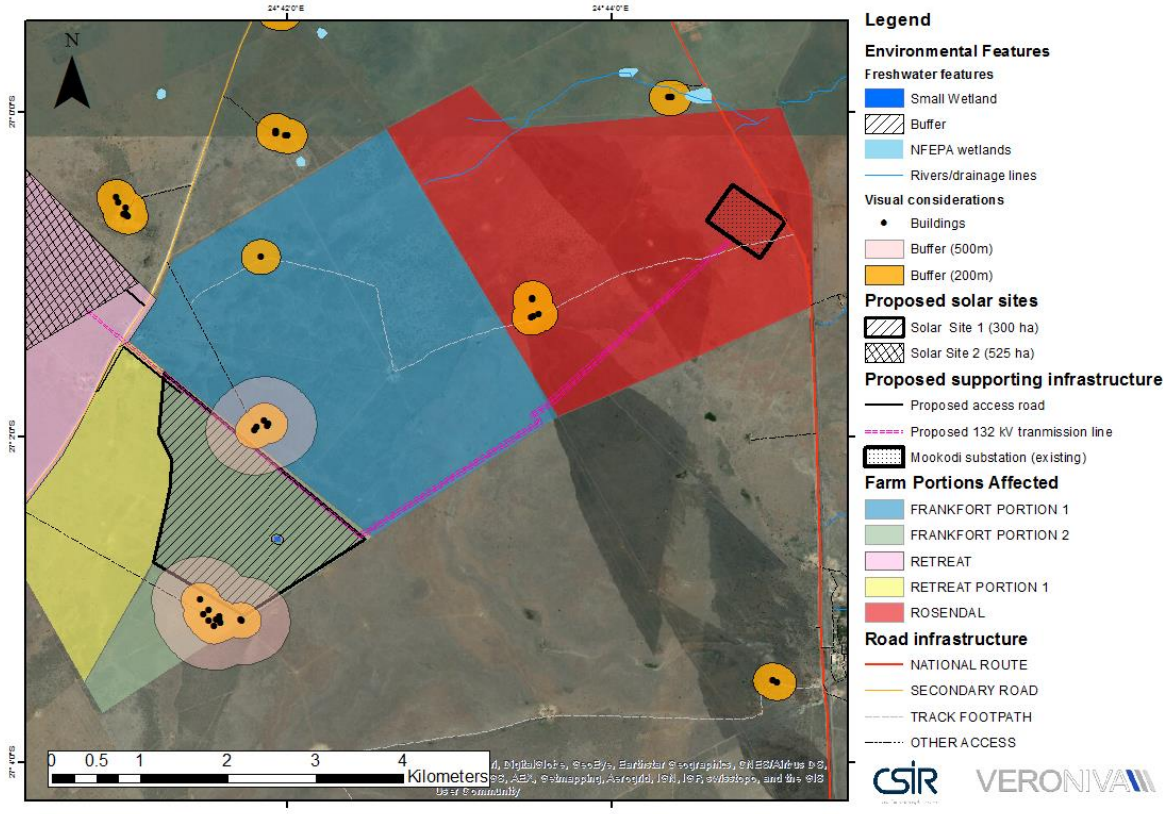

Figure A.7. Site findings of the Environmental Screening Study undertaken in 2016

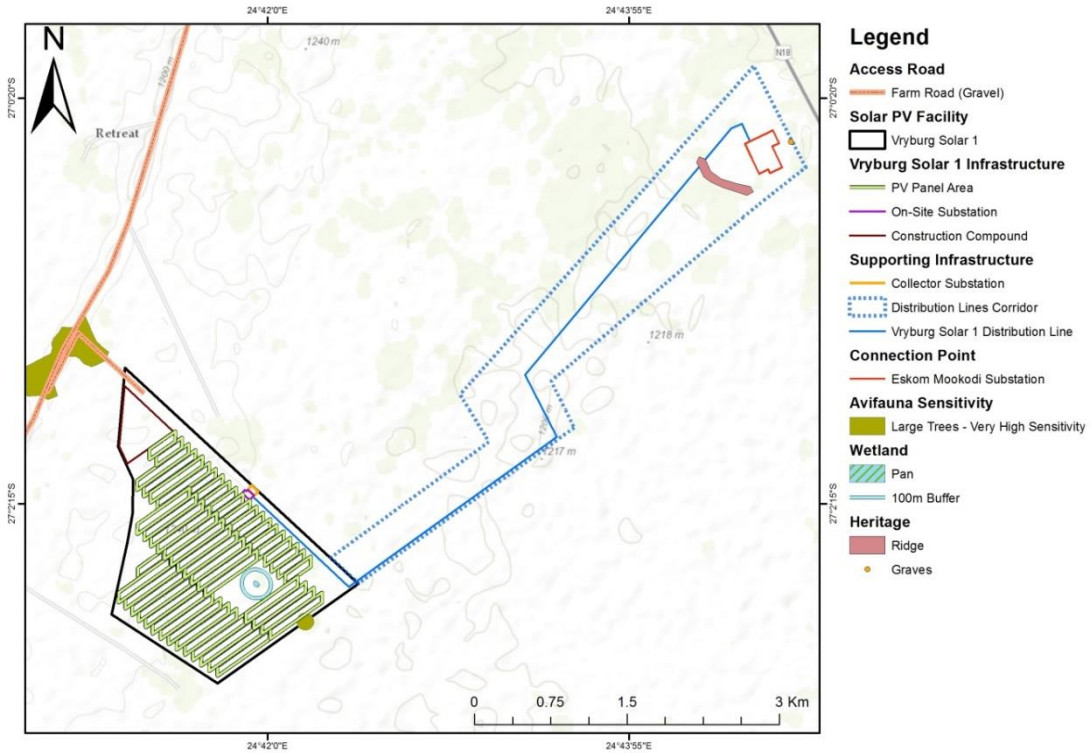

Figure A.8. Alternative layout considered by the specialist assessments

A.9.6 Concluding Statement for Alternatives

Based on the above, the preferred activity on site is the development of a renewable energy facility on site using solar PV as the preferred technology. In terms of the preferred location of the site, the farm portions Portion 2 of Frankfort Number Farm 672 , Portion 1 of Frankfort Number Farm 672 ("Edin") and the Remainder of Rosendal Farm 673 are preferred. The location (layout) of the activity has been informed by an Environmental Screening Study, negotiations with Eskom and the outcomes of the specialist assessments. The preferred layout is further discussed in Section D of this report.

A.10 Needs and desirability

It is an important requirement in the EIA Process to review the need and desirability of the proposed project. Guidelines on Need and Desirability were published in the Government Gazette 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 A.7 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 BA Process.

Table A.7. The Guideline on the Need and Desirability's list of 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, 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.).	**The environmental sensitivities present on site were assessed within the ecological impact assessment undertaken as part of this BA Process.** **The specialist identified all ecological sensitive areas on site that would need 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 (refer to Section D and Appendix D).** **A sensitivity map produced based on the input obtained from the various specialist studies is included in Section B and D of this Report, as well as in Appendix B.**

NEED	
Question	**Response**
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 assessed within the ecological impact assessment undertaken as part of this BA Process. The specialist identified all ecological sensitive areas on site that would need 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 (refer to Section D and Appendix D).** **A sensitivity map produced based on the input obtained from the various specialist studies is included in Section B and D of this Report, as well as in Appendix B.** **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?	**This development has the potential to impact on the ecology of the area, this includes impacts on the natural vegetation, biodiversity, sensitive habitats and ecosystem function. The overall impact to ecology is considered to be of low (negative) impact significance (Please refer to Section D). Measures to avoid, remedy, mitigate and manage impacts are included within the compiled EMPr, which forms part of this BA 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?	**The description of the potential waste generation are included in Section A of this BA Report (this Section). It is not anticipated that a significant amount of waste will be generated.** **The EMPr includes measures to avoid, remedy, mitigate and manage impacts are included within the compiled EMPr (Appendix G), which forms part of this BA 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. The overall findings of the HIA is that the impact to heritage resources will be low (negative) significance. A Heritage profile is included in Section B of this Report. The applicable measures to avoid, remedy, mitigate and manage impacts are included in Section D and Appendix D (full specialist study) as well as in the EMPr.**
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	**This project requires water during the construction and operational phases. Currently, the proposal is to source this from the municipality (confirmation pending). A desktop geohydrological assessment was undertaken to determine the potential to utilise groundwater for this project. This assessment found that there are boreholes around the site that can potentially provide water to site project,**

NEED	
Question	**Response**
explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**however, this is currently not being investigated any further.**
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 harness the sun's light for the generation of electricity. This project is seen as a source of 'clean energy' and reduces the dependence on non- renewable sources, such as coal fired power plants. The proposed development is located in the Vryburg REDZ. The REDZs represent areas where wind and solar photovoltaic development is being incentivised from resource, socio-economic and environmental perspectives. For more information, please refer to the Alternatives section included in Section A of this report (this section) for an outline of the suitability of this activity.**
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.** **Please refer to Appendix D of this report for the full specialist studies. These studies outline the assumptions and limitations that were applicable to the respective studies.** **The risk associated with the limits in knowledge is considered to be low.**

NEED	
Question	**Response**
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?	**Please refer to Section D and Appendix D for the specialist studies undertaken. The overall negative impact to people's environmental right in terms of social and visual impacts are considered to be low. In addition, the social assessment found that the employment opportunities created would be considered a moderate positive impact.**
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.)?	**This is considered and addressed as part of the Social Impact Assessment undertaken for this project (included in Appendix D and summarised in Section D of this report).** **The study found that "in light of the overall low significance (post mitigation) rating of identified negative impacts, and having regard to the nature of such impacts, and the status quo socio-economic conditions present in the Naledi Local Municipality (NLM); the socio-economic benefits of the project appear to outweigh its impacts. Should the mitigation measures be implemented as prescribed in this assessment; it is recommended that the proposed development be awarded environmental authorisation".**
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?	**The Naledi Local Municipality (NLM) Integrated Development Plan (IDP) (2017-2022) identifies renewable energy as a key economic sector within its Local Economic Development (LED) plan. The inclusion of renewable energy as a key sector not only plays to the natural strengths of the area (i.e. good solar irradiation levels), but also appears to be aimed at bringing parity between the existing employment sectors by providing much needed growth within the local construction (2.6%) and electricity (0.5%) employment sectors. The proposed activity therefore does not compromise any of the objectives set within NLM IDP (2017-2022). The proposed project will also be supportive of the IDP's objective of creating more job opportunities.** **The ecological study found (Section D) that footprint at the site proposed for the photovoltaic facility as well as the largest part of distribution line corridor is situated at Other Natural Areas (ONAs). This means that the proposed photovoltaic**

NEED	
Question	**Response**
	footprint and most of the distribution line corridor are in fair ecological condition but fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017). At the eastern extension of the distribution line corridor there is a part that extends into an Ecological Support Area 1. This means that this eastern section of the distribution line corridor is currently either good or in fair ecological condition, for which the objective is to retain them in at least fair ecological condition (SANBI, 2017). This eastern section of the distribution line area should and would be kept as a functional ecosystem in fair ecological condition.
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?	**Please refer to the Alternatives section included in Section A of this report (this section) for an outline of the suitability of this activity.**
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?	**Please refer to Section D of this BA Report.**
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
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,	**The Naledi Local Municipality (NLM) Integrated Development Plan (IDP) (2017-2022) identifies renewable energy as a key economic sector within its Local Economic Development (LED) plan. The inclusion of renewable energy as a key sector not only plays to the natural strengths of the area (i.e. good solar irradiation levels), but also appears to be aimed at bringing parity between the existing employment sectors by providing much needed growth within the local construction (2.6%) and electricity (0.5%) employment sectors.** **The proposed activity therefore does not compromise any of the objectives set within NLM IDP (2017-2022). The proposed project will also be supportive of the IDP's objective of creating more job opportunities. Even though this solar facility will not provide the municipality directly with electricity, the energy produced by the facility will feed into the national grid. The NLM IDP identifies lack of or inadequate employment, as well as lack of reliable electricity supply as some of the societal challenges reported by communities in Naledi. The proposed project will create job opportunities and economic spin offs during the construction and**

NEED	
Question	**Response**
	operational phases (if an EA is granted by the DEA). It is estimated that between 90 and 150 skilled and 400 and 460 unskilled employment opportunities are to be created during the construction phase. Approximately 20 skilled and 40 unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility. **It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase.** **Therefore, the proposed solar facility would help to address the need for increased electricity supply (on a national level) while also be providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area.**
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.**
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	**Please refer to Section B and D of this report for a description of the receiving environment and impact assessment, respectively. 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 D and summarised in Section D.** **The proposed project site is currently being used for agricultural purposes, predominantly grazing. Should the proposed project proceed, approximately 300 ha of the land will be developed on and it is not expected that this will significantly threaten the agricultural activities present on site. A Soils and Agricultural Impact Assessment (Appendix D and summarised in Section D) was undertaken as part of this BA and is included within the BA Report to reflect the impact of the proposed project in terms of the land use and agricultural potential. All agricultural impacts of the proposed development are assessed as being of low or very low significance.**
2.1.4. Municipal Economic Development Strategy ("LED Strategy").	**According to the Renewable Energy Strategy for the North West (2012), the Province has considerable potential for solar applications, with even higher potential in the Dr Ruth Mompati District Municipality and Ngaka Modiri-Molema District Municipality. The proposed Vryburg Solar Project**

NEED	
Question	**Response**
	falls within the Dr Ruth Mompati District Municipality
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?	**Please refer to the social impact assessment summarised in Section D and included in Appendix D for an outline of the social impacts that could occur due to the proposed development of the solar facility.**
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	
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?	
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,	**Please refer to the social impact assessment summarised in Section D and included in Appendix D for an outline of the positive impacts associated with the creation of employment opportunities that could be created by the solar facility.**
2.5.2. reduce the need for transport of people and goods,	**Not applicable. This is a renewable energy project proposal.**
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),	**Not applicable. This is a renewable energy project proposal.**
2.5.4. compliment other uses in the area,	**A soils and agricultural impact assessment was undertaken to determine the impact on the current land-use. Refer to Section D and Appendix D for a summary of the study and the full study, respectively. The preferred project site is currently being used for agricultural purposes, predominantly grazing. Should the proposed project proceed, approximately 300 ha of the land will be developed on and it is not expected that this will significantly threaten the agricultural activities present on site.**
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,	**Not applicable. 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 to the existing Eskom Mookodi Substation and will make use of existing access roads as far as possible.**
2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk	**This project is a renewable energy project and not related to bulk infrastructure expansion.**

NEED		
Question		**Response**
	infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	
2.5.9.	discourage "urban sprawl" and contribute to compaction/densification,	**Please refer to the social impact assessment summarised in Section D and included in Appendix D for management measures on how to manage the impact associated with the "disruption of local social structures as a result of the construction work force and in-migration of job seekers".**
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 (Section D) and will therefore not go against sustainable land development practices and processes. In addition, 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 the Alternatives section included in Section A of this report (this section) for an outline of the selection and suitability of this activity.**
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),	**Please refer to the social impact assessment summarised in Section D and included in Appendix D. In addition, as noted in this section of the report, the Applicant will ultimately own the project and, if successful, will compile an Economic Development Plan which will be compliant with REI4P requirements and will inter alia set out to achieve the following:** • **Create a local community trust or similar (as required by REIPPPP) which has an equity share in the project life to benefit historically disadvantaged communities;** • **Initiate a skills development and training strategy to facilitate future employment from the local community; and** • **Give preference to local suppliers for the construction of the facility.** • **Support local community upliftment projects and entrepreneurship through socio-economic and enterprise development initiatives.**
2.5.14.	impact on the sense of history, sense of place and heritage of the area and the	**A Heritage Impact Assessment was undertaken as part of the assessment for this project. The overall**

NEED	
Question	**Response**
socio-cultural and cultural-historic characteristics and sensitivities of the area, and	**findings of the HIA is that the impact to heritage resources will be low (negative) significance.**
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?	**This facility is proposed in REDZ 6. Several solar facilities (refer to Section D for an outline of the renewable energy project proposed in a 30km radius) are proposed in the area, which lends itself potentially to a renewable energy development 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)?	**Please refer to the social impact assessment summarised in Section D and included in Appendix D.**
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, manage and remedy negative impacts?	**Please refer to the social impact assessment summarised in Section D and included in Appendix D.**
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	

NEED	
Question	**Response**
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 Public Participation Process (PPP) for the proposed Solar PV Facility that will be undertaken is included in the BA Report (Appendix D) and summarised in Section C. This BA Report will be released for a 30-day commenting period to all the relevant authorities and stakeholders and will be given an opportunity to comment during the 30-day public review period. Various methods will be employed to notify potential (I&APs) of the proposed project, namely, through an advert, site notices on site and in Vryburg and notification letters.** **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.**
2.13.2. 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,	
2.13.5. ensure openness and transparency, and access to information in terms of the process,	
2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition 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.	
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)?	**Please refer to the social impact assessment summarised in Section D and included in Appendix D.**

NEED	
Question	**Response**
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,	**Please refer to the social impact assessment summarised in Section D and included in Appendix D.**
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. This has been included in Section A of this BA Report.**
2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	**The Public Participation Process (PPP) for the proposed Solar PV Facility that will be undertaken is included in the BA Report (Appendix D) and summarised in Section C. This BA Report will be released for a 30-day commenting period to all the relevant authorities and stakeholders and will be given an opportunity to comment during the 30-day public review period. Various methods will be employed to notify potential (I&APs) of the proposed project, namely, through an advert, site notices on site and in Vryburg and notification letters.** **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.**
2.18. What measures were taken to ensure that the environment will be held in public trust for the people,	**The outcomes of this BA process and the associated conditions of the EA (should it be received) will**

NEED	
Question	**Response**
that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	**serve to address this question.**
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 and summarised in Section D 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 can be dismantled and completely removed from the site leased 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 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?	**Please refer to the Alternatives section included in Section A of this report (this section) for an outline of the selection and suitability of this activity.**
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?	**Please refer to Section D of this report for a summary of the cumulative impacts.**

SECTION B: DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section of the BA Report provides an overview of the affected environment and surrounding region for the proposed Vryburg Solar 1 PV facility and associated electrical infrastructure. 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 been derived from:

- Inputs obtained from the various specialist studies undertaken during this BA Process (included in Appendix D of this report);
- Inputs from the 2016 Environmental Screening Report of the proposed Vryburg Solar project and associated electrical infrastructure (included in Appendix J of this report);
- Review of information available on the South African National Biodiversity Institute (SANBI) Biodiversity Geographical Information System (BGIS) and Agricultural Geo-Referenced Information System (AGIS); and
- Naledi Local Municipality and Dr Ruth Segomotsi Mompati District IDPs.

It is important to note that this section intends to provide an overview of the receiving environment and does not represent a detailed environmental study. Detailed descriptions of the proposed project site focused on significant environmental aspects of this project are provided in the relevant specialist studies which are included in Appendix D and summarised in Section D of this report.

B.1 Property details

Table B.1 below provides the details of the affected properties for the proposed Vryburg Solar 1 PV facility and associated electrical infrastructure.

Table B.1. Property details of the farm portions affected by the proposed development

	Farm name and number	SG Code	Current land-use zoning
Vryburg Solar 1 (PV site and distribution line)	1. Portion 2 of Frankfort Farm 672 ("Erica") 2. Portion 1 of Farm Frankfurt Number 672 ("Edin") 3. Remainder of Farm Rosendal 673, IN 4. Remainder of Frankfort Farm 672	1. T0IN00000000067200002 2. T0IN00000000067200001 3. T0IN00000000067300000 4. TOIN00000000067200000	Agricultural land-use - mainly livestock grazing.

The closest town to the proposed project is Vryburg. According to the Provincial Development Plan for North West Province, Vryburg is a secondary node of the province (North West Planning Commission 2013). It is a service centre for the agricultural community in the surrounding region. Two national routes pass through the town, N18 between Kimberley and Mahikeng and the N14 between Gauteng and Upington. The R34 connects Vryburg with Schweizer-Reineke (another

secondary provincial node).The Mookodi Substation and high voltage transmission lines crossing the landscape near Vryburg represent the most visible component of electrical infrastructure in the surrounding region. The railway line is a major linear structure between Kimberley and Mahikeng (Figure B.1).

The landscape surrounding the proposed development ranges from urban to rural with most of the potentially affected landscape character designated as peri-urban. This is evident in the number of large, busy roads, power lines and substations, and buildings visible in the landscape (Holland, 2018).

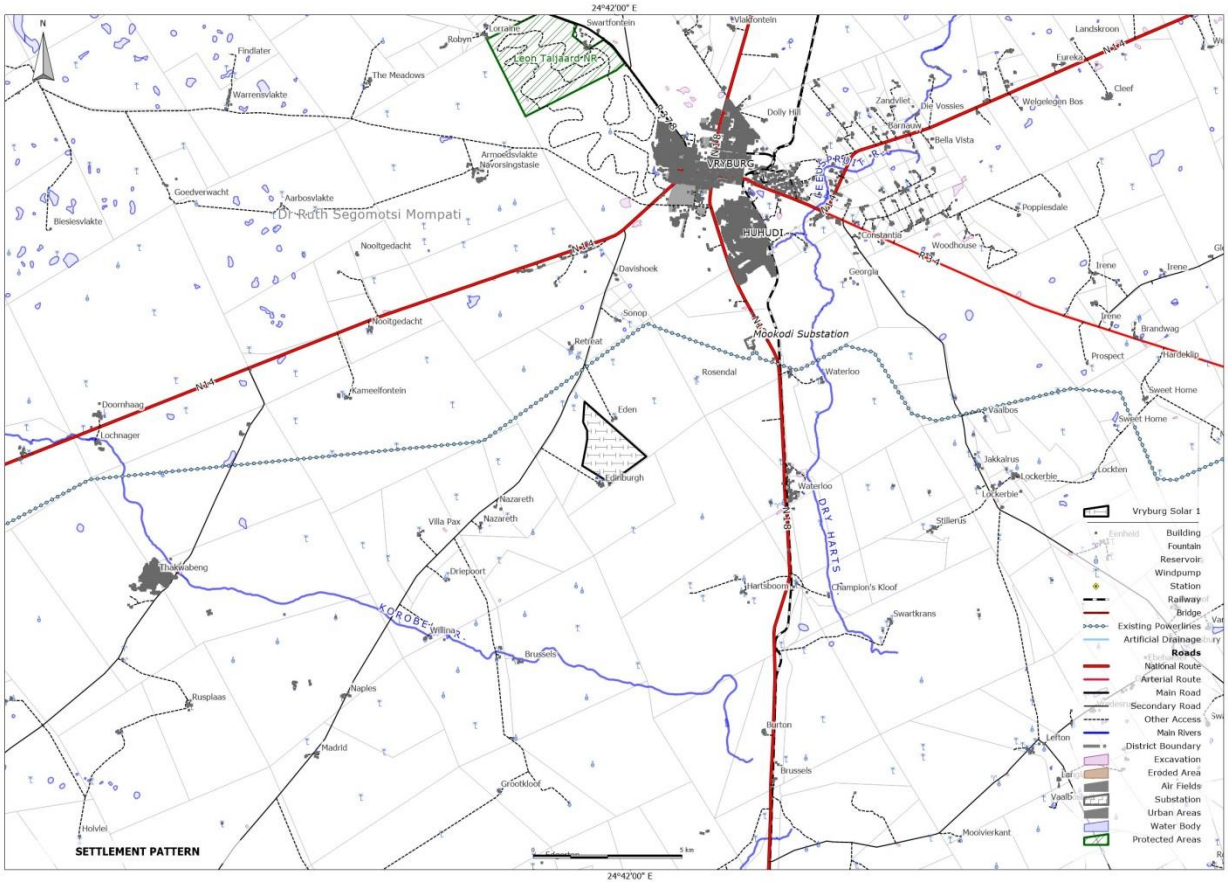

Figure B.1. Prominent man-made structures and settlement patterns in the landscape

B.2 Climatic Conditions

The climate of the North West province is semi-arid, characterised by a summer-autumn rainfall regime and very dry winters. Average rainfall of the area varies from approximately 300 mm in the western part of the province, 550 mm in the central part and approximately 600 mm in the eastern and south-eastern parts. Evaporation levels within this province exceed the annual rainfall, with average evaporation of approximately 2 600 mm per year. The relevance of this information is that rainfall occurs whilst temperatures are still quite high and therefore the associated evaporation rates will be high. In South Africa, one of the most important climate parameters for agriculture is moisture availability, which is the ratio of rainfall to evaporation. Moisture availability is classified into 6 categories across the country. The site falls on the boundary between the 4th and 5th categories (Table B.2), which are labelled as a moderate to severe limitation and a severe limitation to agriculture respectively.

Table B.2. The classification of moisture availability climate classes for summer rainfall areas across South Africa (Agricultural Research Council, 2007)

Climate class	Moisture availability (Rainfall/0.25 Potential evapotranspiration (PET))	Description of agricultural limitation
C1	>34	None to slight
C2	27-34	Slight
C3	19-26	Moderate
C4	12-18	Moderate to severe
C5	6-12	Severe
C6	<6	Very severe

Climate conditions are extreme (i.e. very cold in winter and extremely hot in summer). Figure B.2 depicts the average monthly climatic chart for Vryburg. The highest temperatures are recorded for December at an annual average of 33°C and an annual average low temperature of 5°C in June.

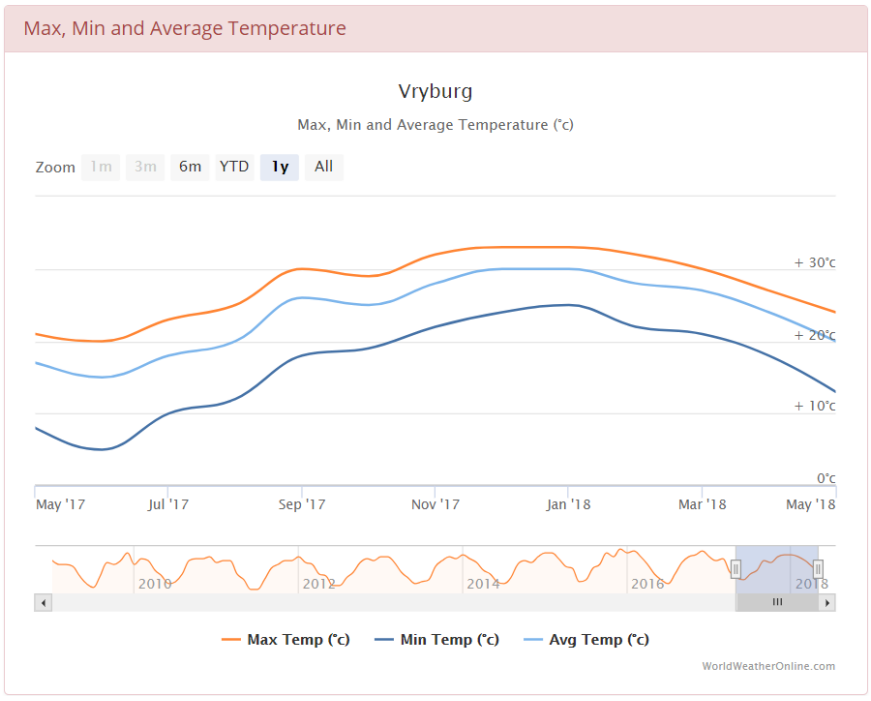

Figure B.2. Temperature chart for Vryburg showing the monthly maximum and minimum temperatures, and the average temperature[3]

[3] WeatherOnline.com

B.3 Topography and Landscape

The topography of the region surrounding the proposed solar plant development is relatively flat with the Dry Harts and Korobe Rivers cutting deep and steep valleys into the landscape south and east of the site (Figure B.3). The Dry Harts River is a major tributary of the Vaal River.

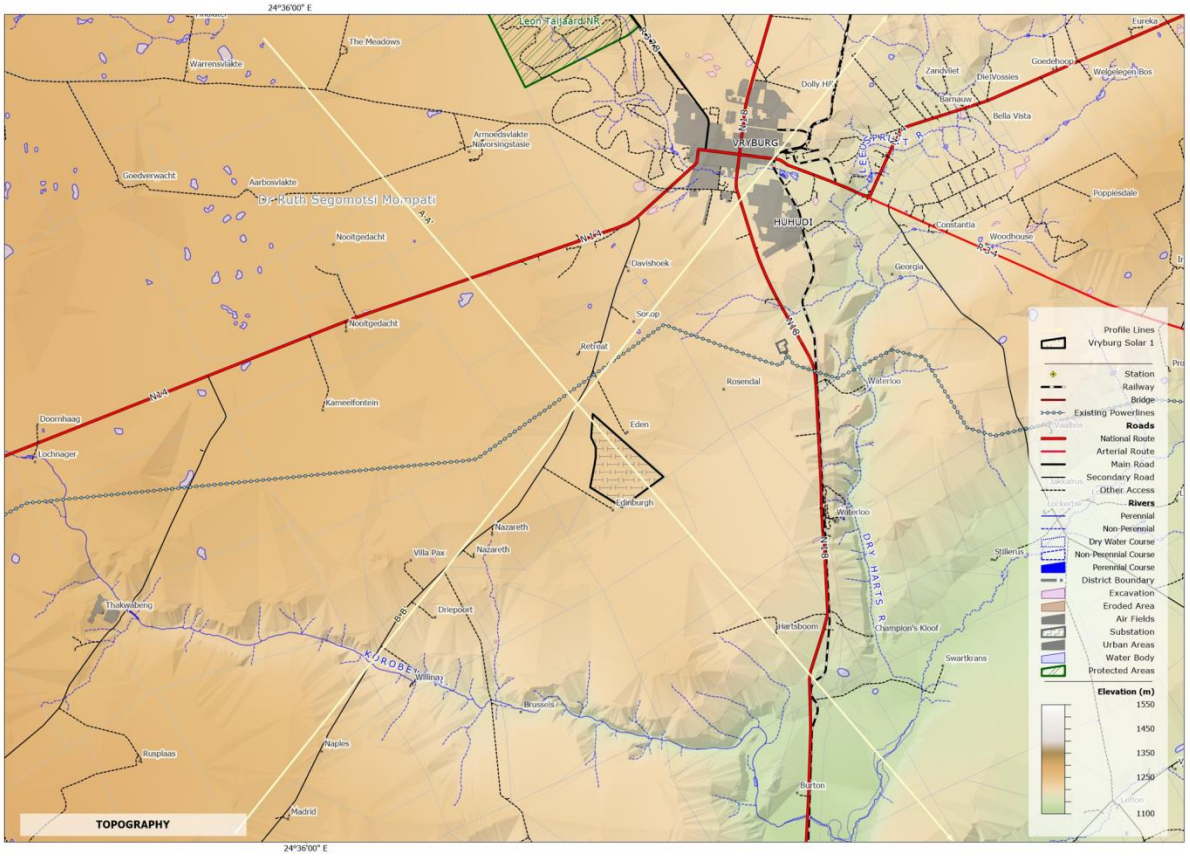

Figure B.3. Topographic map of the region (Holland, 2018)

B.4 Soil Types and Soil Potential

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climate conditions into different land types. The proposed project is located across two land types, Fc4 and Ae36. The land types comprise predominantly very shallow, sandy soils on underlying hardpan carbonate. In the updated classification system, they are classified as Coega and Gamoep soil form. The land type also includes some soils on underlying rock and a small proportion of deeper, sandy soils of the Hutton soil form. The soils are classified as having low to moderate susceptibility to water erosion (class 5), but because of the sandy texture, are classified as susceptible to wind erosion (Lanz, 2018).

B.5 Land capability

Land capability is the combination of soil suitability and climate factors indicating the level and type of agricultural production achievable on any land. The project area has a land capability evaluation value ranging from 5 to 7, classifying the area as unsuitable for rainfed crop cultivation. The limitations to agriculture are related to climate and the shallow soil depth. As a result of these

constraints, agricultural land use is restricted to grazing. The natural grazing capacity is at most 14-17 hectares per large stock unit (Lanz, 2018).

B.6 Geology

The geology of the region, as described in the specialist studies included in Appendix D, is varied from basement granites through Ventersdorp lavas (Andesite) and Transvaal Supergroup layers of dolomite, banded iron formation, quartzite (arenite), shale and siltstones, to sediments overlying these rocks. The underlying geology of Tertiary age gravels (diamondiferous in places) and Quaternary age calcrete. This is underlain by diamictite and shale of the Dwyka Formation; which is underlain by older khaki-coloured and grey shale of the Clearwater Formation. This overlies the Boomplaas Formation consisting of oolitic and stromatolitic dolomite with interbedded shale and the older Vryburg Formation which is made up of andesititc lavas.

B.7 Geohydrology

The regional aquifer directly underlying the development portion is classified by the Department of Water Affairs and Forestry (DWAF, 2001) as an intergranular aquifer with an average yield potential of 0.1 - 0.5 L/s towards the north-east and as fractured with an expected average yield potential of 2 - 5 L/s for the central portions. An intergranular aquifer describes an aquifer in which groundwater is stored within and flows through open pore spaces in the unconsolidated material. A fractured or secondary aquifer describes an aquifer in which groundwater flows through fractures or fault structures. The regional groundwater quality is classified as marginal towards the east with an associated electrical conductivity (EC) of 70 - 300 mS/m (Figure B.4) (GEOSS, 2018).

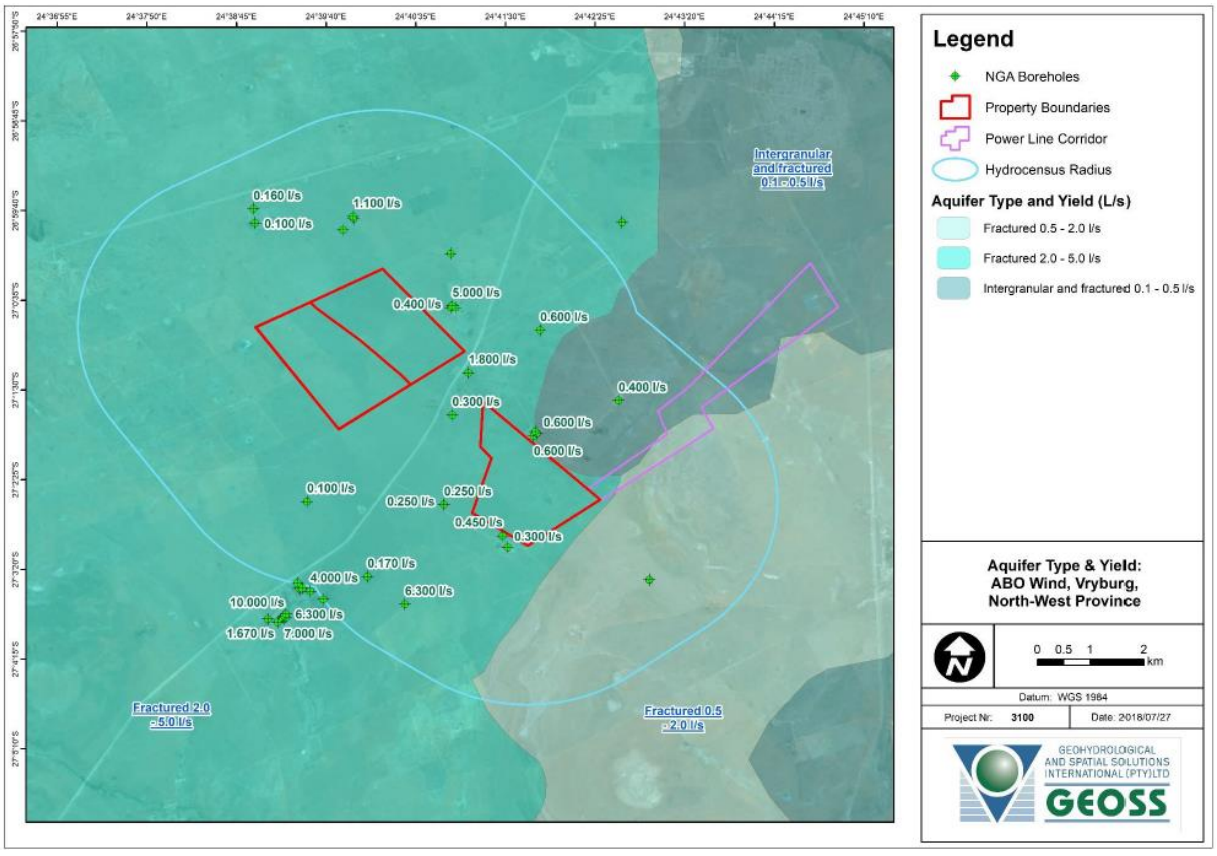

Figure B.4. Regional aquifer yield showing boreholes with respective yields (if available).

B.8 Biodiversity

Based on the Environmental Screening Study undertaken for the site (Appendix J), there are no distinct indications of any terrestrial ecosystems of particular conservation concern at the proposed project site. According to the North West Biodiversity Sector Plan (2015) the site is part of other natural areas and is not part of any Critical Biodiversity Areas. A section of the proposed distribution line is routed within an Ecological Support Area 1 (Figure B.5). In terms of aquatic ecosystems, the proposed site is part of the Lower Vaal Water Management Area (WMA 10) and does not fall within any Freshwater Ecosystems Protected Areas (NFEPAs) (Terblanche, 2018).

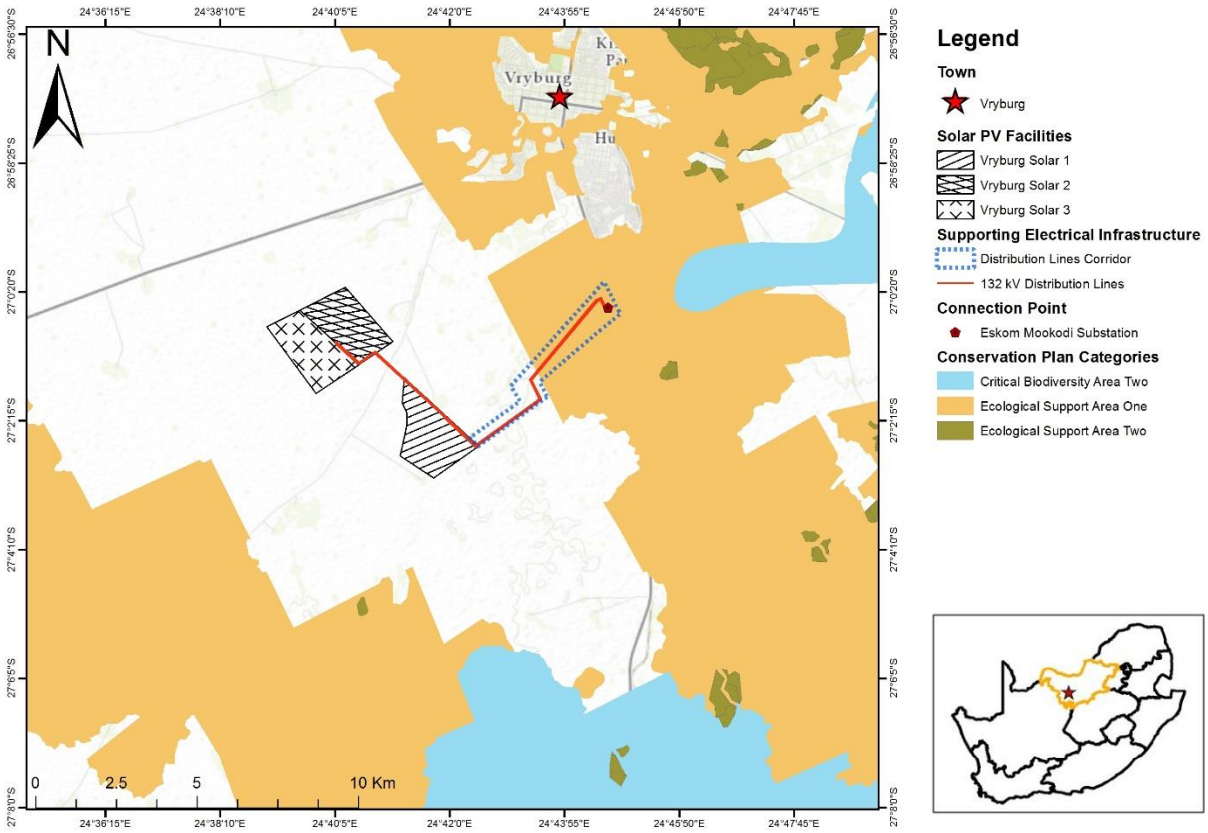

Figure B.5. North West Biodiversity Planning Categories in relation to the proposed project area

B.8.1 Terrestrial Environment

B.8.1.1 Groundcover

The proposed project site is located within the Savanna Biome of South Africa, represented by the Ghaap Plateau Vaalbosveld (SVk 7) vegetation type (Mucina and Rutherford 2006). This vegetation type is found in the Northern Cape and North West Provinces, consisting of well-developed shrub layer with *Tarchonanthus camphoratus* and *Vachellia karroo* [*Acacia karroo*] and an open tree layer with *Olea europaea* subsp. *africana*, *Vachellia tortilis* [*Acacia tortilis*], *Ziziphus mucronata* and *Searsia lancea* [*Rhus lancea*]. *Olea europaea* subsp. *africana* is more important in the southern parts of the vegetation type, while *Vachellia tortilis* [*Acacia tortilis*], *Vachellia hebeclada* [*Acacia hebeclada*] and *Senegalia mellifera* [*Acacia mellifera*]. Much of the south-central part of this vegetation type has a remarkably low cover of *Vachellia* [Acacia] and *Senegalia* [*Acacia*] species for

an arid savanna and is dominated by the nonthorny *Tarchonanthus camphoratus*, *Searsia lancea*, and *Olea europaea* subsp. *africana* (Mucina & Rutherford 2006).

The Terrestrial Ecology Impact Assessment (Appendix D) describes the vegetation on site as an open savanna which has a conspicuous abundance of shrub-height *Tarchonanthus camphoratus* (Camphor Bush) and at some areas also *Grewia flava* (Velvet Raisin).

B.8.2 Aquatic Environment

In terms of surface water, the site is located within the Lower Vaal Water Management Area (WMA 10). Major rivers in this Water Management Area include the Molopo, Harts, Dry (Droeë) Harts, Kuruman and Vaal rivers. The project area falls within the C32 tertiary drainage area in the Lower Vaal WMA. The primary drainage features within close proximity to the proposed site are the Dry (Droe) Harts River, located approximately 1.7 km east of the site, the Korobela River running 6 km south of the site, as well as an unnamed drainage feature approximately 5 km north to the site, within the Vryburg town (Figure B.6). These drainage features are classified as National Freshwater Ecosystem Priority Areas (NFEPA). The Ecology Impact Assessment (included in Appendix D) identified one small restricted pan depression located within the development footprint of Vryburg Solar 1, at the south-eastern part of the site. The small depression (pan) is attributed to endorheic conditions where the water that flows in during rainfall events mostly leaves through evapotranspiration and infiltration in this low rainfall area (Mean Annual Precipitation < 500 mm). The Present ecological status (PES) of the wetland pan at the site is CATEGORY B which means the wetland is largely natural with few modifications, but with some loss of natural habitats; largely attributed to possible grazing pressure or some bush-encroachment of *Vachellia karroo*. The Ecological Importance and Sensitivity (EIS) of the wetland pan is Moderate which means that the wetland is considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains or wetlands is not usually sensitive to flow and habitat modifications. A 100 m buffer zone from the outer edge of this wetland pan has been deemed an exclusion buffer from the proposed development. No other wetlands are identified within the site's boundaries.

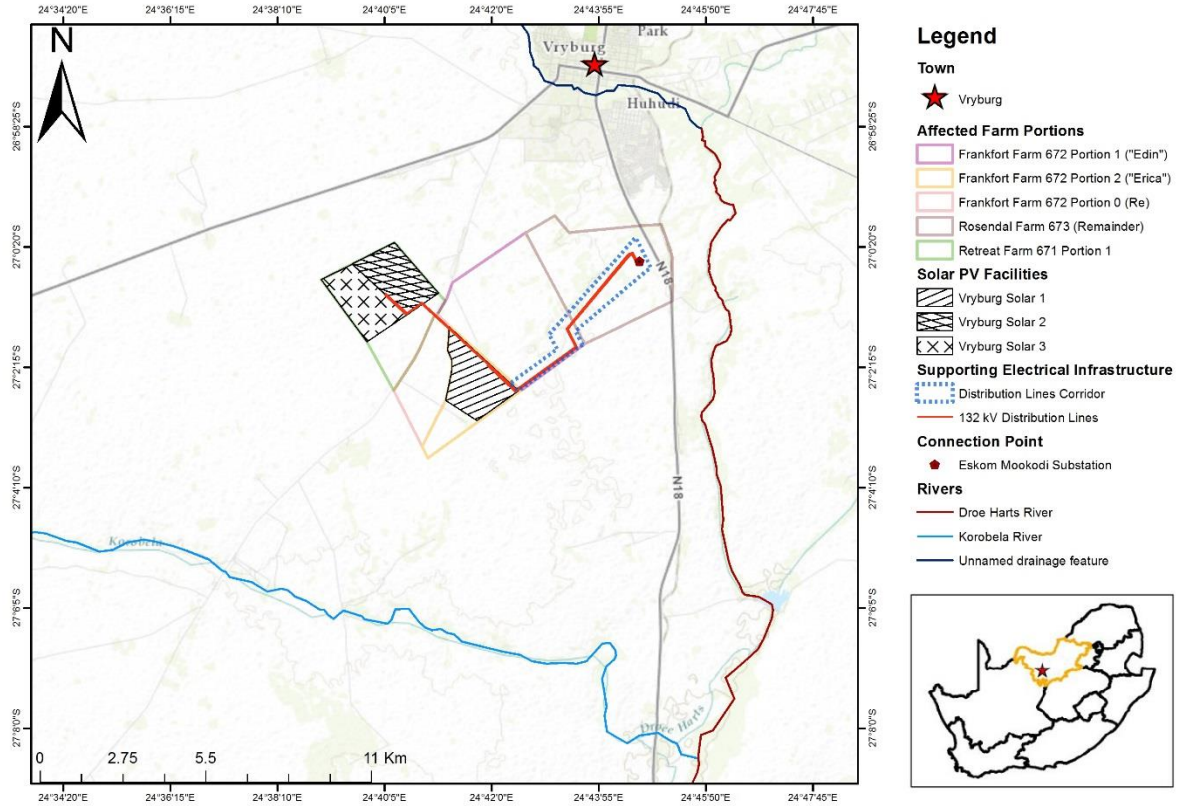

Figure B.6. Major drainage features surrounding the proposed project site.

B.8.3 Avifauna

The information provided below has been extracted from the Avifaunal Impact Assessment included in Appendix D of this BA Report.

The habitat in the project area is homogenous and consists of extensive plains with grass and shrub of varying density, with scattered, stunted trees, mostly *Vachellia* species. In the development footprint, trees are generally clustered around boreholes, however there are tree stands not associated with boreholes. The closest Important Bird Areas (IBAs), the Baberspan and Leeupan (SA026) and the Sandveld and Bloemhof Dam Nature Reserves (SA039) are located approximately 100km away (Marnewick *et al*. 2015). The development is too far away from these IBAs to have any direct impact on the IBAs.

Habitat classes identified for avifauna

- ***Natural savanna***

Priority species that were recorded in natural savanna vegetation of the project area include the Kori Bustard, Eagle Martial, Cattle Egret, Secretarybird, Lanner Falcon, Southern Pale Chanting Goshawk, Greater Kestrel, Black-shouldered Kite, Yellow-billed Kite, Barn Owl, Black-chested Snake-eagle, Fiscal Flycatcher and Karoo Thrush.

- ***Surface water***

The ephemeral rivers, particularly the Dry Harts River situated east of the project site, is important for a variety of waterbirds which could be attracted to pools in the river, as well as the dry river channel itself. Open water troughs are important sources of surface water in arid areas and may be used extensively by various species for drinking and bathing, including large raptors. The presence of trees around surface water often attracts woodland species.

The development footprint contains a small wetland which only briefly holds water after good rains, as well as a borehole with a water trough. Priority species recorded during the avifauna survey included Martial Eagle, Lanner Falcon, Yellow-billed Kite, Black-chested Snake-eagle, Secretarybird, Cattle Egret, Blacksmith Lapwing and Kori Bustard.

- ***High voltage lines***

High voltage lines are an important potential roosting and breeding substrate for raptors in the greater study area. In some areas of the country, high-voltage lines are used extensively by large raptors, especially Martial Eagles, for breeding purposes (Jenkins *et al*. 2006), but also smaller species such as Lanner Falcon and Greater Kestrel which often breeds in abandoned corvid nests. High voltage lines therefore hold a special importance for large raptors, but also for Sociable Weavers which often construct their giant nests within the lattice work or cross-arms of high voltage structures. One high voltage line, the Ferrum – Mercury 400kV line, runs in an east – west direction 1- 2km north of the development footprint. The section of the line which runs parallel to the development footprint was inspected in February 2016 and again in July 2018, and no nests were recorded on any of the towers.

The proposed 132kV line will run along the north-eastern border of the development footprint and will then follow a north-easterly course to the Eskom Mookodi Substation. Priority species that could be attracted to the proposed 132kV powerline on the development footprint and recorded during the survey included Martial Eagle, Lanner Falcon, Black-chested Snake-eagle, Greater Kestrel, Barn Owl, Spotted Eagle-Owl, Southern Pale Chanting Goshawk, Yellow-billed Kite.

B.9 Heritage Profile

A Cultural Heritage Impact Assessment and Palaeontological Impact Assessment have been undertaken as part of this BA process and the complete studies are included in Appendix D of this report. The information provided below has been extracted from the Heritage Impact Assessment and Palaeontological Impact Assessment.

B.9.1 Cultural landscape

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) occupation and a much later colonial (farmer) component. The second component is an urban one consisting of a number of smaller towns, most of which developed during the last 150 years or less.

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and North West Province.

The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the booRapulana and booRatlou sections of the Rolong (Breutz 1959).

Stone walled sites dating to the Late Iron Age and which can be linked to the Tswana occupation of the area, are found on a number of farms in the region, e.g. Waai Hoek and Brul Pan. However, the historic most important one, named Dithakong, is located some distance to the north-west. This site was first visited by early travellers such as Lichtenstein and John Campbell in the early part of the 19th century.

Many early travellers, hunters and missionaries (Burchell 1824, Campbell 1822, Smith 1834-1836 (Lye 1975), Moffat 1842 and Harris 1852) either passed through the area or close to it. Their writings leave us a tantalising description of what life was in these communities before large-scale interaction with white settles took place. Some of the first whites to settle here were the missionaries Samuel Broadbent and Thomas Hodgson, who settled some distance to the east of what later became known as Wolmaransstad.

White settlers moved into the area during the first half of the 19th century. They were largely self-sufficient, basing their survival on cattle/sheep farming and hunting. Few towns were established, and it remained an undeveloped area.

During the 1880s the white settlers exploited conflict between the different Tswana chiefdoms to obtain more land (Legassick 2010). Chief David Massouw gave some land to some whites in recognition for their help in his fight against the Batlhapin chief Mankoroane Molehabanque. From this developed the Republic of Stellaland, which was named for a comet ("stella" in Latin) that was visible in 1882. The town of Vryburg was to be the capital of the republic. However, due to British intervention in the area as a result of the discovery of diamonds, the republic was very short-lived.

The last chapter in the history of the region was its incorporation under the policy of homeland development, into the Republic of Bophuthatswana. This was a very fragmented 'State' and it would have needed permanent support by the central government to keep it in place. Since 1994, this has fallen away, and the people and the region were reincorporated into the larger Republic of South Africa.

The Vryburg town was founded in 1883 as the capital of the Republic of Stellaland, an independent Boer republic. The Boers that inhabited the area styled themselves as free citizens, or *vryburgers*, in Dutch, from which the name of the town was derived. The town achieved municipal status in 1896.

According to available data bases this town has 5 buildings listed as of provincial significance. In addition, some cemeteries and monuments also occur. During the Anglo Boer War (1899-1902) a large concentration camp was established on the outskirts of the town.

The Tierkloof Institute, located to the south of Vryburg, on the farm Waterloo, was established in 1904 and served as centre for higher education for Tswana-speaking people, especially for children of the various royal families.

The Heritage Impact Assessment survey did not identify any sites, features or objects dating to the Stone Age, Iron Age or Historic period within the proposed Vryburg Solar 1 site. However the survey within powerline corridor identified stone tools occurring on a low ridge to the west of the substation. It mostly dates to the Middle Stone Age, although some smaller ones might date to the Later Stone Age. Cores, tools and flakes (debitage) were identified, indicating that the tools were manufactured on site. The material used was mostly chert, although some quartzite were also

identified. The density of the stone tool scatter seems to be quite consistent over the whole ridge, averaging at approximately 2 pieces per $2m^2$.

B.9.2 Graves

Originally some graves occurred east of the substation. They were very old and only marked with low stone cairns. As they were located next to the laydown area for the construction of the substation, they were fenced off. They could not be located during the current site visit (possibly due to incorrect coordinates). It is also possible that they were relocated during the construction activities.

B.9.3 Palaeontology

The South African Heritage Resources Information System (SAHRIS) PalaeoSensitivity Map shows the proposed development area to be largely of High Palaeontological Sensitivity for the PV facility, and areas of Medium, High and Very High Palaeontological Sensitivity within the corridor for the distribution power lines (Figure B.7). Based on the findings of the Palaeontological Impact Assessment, these areas fall in the High Palaeontological Sensitivity category because of the underlying Tertiary-aged calcrete and Quaternary alluvium, sand and soils. Parts of the proposed Power Corridor is underlain by rocks of the Schmidtsdrif Formation which is considered to have a Very High Palaeontological Sensitivity due to the probability of finding stromatolites. As stated in the Palaeontological Impact Assessment; there is a low likelihood that the Quaternary alluvium and aeolian sand and Tertiary calcrete in the study area may contain fossils.

As explained in the Palaeontological Impact Assessment, that although stromatolites are considered to be fossils, there are hundreds of square kilometres of stromatolites in South Africa and it is not considered to be so scarce that every stromatolite has to be preserved.

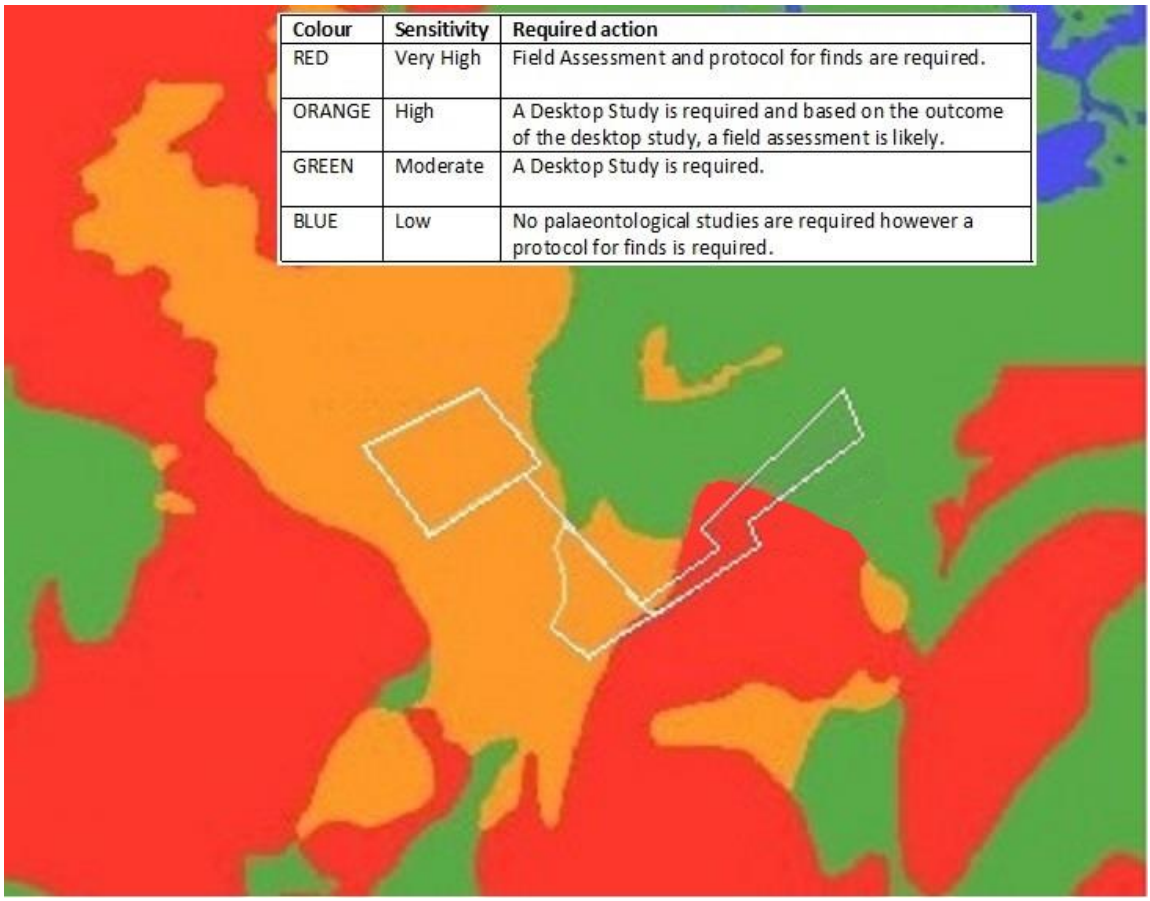

Figure B.7. Palaeontological sensitivity of the region (SAHRA, 2018)

B.10 Socio-Economic Character

The information presented in this section is based on the 2001 and 2011 Census; and 2016 Community Survey carried out by Statistics South Africa (Statistics SA).

As stated above, the proposed project will occur on farm portions located in the North-West Province, approximately 10 km north-west of Vryburg, under the jurisdiction of the Dr Ruth Segomotsi Mompati District Municipality and Naledi Local Municipality.

Additional information on the social Impacts linked to the proposed project is provided in Appendix D of this BA Report.

B.10.1 Demographic Profile

B.10.1.1 Dr Ruth Segomotsi Mompati District Municipality

As noted in the Statistics SA 2016 Community Survey Provincial Profile for the North-West, the Dr Ruth Segomotsi Mompati District Municipality comprises five local municipalities, namely: Naledi; Mamusa; Greater Taung; Lekwa-Teemane; and Kagisano-Molopo (Statistics SA, 2018a).

The Dr Ruth Segomotsi Mompati District Municipality is classified as a Category C municipality, which has municipal executive and legislative authority in an area that includes more than one municipality (Statistics SA, 2016a, Page 6 and 7).

In 2011, the Dr Ruth Segomotsi Mompati District Municipality contained a total population of 463 815 (Statistics SA, 2016a; 2018a). For the 2016 Community Survey conducted by Statistics SA, the population of the Dr Ruth Segomotsi Mompati District Municipality decreased to 459 357 (Statistics SA, 2018a), indicating a -0.22 growth rate. For the District Municipality, the age structure of the population in 2016 was 33.8 % for under 15 years of age, 57.5 % for ages between 15 and 59, and 8.7 % for 60 years and older (Statistics SA, 2018a).

B.10.1.2 Naledi Local Municipality

The Naledi Local Municipality is categorised as a B3 municipality, which is regarded to have small towns, with relatively small populations and significant proportions of urban population (Statistics SA, 2016a, Page 6 and 7).

According to the 2001 and 2011 Census, the total population was respectively recorded as 56 263 and 66 781 for the Naledi Local Municipality (Statistics SA, 2018b), with a 1.71 % growth rate from 2001 - 2011. The population density in 2011 was calculated as 10 persons/km^2 (Statistics SA, 2018b). For the 2016 Community Survey, the population of the Local Municipality increased to 68 803 (Statistics SA, 2018a; and 2018b). In 2001, 32.3 % of the population comprised the young age group (i.e. 0 - 14 years), 64 % comprised the working age (15 – 64 years), and 4.5 % comprised the elderly age group (i.e. 65 years and older), with a dependency ratio of 58.4 % (Statistics SA, 2018b). In 2011, 31 % of the population comprised the young age group (i.e. 0 - 14 years), 64 % comprised the working age (15 – 64 years) and 5 % comprised the elderly age group (i.e. 65 years and older), with a dependency ratio of 56.2 % (Statistics SA, 2018b).

Setswana is the dominant language (69.7%), with Afrikaans (24 %) and English (3.4 %) being the second and third largest languages spoken in the Naledi Local Municipality (Statistics SA, 2018b). The population of the Naledi Local Municipality is predominantly Black Africans (74 %), followed by Coloured (14.7 %), Whites (9.5 %) and Indian/Asians (1.1 %), as shown in Figure B.8 (Statistics SA, 2018b).

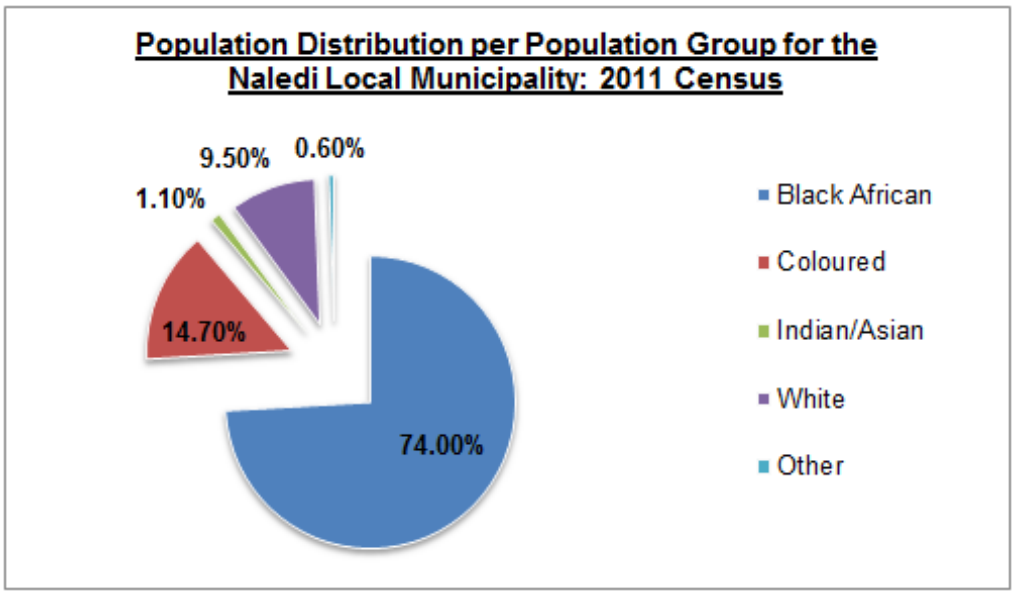

Figure B.8. Percentage Distribution of Population per Population Group for the Naledi Local Municipality in 2011 (Statistics SA, 2018b).

A total of 14 409 and 18 572 households were recorded in the Naledi Local Municipality in 2001 and 2011 respectively, with 34.8 % (in 2001) and 35.3 % (in 2011) of the households being female headed (Statistics SA, 2018b). During the 2016 Community Survey, the number of households increased to 20 692 (Statistics SA, 2018a). In addition, 83.3 % of formal dwellings were recorded in the Local Municipality in 2001, and this decreased to 81.2 % in 2011 (Statistics SA, 2018b).

B.10.1.3 Vryburg Town

Based on the 2011 Census, the total population for the town of Vryburg was recorded as 21 182 (Statistics SA, 2018b). The population density in 2011 was calculated as 330 persons/km^2 (Statistics SA, 2018b). In 2011, the population comprised 29.1 % of the young age group (i.e. 0 - 14 years), 65.1 % of the working age (15 – 64 years), and 5.8 % of the elderly age group (i.e. 65 years and older), with a dependency ratio of 53.5 % (Statistics SA, 2018b).

A total of 5 521 households were recorded in the town in 2011, with 35.8 % of the households being female headed, and 81.2 % of formal dwellings being recorded (Statistics SA, 2018b).

The population of the town of Vryburg is predominantly Black Africans (40.8 %), followed by Coloured (37.6 %), Whites (17.7 %) and Indian/Asians (3.2 %), as shown in Figure B.9 (Statistics SA, 2018b).

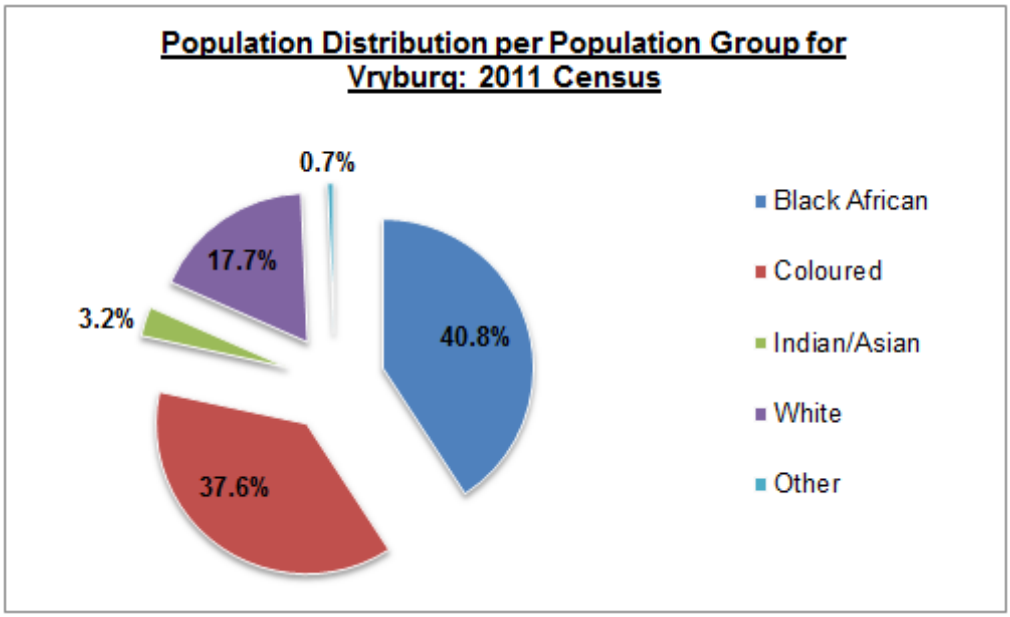

Figure B.9. Percentage Distribution of Population per Population Group for Vryburg in 2011 (Statistics SA, 2018b).

B.10.2 Level of Unemployment

B.10.2.1 Dr Ruth Segomotsi Mompati District Municipality

The working age population of the District Municipality based on the 2011 Census was determined as 271 161, whereas the non-economically active population was 132 786 (Statistics SA, 2012 in Sivest, 2016). The labour force was determined as 112 900, of which 72 535 was employed and 40 365 was unemployed, with an unemployment rate of 35.8 % (Statistics SA, 2012 in Sivest, 2016).

Based on the Statistics SA 2016 Community Survey Provincial Profile for the North-West, the Dr Ruth Segomotsi Mompati District Municipality had a 41.9 % intensity of poverty in 2011 and this increased to 42.2 % in 2016 (Statistics SA, 2016a).

B.10.2.2 Naledi Local Municipality

The 2001 and 2011 census indicates that the Naledi Local Municipality had an unemployment rate of 36.3 % and 26.1 %, respectively (Statistics SA, 2018b). The youth unemployment rate was recorded as 46.1 % in 2001 and 35.5 % in 2011 (Statistics SA, 2018b). Between 2001 and 2011, the unemployment rate therefore significantly decreased by 10.2 %, whilst the youth unemployment rate also significantly decreased by 10.6 %.

According to Statistics SA (2018b), the 2011 unemployment rate of the Local Municipality was the lowest municipal unemployment rate within the district, which could be linked to the municipality being the host to "all district sector government departmental offices", and that the town of contains "major retail sector chain stores that also contribute to employment within the district".

The Naledi Local Municipality had a 41.9 % intensity of poverty in 2011 and this increased to 43.0 % in 2016 (Statistics SA, 2016a).

The 2011 Census data for the employment status of the working age of the population (15 - 64 years) of the Naledi Local Municipality indicates that 18 201 are employed, 6415 are unemployed, 1780 are classified as discouraged work-seekers, and 16344 are classed as not economically active (Statistics SA, 2018b). This is indicated in Figure B.10 below.

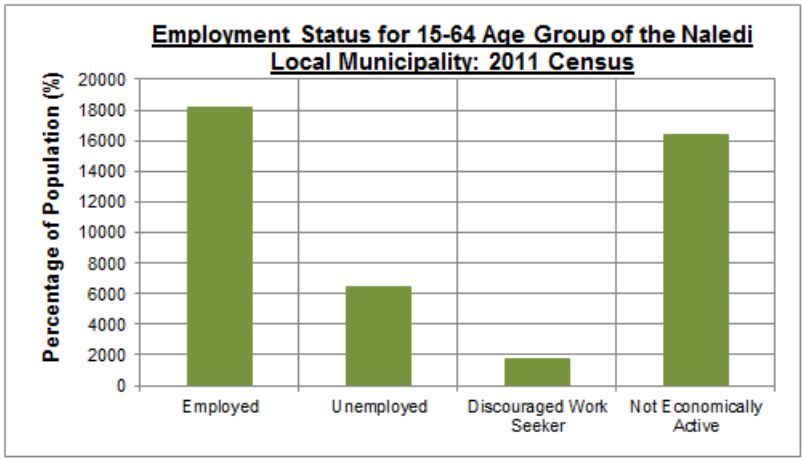

Figure B.10. Employment Status for the 15 – 64 Age Group of the Naledi Local Municipality based on the 2011 Census Data (Statistics SA, 2018b).

B.10.2.3 Vryburg

The working age population of the town of Vryburg based on the 2011 Census was determined as 13 809, whereas the non-economically active population was 4911 (Statistics SA, 2012 in Sivest, 2016). The labour force was determined as 8461, of which 6952 was employed and 1509 was unemployed, with an unemployment rate of 17.8 % (Statistics SA, 2012 in Sivest, 2016).

B.10.3 Economic Profile of Local Municipality

B.10.3.1 Dr Ruth Segomotsi Mompati District Municipality

In terms of the district, 18 564 of households were involved in livestock production, followed by 15 290 for poultry production, 2021 for vegetable production, 1401 for grain and food crops, as well as 711 for fruit production and lastly, 67 for industrial crops (Statistics SA, 2018a).

B.10.3.2 Naledi Local Municipality

Based on the 2011 Census data, approximately 13 % of the households of the Naledi Local Municipality had no income, whereas the majority of the households (i.e. 21.8 %) earned between the R 19 601 – R 38 200 income bracket, as shown in Figure B.11 below, which shows the average household income distribution (Statistics SA, 2018b).

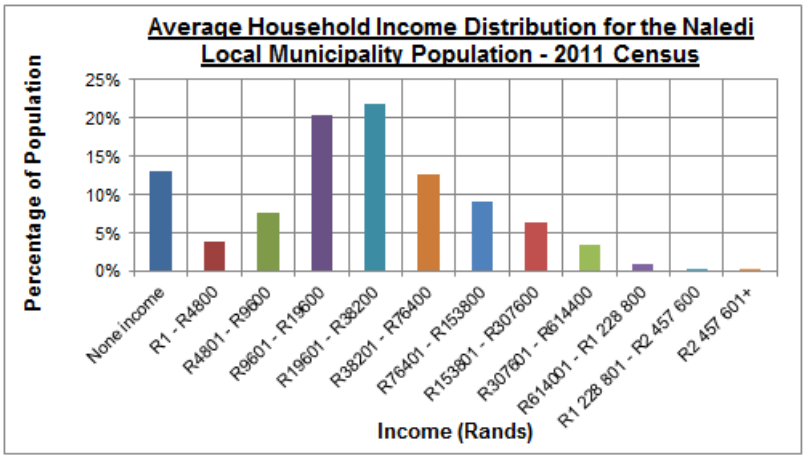

Figure B.11. Average Household Income Distribution of the Naledi Local Municipality in 2011 (Statistics SA, 2018b).

Figure B.12 below shows the annual income category of agricultural households within the Naledi Local Municipality based on the 2011 Census data. It is evident in Figure B.12 that 477 agricultural households had no income, and the majority of households (1468) had an annual income of between R 4 801 and R 38 400 (Statistics SA, 2018b).

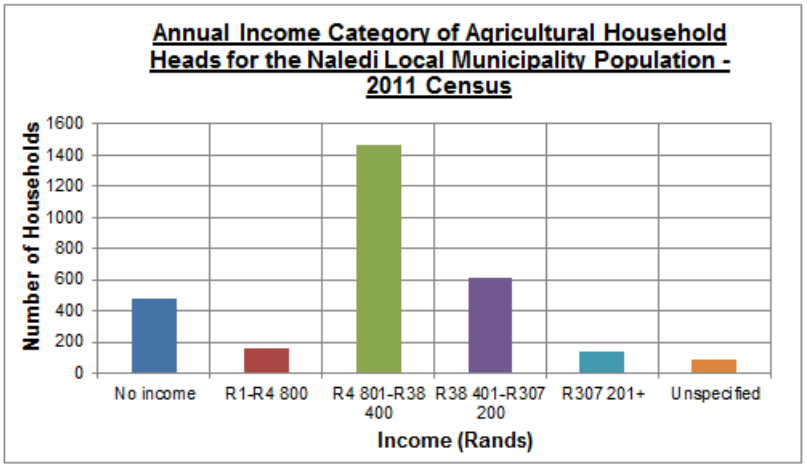

Figure B.12. Annual Income Category of Agricultural Household Heads for the Naledi Local Municipality in 2011 (Statistics SA, 2018b).

Figure B.13 below shows the number of agricultural households in relation to the type of agricultural activity within the Naledi Local Municipality based on the 2011 Census data. Figure B.6 indicates that the majority of households (1500) are involved in poultry production, followed by 1327 households for livestock production, 387 households for production of other crops, and 249 households for vegetable production (Statistics SA, 2018b).

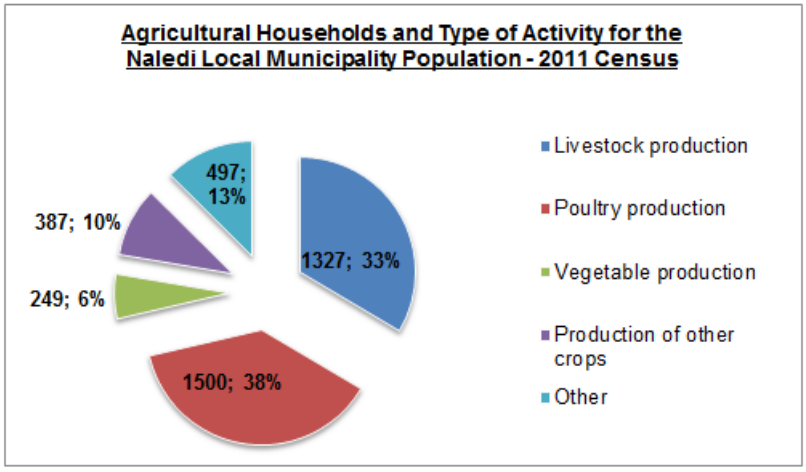

Figure B.13. Agricultural Households and Type of Activity for the Naledi Local Municipality in 2011 (Statistics SA, 2018b).

B.10.3.3 Vryburg

Approximately 10.3 % of the households in Vryburg had no income, whereas the majority of the households (i.e. 17.60 %) earned between the R 19 601 – R 38 200 income bracket, as shown in Figure B.14 below, which shows the average household income distribution based on the 2011 Census data (Statistics SA, 2018b).

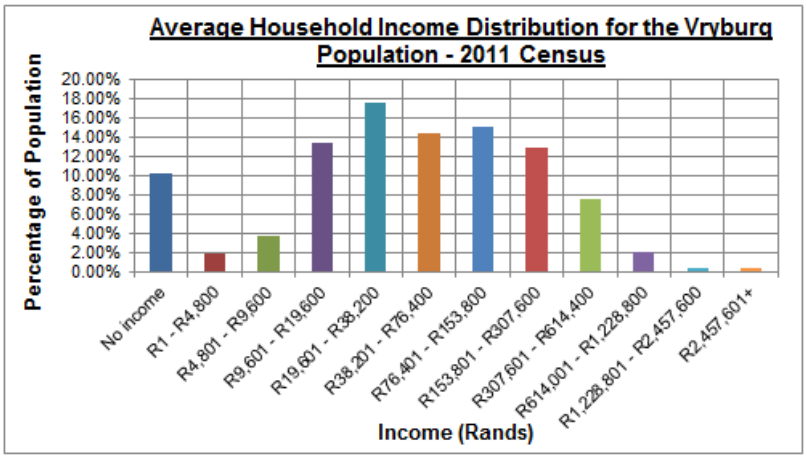

Figure B.14. Average Household Income Distribution of the town of Vryburg in 2011 (Statistics SA, 2018b).

B.10.4 Level of Education

B.10.4.1 Dr Ruth Segomotsi Mompati District Municipality

Based on the 2016 Community Survey, the population of District Municipality displayed 34.6 % of no schooling, 12 % of primary schooling, 50.6 % of secondary schooling, and 2.8 % of higher education (Statistics SA, 2018a).

B.10.4.2 Naledi Local Municipality

Figure B.15 shows the Education Levels for all ages for the population of the Naledi Local Municipality based on the 2011 Census. It is evident that a large portion of the population in 2011 had some primary schooling (i.e. 47.50 %), whereas only 1.3 % of the population had higher education.

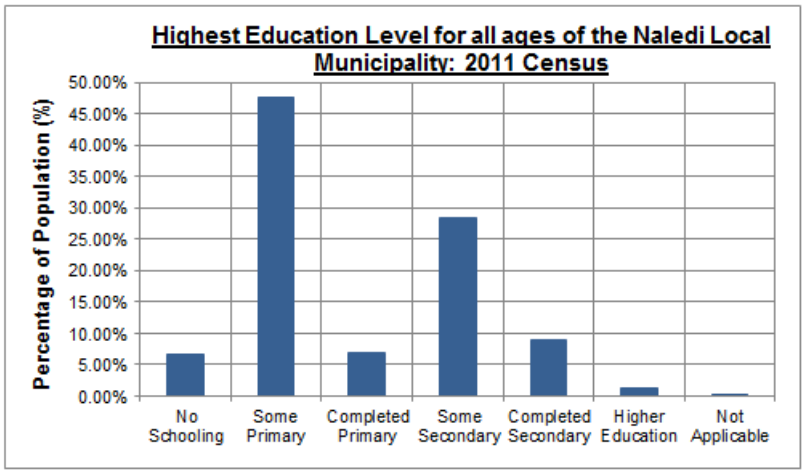

Figure B.15. Education Levels of the Naledi Local Municipality in 2011 (Statistics SA, 2018a).

B.10.4.3 Vryburg

In terms of education, 9.3 % of the population of the town of Vryburg was recorded in 2011 as having no schooling, 11.80 % with some primary schooling, 4.7 % completed primary school, 30.2 % with some secondary education, 28.70 % completed matric, and 15.40 % with higher education, as shown in Figure B.16 below.

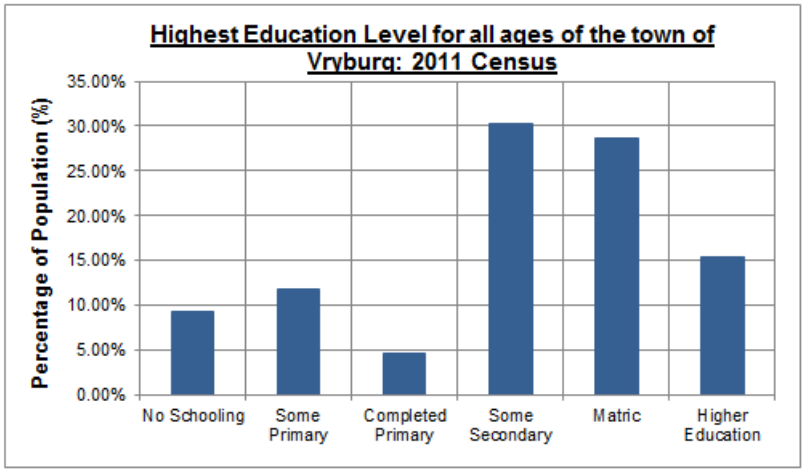

Figure B.16. Education Levels of the Town of Vryburg in 2011 (Statistics SA, 2018a).

SECTION C: PUBLIC PARTICIPATION

C.1 Introduction to the Public Participation Process

This section provides an overview of the tasks undertaken during the BA Phase, with a particular emphasis on providing a clear record of the Public Participation Process (PPP) to be followed. An integrated PPP will be undertaken for the BA Processes (i.e. Vryburg Solar 1, Vryburg Solar 2, and Vryburg Solar 3). Separate BA Reports have been compiled for each project and these are being made available for Interested and Affected Parties (I&AP) and authority review in an integrated manner. The integrated PPP for the proposed projects entails that all public participation documents (such as newspaper advertisements, site notices, notification letters, emails etc.) will serve to notify I&APs, Stakeholders and Organs of State of the joint availability of all reports for the abovementioned projects and will provide I&APs with an opportunity to comment on the reports. This process is outlined in Figure C.1. This approach is being undertaken due to the close proximity of the sites (i.e. the proposed projects will take place within the same geographical area) and that proposed projects entail the same activity (i.e. generation of energy using a renewable source (i.e. Solar PV), and distribution of electricity via distribution lines).

The PPP for these BA Processes is driven by a stakeholder engagement process that includes inputs from authorities, I&APs, technical specialists and the project proponent. Guideline 4 on "Public Participation in support of the EIA Regulations" published by the former Department of Environmental Affairs and Tourism (DEAT) in May 2006, states that public participation is one of the most important aspects of the EA Process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the Competent Authority (CA) to make informed decisions and results in improved decision-making as the view of all parties are considered.

An effective PPP could therefore result in stakeholders working together to produce better decisions than if they had worked independently. The DEAT guideline states the following in terms of PPP:

- "Provides an opportunity for I&APs, EAPs and the CA to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
    - Provides I&APs with an opportunity to voice their support, concern and question regarding the project, application or decision;
    - Enables an applicant to incorporate the needs, preferences and values of affected parties into its application;
    - Provides opportunities for clearing up misunderstanding about technical issues, resolving disputes and reconciling conflicting interests;
    - Is an important aspect of securing transparency and accountability in decision-making; and
    - Contributes toward maintaining a health, vibrant democracy."

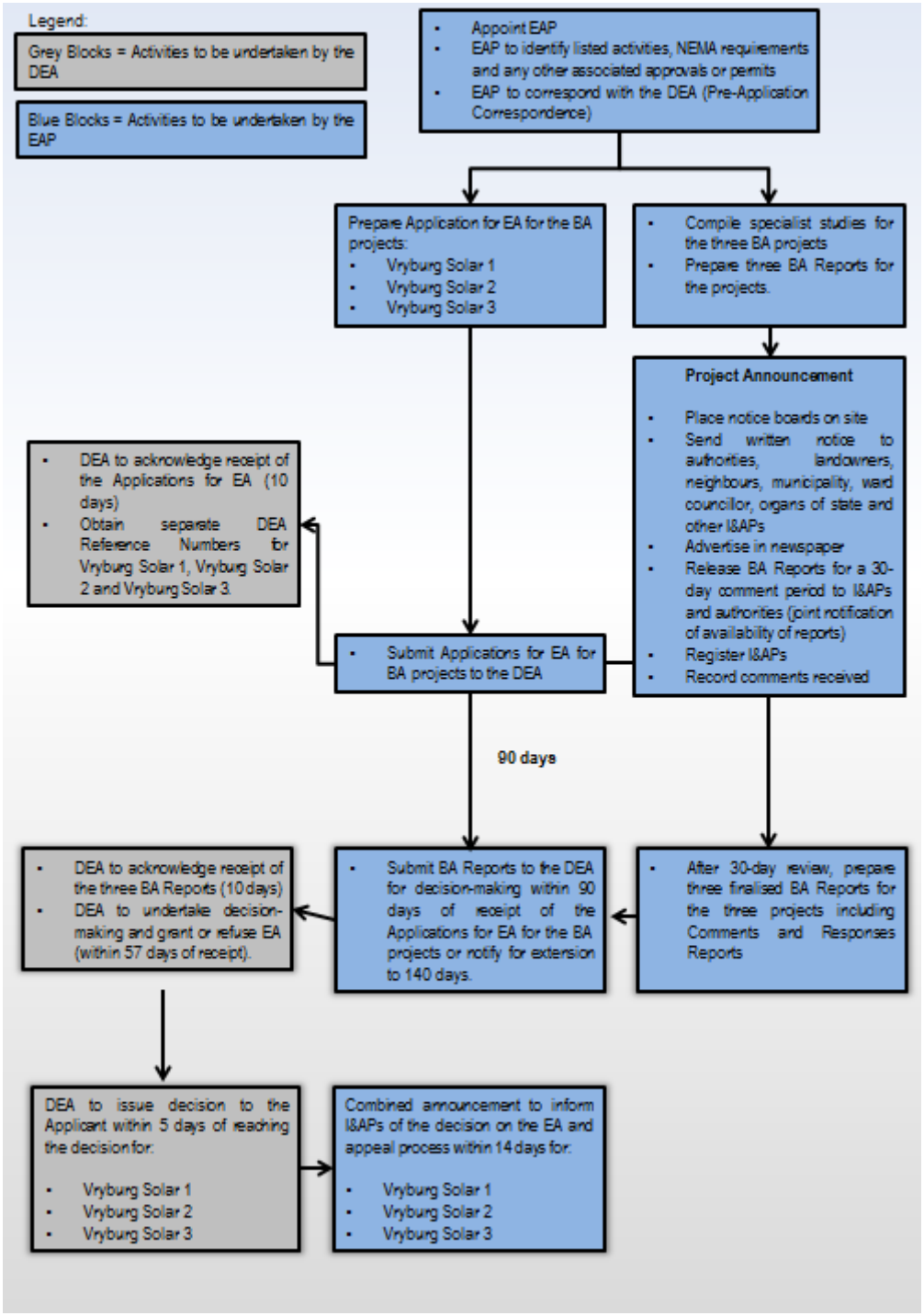

Figure C.1. Joint PPP proposed for the Vryburg Solar 1, Vryburg Solar 2 and Vryburg Solar 3 BA Projects

To the above, one can add the following universally recognised principles for public participation:

- Inclusive consultation that enables all sectors of society to participate in the consultation and assessment processes;
- Provision of accurate and easily accessible information in a language that is clear and sufficiently non-technical for I&APs to understand, and that is sufficient to enable meaningful participation;
- Active empowerment of grassroots people to understand concepts and information with a view to active and meaningful participation;
- Use of a variety of methods for information dissemination in order to improve accessibility, for example, by way of discussion documents, meetings, workshops, focus group discussions, and the printed and broadcast media;
- Affording I&APs sufficient time to study material, to exchange information, and to make contributions at various stages during the assessment process;
- Provision of opportunities for I&APs to provide their inputs via a range of methods, for example, via briefing sessions, public meetings, written submissions or direct contact with members of the BA team.
- Public participation is a process and vehicle to provide sufficient and accessible information to I&APs in an objective manner to assist I&APs to identify issues of concern, to identify alternatives, to suggest opportunities to reduce potentially negative or enhance potentially positive impacts, and to verify that issues and/or inputs have been captured and addressed during the assessment process.

At the outset it is important to highlight two key aspects of public participation:

- There are practical and financial limitations to the involvement of all individuals within a PPP. Hence, public participation aims to generate issues that are representative of societal sectors, not each individual. Hence, the PPP will be designed to be inclusive of a broad range of sectors relevant to the proposed project.
- The PPP will aim to raise a diversity of perspectives and will not be designed to force consensus amongst I&APs. Indeed, diversity of opinion rather than consensus building is likely to enrich ultimate decision-making. Therefore, where possible, the PPP will aim to obtain an indication of trade-offs that all stakeholders (i.e. I&APs, technical specialists, the authorities and the development proponent) are willing to accept with regard to the ecological sustainability, social equity and economic growth associated with the project.

The key steps in the PPP for the BAs are described below. This approach is structured in line with the requirements of Chapter 6 (PPP) of the 2014 NEMA EIA Regulations (as amended, i.e. GN R326).

The BA Processes commenced in July 2018, whereby the specialist studies were commissioned and the BA Reports were compiled. The BA Reports are currently being released to I&APs, Stakeholders and Organs of State (including the National DEA) for a 30-day comment period. The Applications for EA are to be submitted to the National DEA at the same time as the BA Reports.

C.2 Landowner written consent

Regulation 39 (1) of the 2014 NEMA EIA Regulations (as amended) states that "*if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity,*

obtain the written consent of the landowner or person in control of the land to undertake such activity on that land".

Regulation 39 (2) of the 2014 NEMA EIA Regulations (as amended) further states that "*sub-regulation (1) does not apply in respect of: (a) linear activities; (b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and (c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014*".

The proposed solar PV component of the Vryburg Solar 1, Vryburg Solar 2 and Vryburg Solar 3 projects constitute a non-linear activity, and landowner consent is therefore required for the following land portions:

Project	Affected Farm Portions
Vryburg Solar 1	▪ Portion 2 of Farm Frankfort Number 672 ("Erica")
Vryburg Solar 2	▪ Portion 1 of Farm Retreat Number 671
Vryburg Solar 3	▪ Portion 1 of Farm Retreat Number 671

Written consent has been obtained from the landowner of the above farm portions (i.e. the Edinburgh Trust), on which the non-linear infrastructure are proposed to be located. The written consent has been included as an appendix to the Application for EA, which will be submitted to the DEA for consideration, together with the BA Reports for comment.

The proposed access road, distribution line and associated infrastructure (including the proposed gravel service road below the distribution line) are constituted as linear developments; hence written consent is not legally required in terms of Regulation 39 of the 2014 NEMA EIA Regulations (as amended). However, part of the proposed distribution line corridor occurs on the Remainder of Farm Rosendal 673, which is owned by the Naledi Local Municipality, and in order to show their awareness of the proposed project, they have provided signed consent. The written consent has been included in the Application for EA for submission to the DEA.

C.3 Advertisement and Site Notice board

Newspaper Advertisement:

Regulation 41 (2) (c) of the 2014 NEMA EIA Regulations (as amended) requires the placement of a newspaper advertisement in one local newspaper. In line with this, in order to notify and inform the public of the proposed projects, to invite I&APs to register on the project database, as well as to inform I&APs of the release of the BA Reports for comment, the BA Processes have been arranged to be advertised in one local newspaper at the commencement of the 30-day comment period for the BA Reports. Specifically, the advertisements have been arranged to be placed in the Stellalander newspaper (in both English and Afrikaans). The newspaper advertisement also provides 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.

Proof of placement of the newspaper advertisements will be included in Appendix E of the finalised BA Report.

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 entrance of Portion 1 of the Retreat Farm 671, entrance to Portion 2 Frankfort Farm 672, Remainder of Rosendal Farm 673 and at the Naledi Local Municipality Offices in Vryburg.

A copy of the notice boards is included in Appendix E.1 of this BA Report. Proof of placement of the notice boards will be included in the finalised BA Report.

C.4 Determination of appropriate measures

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

In terms of Regulation 41 (2) (e) of GN R326, at this stage of the assessment process no persons have been identified as desiring but unable to participate in the process. Therefore, no alternative methods have been agreed to by the competent authority.

In line with Regulation 41 (2) (b) of GN R326 and prior to the commencement of the BA Process (and advertising the EA Process in the local print media), an initial database of I&APs (including key stakeholders and Organs of State) was developed for the combined BA Processes. This was supplemented with input from the EAP and the Project Applicant. Appendix E.2 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 that have been added to the project database. In line with Regulation 41 (2) (b) of the 2014 NEMA EIA Regulations, the database includes the details of the following:

- Landowners of the affected farm portions;
- Landowners of the neighbouring adjacent farm portions;
- The municipal councillor of the ward in which the proposed projects will be undertaken (i.e. Ward Numbers 5 and 9);
- The municipality which has jurisdiction in the area (i.e. Naledi Local Municipality and Dr. Ruth Segomotsi Mompati District Municipality);
- Relevant Organs of State that have jurisdiction in respect of any aspect of the activity; and
- Any other party as required by the competent authority.

The above stakeholders, Organs of State and I&APs will accordingly receive written notification of the commencement of the BA Processes and release of the BA Reports for comment.

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 per Regulation 42 of the GN 326, in terms of the electronic database, I&AP details will be 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.

C.5 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.

C.5.1 BA Report Phase - Review of the BA Report

As noted above, the BA Reports for each Vryburg Solar project are currently being released to I&APs, Stakeholders and Organs of State for review. The section below summarises the PPP for the review of the BA Reports.

- **Database Development and Maintenance**: In line with Regulation 41 (2) (b) of GN R326, an initial database of potential I&APs was developed for the BA Process, and will be updated throughout the process. Refer to Section C (4) for additional information.

- **Site Notice Board**: As noted in Section C (3) above, 4 notice boards were placed for the proposed projects. A copy of the notice boards is included in Appendix E.1 of this BA Report.

- **Letter 1 to I&APs**: Written notification of the availability of the BA Reports will be sent to all I&APs and Organs of State included on the project database via Letter 1 sent through email (where email addresses are available) and postage (where postal and/or physical addresses are available). The letter will be written in English, and will include notification of the 30-day comment period for the BA Reports, and a Comment and Registration Form. Proof of postage and email, as well as copies of the Letter 1 and emails sent will be included in Appendix E of the finalised BA Report (which will be submitted to the DEA for decision-making).

- **Advertisements to Register Interest:** An advertisement will be placed in The Stellander for the release of the BA Reports for comment. A copy of this advertisement will be included in Appendix E of the finalised BA Report.

- **30-day Comment Period**: As noted above, potential I&APs, including authorities and Organs of State, are to be notified via Letter 1, of the 30-day comment and registration period within which to submit comments on the BA Reports and/or to register on the I&AP database.

- **Availability of Information:** The BA Reports will be made available and distributed to ensure access to information on the project and to communicate the outcome of specialist studies. Copies of the reports will be placed at the Huhudi local 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 Reports via courier. Proof of courier (i.e. waybills) will be included in Appendix E of the finalised BA Report. The BA Reports will also be uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment) and telephonic consultations will take place, as necessary.

- **Comments Received**: A key component of the BA Process is documenting and responding to the comments received from I&APs and the authorities. Copies of all comments received during the review of the BA Reports will be included in Appendix E of the finalised BA Report and in the Comments and Response Report.

C.5.2 Compilation of finalised BA Reports for Submission to the DEA

- Following the 30-day commenting period of the BA Reports and incorporation of the comments received into the reports, the finalised BA Reports (i.e. hard copies and electronic copies) will be submitted to the DEA in line with Regulation 19 (1) (a) of the 2014 NEMA EIA Regulations (as amended). In line with best practice, I&APs on the project database will be notified via email (where email addresses are available) of the submission of the finalised BA Reports to the DEA for decision-making.
- The BA Reports that are submitted for decision-making will include proof of the PPP that will be undertaken to inform Organs of State, Stakeholders and I&APs of the availability of the BA Reports for the 30 day review (as explained above). To ensure ongoing access to information, copies of the finalised BA Reports that will be submitted for decision-making and the Comments and Response Report (detailing comments received during the BA Phase and responses thereto) will be placed on the project website (i.e. https://www.csir.co.za/environmental-impact-assessment).
- The DEA will have 57 days (from receipt of the finalised BA Reports) to either grant or refuse EA (in line with Regulation 20 (1) of the 2014 NEMA EIA Regulations (as amended)).

C.5.3 Environmental Decision-Making

- **Environmental Decision-Making and Appeal Period** - Subsequent to the decision-making phase, if an EA is granted by the DEA for the proposed projects, all registered I&APs, Organs of State and stakeholders on the project database will receive notification of the issuing of the EA and the appeal period. The 2014 NEMA EIA Regulations (as amended) (i.e. Regulation 4 (1)) states that after the Competent Authority has a reached a decision, it must inform the Applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) of the 2014 NEMA EIA Regulations (as amended) stipulates that I&APs need to be informed of the EA and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the EA and the appeal procedure and its respective timelines. The distribution of the EA (should such authorisation be granted by the DEA), as well as the notification of the appeal period, will include a letter (i.e. Letter 2) to 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).

C.6 Issues raised by I&APs and comments and response report

Issues raised by I&APs during the release of the BA Reports will be captured in the finalised BA Reports, together with responses to the comments from the project team.

C.7 Consultation with the DEA (CA)

Pre-application discussions and communications were held with the DEA in July 2018 with regards to seeking their feedback on the specialist studies commissioned, as well as the approach to the BA Process in the REDZ and the assessment of cumulative impacts. The DEA responded to the EAP on 31 July 2018. A copy of this correspondence is included in Appendix E.3 of this BA Report.

SECTION D: IMPACT ASSESSMENT

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).

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. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

The cumulative impacts have been assessed by identifying other renewable energy project proposals and other applicable (and relevant) projects, such as construction and upgrade of electricity generation, and transmission or distribution infrastructure in the local area (i.e. within 30 km of the proposed solar PV facility). There are various renewable energy projects being investigated in the local area that are at different stages of planning, ranging from a project that has been awarded Preferred Bidder status approach, to projects where the EIAs/BAs are currently being conducted. The approach for this BA is that the assessment includes all renewable energy projects within 30 km that have received an EA at the time of starting this BA (i.e. by 18 June 2018).

Only one project, the Waterloo 75 MW Solar Project, has received Preferred Bidder status and has reached financial closure, with construction planned to start in 2018. Details on other projects that have received positive EAs are provided in Table D.1.

Table D.1. Proposed renewable energy projects that have received EA within 30 km of Solar PV facility according to the DEA's database

PROPOSED DEVELOPMENT	DEA REFERENCE NO.	CURRENT EIA STATUS	PROPONENT	PROPOSED CAPACITY	EXTENT	FARM DETAILS
Tiger Kloof Solar PV energy facility	14/12/16/3/3/2/535	EA received	Kabi Solar (Pty) Ltd.	75 MW	250 Ha	Portions 3 & 4 of the Farm Waterloo 730
Sediba Power Plant 75MW PV Solar Facility and associated infrastructure	14/12/16/3/3/2/390AM1	EA received	Sediba Power Plant (Pty) Ltd	75 MW	150 Ha	A portion of the remaining extent of the Farm Rosendal 673
Sediba Power Plant 75MW PV Solar Facility and associated infrastructure	14/12/16/3/3/2/390AM2	EA received	Sediba Power Plant (Pty) Ltd	75 MW	150 Ha	A portion of the remaining extent of the Farm Rosendal 673
Waterloo Solar Park	14/12/16/3/3/2/308AM3	EA and awarded preferred bidder status (REIPPP window 4)	DPS79 Solar Energy (Pty) Ltd	75 MW	150 Ha	Southern portion of the Farm Waterloo 992

PROPOSED DEVELOPMENT	DEA REFERENCE	CURRENT EIA	PROPONENT	PROPOSED CAPACITY	EXTENT	FARM DETAILS
Cronos Energy Renewable Energy Generation Project	14/12/16/3/3/2/750	EA received	Cronos Energy (Pty) Ltd	75 MW	Not known	Remainder of the Farm Elma No 575
75MW Carocraft PV Solar Park and associated infrastructure	14/12/16/3/3/2/374	EA received 29 June 2013. Amended to 75 MW on 4 April 2014	Carocraft (Pty) Ltd	75 MW	Not known	Portion 1 and the Remainder of the Farm Weltevrede 681

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 D.1). 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):

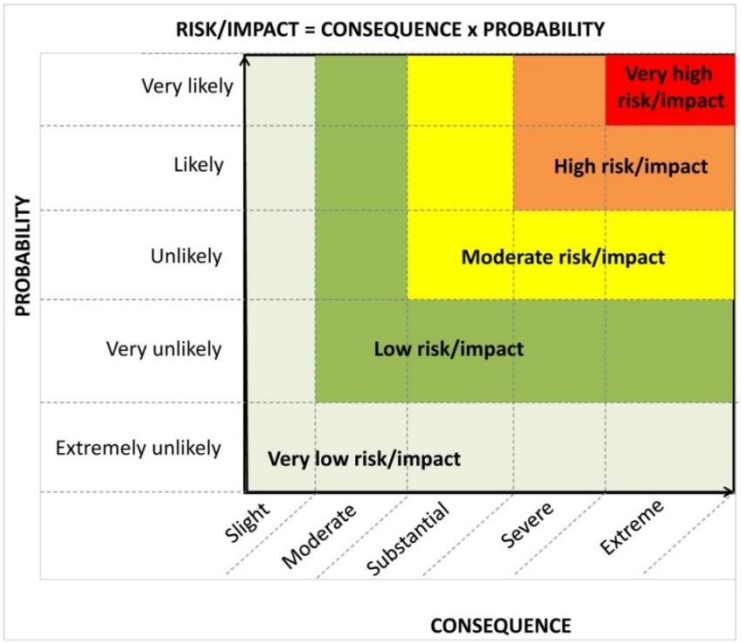

Figure D.1. Guide to assessing risk/impact significance as a result of consequence and probability.

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);
- 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; 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.

D.1.2 Assessment of environmental risks and impacts

The issues and impacts presented in this Section have been identified via the environmental *status quo* of the receiving environment (environmental, social and heritage features present on site - as discussed in Section B of this BA Report) and input from specialists that form part of the project team. The specialist studies undertaken to inform this BA has been summarised in this section. It should be noted that unless otherwise stated, impacts identified and their associated significance are deemed to be negative.

Please refer to Appendix D of this report for the full specialist studies undertaken (including the Terms of Reference for each study) and Appendix F for the full Impact Assessment Tables. All

proposed mitigation measures have been carried over into the project's EMPr, included in Appendix G of this report.

D.1.2.1 Visual[4]

D.1.2.1.1 Approach and methodology

This VIA is based on guidelines for visual assessment specialist studies as set out by South Africa's Western Cape Department of Environmental Affairs and Development Planning, as well as guidelines provided by the Landscape Institute of the UK.

A visibility analysis was conducted for the region surrounding the proposed development site and components of the development relevant to the assessment of the potential visual impact (10 km radius) to identify key representative viewpoints and sensitive visual receptors. A site visit and photographic survey of this region followed to establish a baseline for visual resources to compare the proposed developments against. Spatial Development Frameworks and Integrated Development Plans for the relevant municipalities were studied to align the VIA with municipal objectives in terms of landscape and visual resources.

The key steps followed in the VIA are presented below:

Site Visit and Photographic Survey

The field survey (conducted on 17-19 October 2016) provided an opportunity to:

- Determine the actual or practical extent of potential visibility of the proposed development, by assessing the screening effect of landscape features;
- Conduct a photographic survey of the landscape surrounding the development;
- Take photos for use in photomontage images;
- Identify sensitive landscape and visual receptors;
- Viewpoints were chosen using the following criteria:
    - High visibility – sites from where most of the solar facility will be visible;
    - High visual exposure – sites at various distances from the proposed site; and
    - Sensitive areas and viewpoints such as nature reserves and game farms from which turbines will potentially be seen.
- Additionally, photo sites were chosen to aid in describing the landscape surrounding, and potentially affected by, the proposed development.

Field work was conducted in spring but seasonal differences in vegetation cover and atmospheric conditions are slight and contrasts in texture and colour between development structures and landscape background will not change enough due to seasonal changes to invalidate this assessment.

[4] Holland, 2018

Landscape Description

A desktop study was conducted to establish and describe the landscape character of the receiving environment. A combination of data analysis using a Geographic Information System (GIS), literature review and photographic survey was used to identify land cover, landforms and land use in order to gain an understanding of the current landscape within which the development will take place. Areas of scenic interest, potential sensitive receptors (viewpoints, residences), preliminary zone of visual influence, and principal representative viewpoints were also identified. Landscape features of special interest were identified and mapped, as were landscape elements that may potentially be affected by the development.

Visual Impact Assessment

A GIS (TNTmips) is used to calculate viewsheds for various components of the proposed development. The viewsheds and information gathered during the field survey were used to define criteria such as visibility, viewer sensitivity, visual exposure and visual intrusion for the proposed development. These criteria were, in turn, used to determine the intensity of potential visual impacts on sensitive viewers. All information and knowledge acquired as part of the assessment process was then used to determine the potential significance of the impacts according to the standardised rating methodology.

D.1.2.1.2 Project aspects relevant to visual impacts

It is likely that all or most components of the proposed PV plant will contribute to potential visual impact during the construction and decommissioning phases. Elements of the construction and decommissioning phases that will have a potential visual impact include:

- A large area will be cleared of vegetation to host the solar field and associated buildings and structures;
- Laydown areas for equipment will also be required, although these will be temporary;
- Access roads, maintenance roads and power line servitudes will require clearing of vegetation. Exposure of large tracts of soil or rock will contrast significantly with the existing mottled landscape;
- Soil stockpiles and removed vegetation heaps will potentially be visible;
- Alien invasive plant species may contrast strongly with surrounding vegetation;
- An increase in human activity in a remote area is likely to be noticed even by only a small number of visual receptors. Construction of the various components will require a large number of workers. Relatively large construction equipment and vehicles will be operating during these phases of development, and an increase in traffic on roads in the region is likely;
- Exposure of large areas of soil, and worker and equipment traffic will increase dust generation which will increase construction visibility;
- Buried pipelines and cables will not be visible during the operational phase, but activity, equipment and soil heaps will be visible during construction; and
- Construction or improvement of access roads will be more visible than the operational roads.

Construction of the proposed power line for the PV plant will potentially cause visual intrusion on existing views of sensitive visual receptors through the following activities:

- Some construction activities will potentially be exposed above the skyline due to the height of the pylons, and as such it is likely to be more intrusive on views;
- Laydown areas for equipment will be required, although these will be temporary;
- Access roads, maintenance roads and power line servitudes will potentially require clearing of vegetation;
- Soil stockpiles and removed vegetation heaps will be visible;
- Alien invasive plant species may contrast strongly with surrounding vegetation;
- An increase in human activity in a remote area is likely to be noticed even by only a small number of visual receptors. Relatively large construction equipment and vehicles will be operating during these phases of development, and an increase in traffic on roads in the region is likely;
- Exposure of large areas of soil, and worker and equipment traffic will increase dust generation which will increase construction visibility; and
- Construction or improvement of access roads will be more visible than the operational roads.

Elements of the proposed project that will potentially cause significant visual impact during the operational phase include (maximum heights were used in the analyses to model a worst case scenario):

- Solar field – solar panels of up to 10 m high. The solar field covers a large area and is likely to contrast strongly with surrounding or background vegetation, particularly when viewed from elevated positions;
- Converter station and operations buildings (i.e. operational and maintenance control centre, offices, workshop/warehouse, operations office etc.) (7 m high);
- On-site substation (height up to 15 m for the structures and up to 25m for the lightning conductor poles) and 132 kV overhead distribution line (30 m high – these are likely to extend above the skyline for some visual receptors in the surrounding area;
- Security fencing (up to 3 m high) and the guard cabin/house (3 m high). From some viewing angles the fence is more visible than the panels;
- Solar resource measuring station (5 m high);
- Buildings and ancillary structures will likely contrast strongly with the solar field due to colour differences as well as the fact that most structures are taller than the solar panels; and
- Security and exterior lighting around buildings and parking areas could add to light pollution in the region.

D.1.2.1.3 Sensitivity of the site in relation to the proposed activity

D.1.2.1.3.1 Sensitive visual features

Features at risk of impact in a VIA are the **landscape** and **sensitive visual receptors** in the landscape.

Landscape

A landscape impact occurs when a development alters the existing landscape character. If the landscape character is highly sensitive to the development type then the intensity of the impact will be high. A high intensity landscape impact, for instance, will be highly significant if the

landscape character type is scarce as well as highly valued by the community (local, regional, national and international). The landscape impact does not depend only on the existing sensitive visual receptors since it can also affect future visual receptors and communities beyond the local or regional context.

As noted above, the existing landscape character of the surrounding region is peri-urban with some large scale infrastructure such as various large roads, a railway and the Eskom Mookodi Substation. The proximity to a relatively large settlement is evident in the surrounding landscape. As a result the landscape character has a low sensitivity to the proposed development.

Sensitive Visual Receptors

The viewshed map for the proposed Vryburg Solar 1 PV plant (Figure D.2) shows that potentially affected sensitive visual receptors are mainly limited to farmsteads, dwellings and viewpoints on farms surrounding the proposed site, and motorists using the N14 east of Vryburg and the R34. The settlement of Vryburg is located outside the viewshed. Sensitive visual receptors for the Vryburg Solar 1 PV Plant therefore include:

- Residents and viewpoints on farms surrounding the proposed site; and
- Motorists on the N14 and R34.
- The viewshed map for the proposed overhead line (OHL) from the PV Plant to Mookodi Substation indicates that visual receptors in Vryburg, residents and viewpoints on surrounding farms and motorists on the N14, N18 and R34 will potentially be affected by the power line.

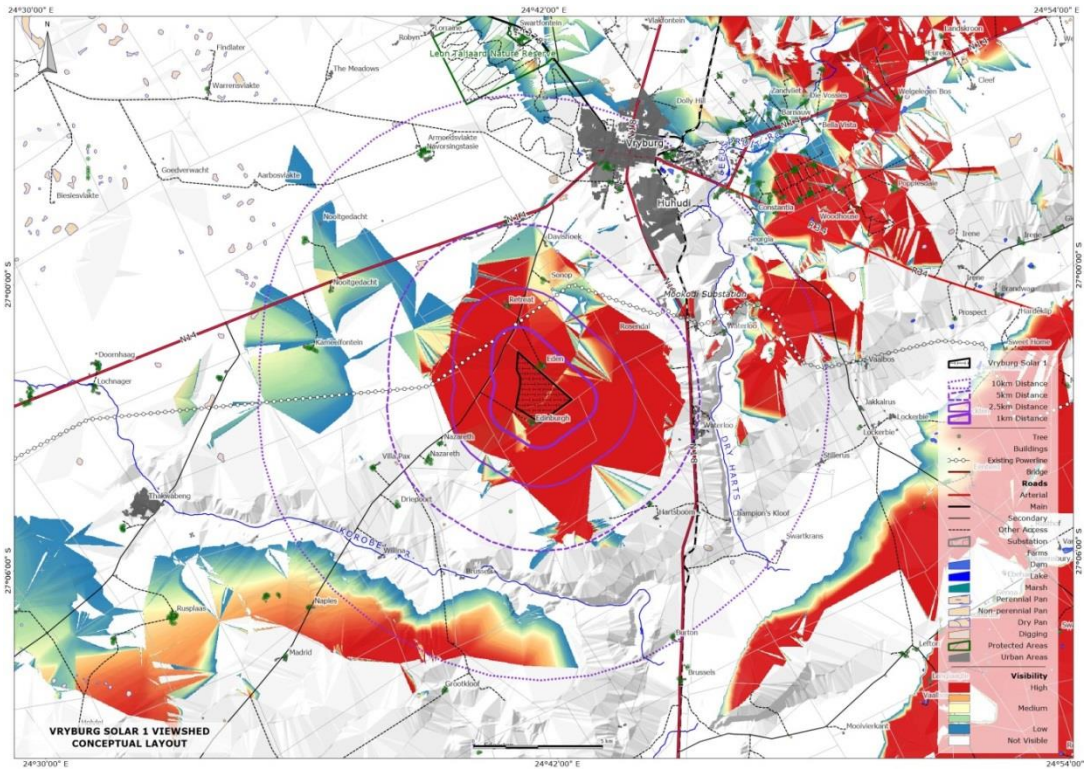

Figure D.2. Viewshed of the proposed Vryburg Solar 1 facility

Sensitive visual receptors for the proposed overhead line include (Figure D.3):

- Residents in Vryburg;
- Residents and viewpoints on farms surrounding the proposed sites; and
- Motorists on the N14 and R34.

Residents of Vryburg are rated as low sensitivity visual receptors since they are surrounded by urban structures which tend to produce views of high complexity, patterns and contrasts. Residents on surrounding farms are highly sensitive to changes in their views since they have an active interest in the landscape. The topography of the region is such that there are unlikely to be viewpoints of exceptional scenic value on farms immediately surrounding the proposed site. Motorists are rated as low sensitivity visual receptors since they pass through the landscape and their attention is focused on the road. The N14, N18 and R34 are also busy roads and motorists will have many urban elements related to the settlement of Vryburg in their views.

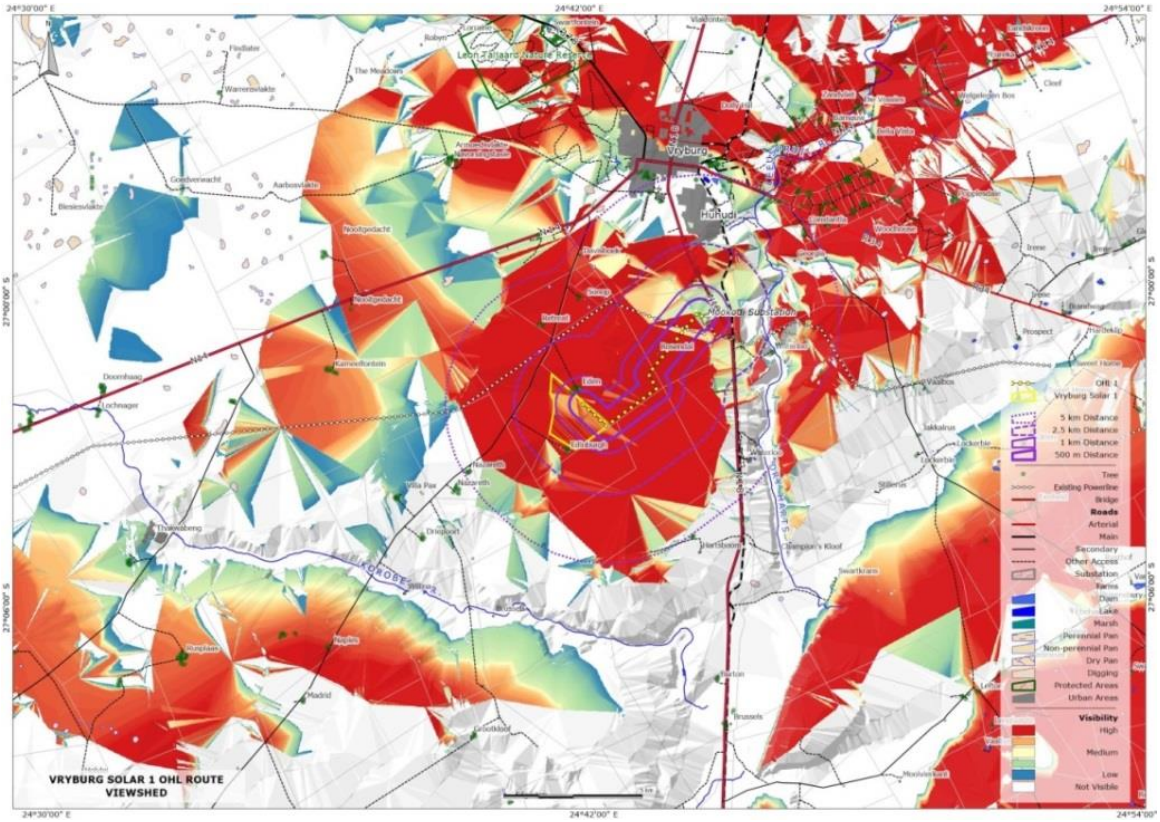

Figure D.3. Viewshed of the proposed 132 kV power line from Vryburg Solar 1 to the Mookodi Substation

D.1.2.1.3.2 Visual exposure

Visual exposure refers to the relative visibility of a project or feature in the landscape and is related to the distance between the observer and the project. Exposure and visual impact tend to diminish exponentially with distance since the observed element comprises a smaller part of the view. Visual exposure is classified as follows:

- High – dominant or clearly noticeable;

- Moderate – recognisable to the viewer; and
- Low – not particularly noticeable to the viewer

Residents of Vryburg are unlikely to have views of the proposed PV Plant and they will experience low visual exposure to the power line since they are more than 2.5 km from the route. There are a number of farmsteads within 2.5 km of the proposed site (Figure D.4). Visual receptors at Edinburg, Eden and Retreat will be highly exposed to the development (23 buildings), while those at Sonop will be moderately exposed (6 buildings). The Edinburg farmstead is on the farm hosting the project. Visual exposure for the 132 kV powerline is limited to approximately 1 km from the proposed route. There are three buildings north of the route which will be highly exposed to power lines (it is unclear whether these buildings are occupied) and some of the buildings at the Eden farmstead will also be highly exposed (Figure D.5).

The major roads in the region are all more than 5 km from the Vryburg Solar 1 site where they fall within the viewshed. Motorists on these roads will experience low visual exposure to the proposed solar plant. Motorists using the N18 will potentially be highly exposed to the power line for a 2 km section of the road (1 minute at 100 km/h). Motorists using the other main roads will experience low visual exposure to the proposed power line when in the viewshed.

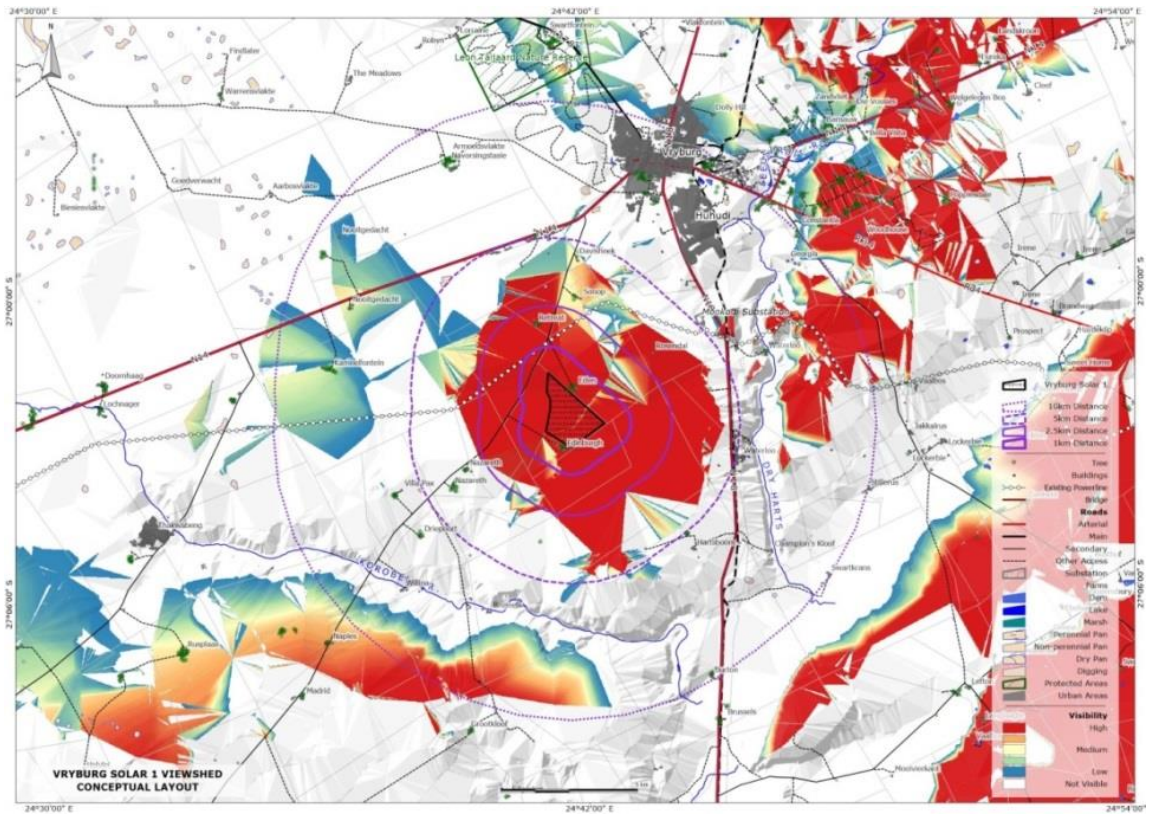

Figure D.4. Viewshed of the proposed Vryburg Solar 1 facility

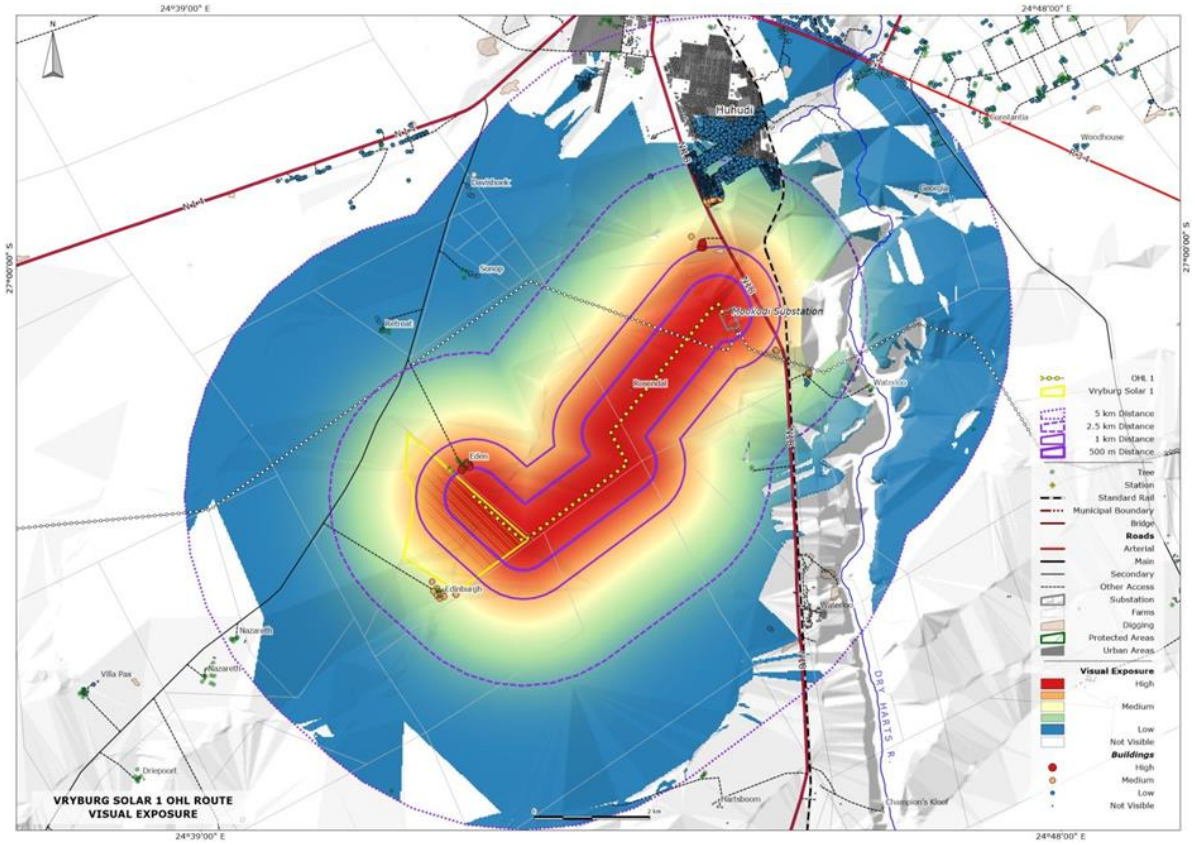

Figure D.5. Visual exposure for sensitive visual receptors within 5 km of the proposed 132 kV powerline

D.1.2.1.3.3 Visual intrusion

Visual intrusion indicates the level of compatibility or congruence 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. It can be ranked as follows:

- High – results in a noticeable change or is discordant with the surroundings;
- Moderate – partially fits into the surroundings, but is clearly noticeable; and
- Low – minimal change or blends in well with the surroundings.

The proposed site is within 10 km of Vryburg and existing views in the surrounding area are likely to contain elements associated with the settlement. Urban structures are often complex in patterns, colours and textures and they tend to reduce the quality of views. The structures surrounding Vryburg include high voltage power lines and pylons, a substation, communication towers, mining/quarry activity, a number of relatively large and busy roads (N18, N14 and R34) and a railway line.

Views from Vryburg are unlikely to include the PV Plant and if any do include it the visual intrusion will be low since there are major structures between the proposed site and Vryburg, particularly the Mookodi Substation and a number of power lines. Visual intrusion will also be low for views of the proposed 132 kV power line since it will blend in with the surrounding landscape.

The proposed site is in close proximity to Vryburg and various structures associated with a settlement. There are high voltage power lines crossing the landscape and a large substation within

5 km of the site. The PV Plant will therefore be noticed by highly sensitive visual receptors but it will not be incongruent with the landscape. Moderate visual intrusion on existing views is expected for the PV Plant and low visual intrusion for the proposed power line.

Motorists using the N14 and R34 will potentially be able to see the proposed PV Plant but at distances beyond 5 km and as such it is likely that the plant will be associated with the electrical infrastructure nearby. The proposed power line will also fit in with the landscape and low visual intrusion is expected for motorists.

D.1.2.1.4 Visual impacts

D.1.2.1.4.1 Impacts Identified for the Construction Phase

- Potential visual intrusion of construction activities associated with a PV plant on existing views of sensitive visual receptors; and
- Potential visual intrusion of construction activities associated with a 132 kV powerline on existing views of sensitive visual receptors.

D.1.2.1.4.2 Impacts Identified for the Operational Phase

- Potential landscape impact of a large solar energy facility on a peri-urban landscape;
- Potential landscape impact of a 132 kV powerline on a peri-urban landscape;
- Potential visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors;
  - Potential visual intrusion of a 132 kV powerline on the views of sensitive visual receptors; and
- Potential impact of night lighting of a large solar energy facility on the nightscape of the region.

D.1.2.1.4.3 Impacts Identified for the Decommissioning Phase

- Potential visual intrusion of decommissioning activities on views of sensitive visual receptors; and
- Potential visual intrusion of decommissioning activities related to a 132 kV powerline on the existing views of sensitive visual receptors.

D.1.2.1.4.4 Cumulative Impacts

- Cumulative impact of solar energy generation projects on the existing peri-urban landscape; and
- Cumulative visual impact of solar energy generation projects on existing views of sensitive visual receptors in the surrounding landscape.

D.1.2.1.5 Impact Assessment Summary

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CONSTRUCTION PHASE			
Potential visual intrusion of construction activities associated with a PV plant on existing views of sensitive visual receptors	• Preparation of the solar field area (i.e. clearance of vegetation, grading, contouring and compacting) and solar field construction should be phased in a way that makes practical sense in order to minimise the area of soil exposed and duration of exposure; • Parking areas should be demarcated and strictly controlled so that vehicles are limited to specific areas only; • Night time construction should be avoided where possible; and • Night lighting of the construction sites should be minimised within requirements of safety and efficiency.	**Moderate**	**Low**
Potential visual intrusion of construction activities associated with a 132 kV powerline on existing views of sensitive visual receptors	• Night time construction should be avoided where possible; and • Night lighting of the construction sites should be minimised within requirements of safety and efficiency	**Low**	**Low**
OPERATIONAL PHASE			
Potential landscape impact of a large solar energy facility on a peri-urban landscape	No mitigation measures proposed. Impact is deemed to be very low in significance.	**Very low**	**Very low**
Potential landscape impact of a 132 kV powerline on a peri-urban landscape	No mitigation measures proposed. Impact is deemed to be very low in significance.	**Very low**	**Very low**
Potential visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors	Solar Arrays • The project developer should maintain rehabilitated surfaces until a self-sustaining stand of vegetation is established and visually adapted to the undisturbed surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Officer; • Restoration of disturbed land should commence as soon after disturbance as possible; • Dust and noxious weed control should be part of maintenance activities; • Road maintenance activities should avoid damaging or disturbing vegetation; and • Painted features should be maintained and repainted when colour fades or paint	**Moderate**	**Low**

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
	flakes. Buildings • Appropriate coloured materials should be used for structures to blend in with the backdrop of the project where this is technically feasible and the colour or paint will not have a deleterious effect on the functionality of the structures; • Appropriate colours for smooth surfaces often need to be two to three shades darker than the background colour to compensate for shadows that darken most textured natural surfaces; • Materials, coatings and paints should be chosen based on minimal reflectivity where possible; and • Grouped structures should be painted the same colour to reduce visual complexity and contrast.		
Potential visual intrusion of a 132 kV powerline on the views of sensitive visual receptors	No mitigation measures proposed. Impact is deemed to be very low in significance.	**Very low**	**Very low**
Potential impact of night lighting of a large solar energy facility on the nightscape of the region	• A lighting plan that documents the design, layout and technology used for lighting purposes should be prepared, indicating how nightscape impacts will be minimised; • The lighting plan should include a process for promptly addressing and mitigating complaints about potential lighting impacts; • Lighting of the facility should not exceed, in number of lights and brightness, the minimum required for safety and security; • Uplighting and glare (bright light) should be minimised using appropriate screening; • Low-pressure sodium light sources should be used to reduce light pollution; • Light fixtures should not spill light beyond the project boundary; • Timer switches or motion detectors (within safety requirements) should be used to control lighting in areas that are not occupied continuously; and • Lights should be switched off when not in use whenever it is in line with safety and security.	**Moderate**	**Low**
DECOMMISSIONING PHASE			
Potential visual intrusion of decommissioning activities on views of	• Disturbed and transformed areas should be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing	**Moderate**	**Low**

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
sensitive visual receptors	landscapes; • Stockpiled topsoil should be reapplied to disturbed areas and these areas should be re-vegetated using a mix of indigenous species in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape; • Edges of re-vegetated areas should be feathered to reduce form and line contrasts with surrounding undisturbed landscape; • Working at night should be avoided where possible; and • Night lighting of reclamation sites should be minimised within requirements of safety and efficiency.		
Potential visual intrusion of decommissioning activities related to a 132 kV powerline on the existing views of sensitive visual receptors	• Disturbed and transformed areas should be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes; • Stockpiled topsoil should be reapplied to disturbed areas and these areas should be re-vegetated using a mix of indigenous species in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape; • Edges of re-vegetated areas should be feathered to reduce form and line contrasts with surrounding undisturbed landscape; • Working at night should be avoided, where possible; and • Night lighting of reclamation sites should be minimised within requirements of safety and efficiency.	**Low**	**Low**
CUMULATIVE IMPACTS			
Cumulative impact of solar energy generation projects on the existing peri-urban landscape	No mitigation measures proposed. Impact is deemed to be very low in significance.	**Very low**	**Very low**
Cumulative visual impact of solar energy generation projects on existing views of sensitive visual receptors in the surrounding landscape	No mitigation measures proposed.	**Low**	**Low**

D.1.2.1.6 Concluding statement

It is the opinion of the visual specialist that this project should be authorised with adherence to mitigation measures as set out in this report, since the significance of the overall visual impact of the project is expected to be low.

D.1.2.2 Heritage[5]

D.1.2.2.1 Approach and methodology

The study approach and methodology for the HIA included the following:

Survey of the literature

A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. In this regard, various anthropological, archaeological and historical sources were consulted.

Survey of the Heritage Impact Assessments

A survey of HIAs done for projects in the region by various heritage consultants was conducted with the aim of determining the heritage potential of the area.

Data bases

The Heritage Atlas Database, various SAHRA databases, the Environmental Potential Atlas, the Chief Surveyor General and the National Archives of South Africa were consulted.

Other sources

Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

Interviews

Mrs. A Oberholzer, daughter of the current landowner. These properties have been in their family for three generations.

Authors of previous studies done in the area are all of the opinion that the number of sites identified were not as high as originally anticipated. They argue that this may be related to the fact that the development is located in less favourable occupation areas, i.e. open water is scarce

[5] Van Schalkwyk, 2018

in the region, therefore people used to congregated in valleys close to water, rather than on the plains.

The types of sites that have been identified in the larger region can be categorised as follows:

- Stone Age tools, dating to the MSA and LSA occur as low-density scatters on the banks of the streams and rivers and on some outcrops in the larger region;
- Rock art occur in small caves or shelters in a limited number of cases in the larger region to the north of the study region;
- Historic structures, inclusive of buildings, monuments and bridges, usually occur mostly in an urban environment although they also occur on farms or alongside infrastructure facilities such as roads and railway lines. However, as this region has only recently been occupied intensively, such features are very limited;
- Formal burial sites occur in urban settings, with a number of informal ones occurring sporadically throughout the country side;
- Based on the above assessment, the probability of cultural heritage sites, features and objects occurring in the study area, i.e. solar facility and power line corridor, is deemed to be very low.

Field survey

The field survey was done according to generally accepted archaeological practices, and was aimed at locating all possible sites, objects and structures. The area that had to be investigated was identified by the CSIR by means of maps and .kml files indicating the development area. This was loaded onto a Nexus 7 tablet and used in Google Earth during the field survey to access the areas.

The site for the proposed Solar PV facilities was visited on 21 November 2016. The area was investigated by walking transects across it, giving special attention to features such as hills, outcrops, pans and clumps of trees. During the site visit the archaeological visibility was good due to the intense drought that the region experienced over the past few years.

A follow up site visit was conducted on 16 July 2018 for the transmission line component of the project that connects the PV facility to the Mookodi Substation.

Documentation

All sites, objects and structures that are identified are documented according to the general minimum standards accepted by the archaeological profession. Coordinates of individual localities are determined by means of the Global Positioning System (GPS) and plotted on a map. This information is added to the description in order to facilitate the identification of each locality.

The track log and identified sites were recorded by means of a Garmin Oregon 550 handheld GPS device. Photographic recording was done by means of a Canon EOS 550D digital camera.

D.1.2.2.2 Project aspects relevant to heritage impacts

It is likely that all or most components of the proposed PV plant and distribution line will contribute to potential heritage impact during the construction phase. Elements of the construction phases that will have a potential heritage impact include:

- A large area will be cleared of vegetation to host the solar field and associated buildings and structures; and
- Access roads, maintenance roads and power line servitudes will require clearing of vegetation. Exposure of large tracts of soil or rock will contrast significantly with the existing mottled landscape.

D.1.2.2.3 Sensitivity of the site in relation to the proposed activity

Features of cultural significance include Stone Age, Iron Age and Historic Period features. No features and objects of cultural significance were identified within the proposed PV plant's footprint.

Two cultural significance finds were made within the distribution line corridor (Figure D.7). Stone tools were identified to occur on a low ridge to the east of the substation. It mostly dates to the Middle Stone Age, although some smaller ones might date to the Later Stone Age. Cores, tools and flakes (debitage) were identified, indicating that the tools were manufactured on site. The material used was mostly chert, although some quartzite was also identified. The density of the stone tool scatter seems to quite consistent over the whole ridge, averaging at approximately 2 pieces per $2m^2$ (Figure D.6).

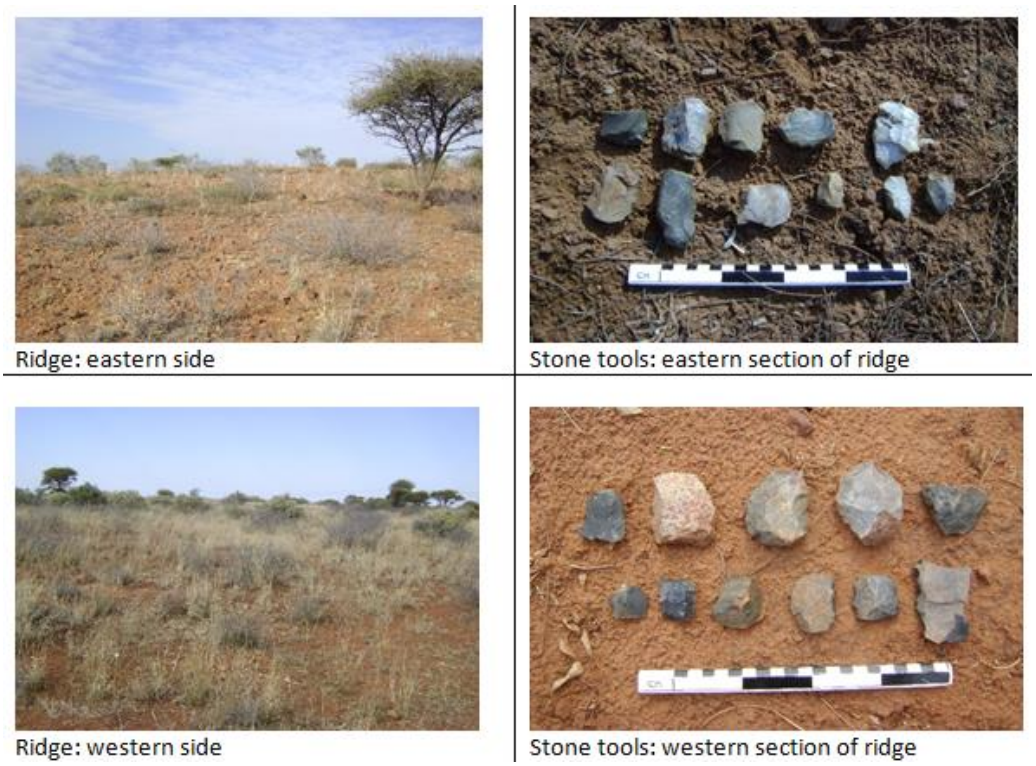

Figure D.6. Stone Age tools identified within the distribution line corridor

Originally some graves (c. 6) occurred west of the substation. They were very old and only marked with low stone cairns. As they were located next to the laydown area for the construction of the substation, they were fenced off. They could not be located during the current site visit (possibly due to incorrect coordinates). It is also possible that they were relocated during the construction activities of the Mookodi substation.

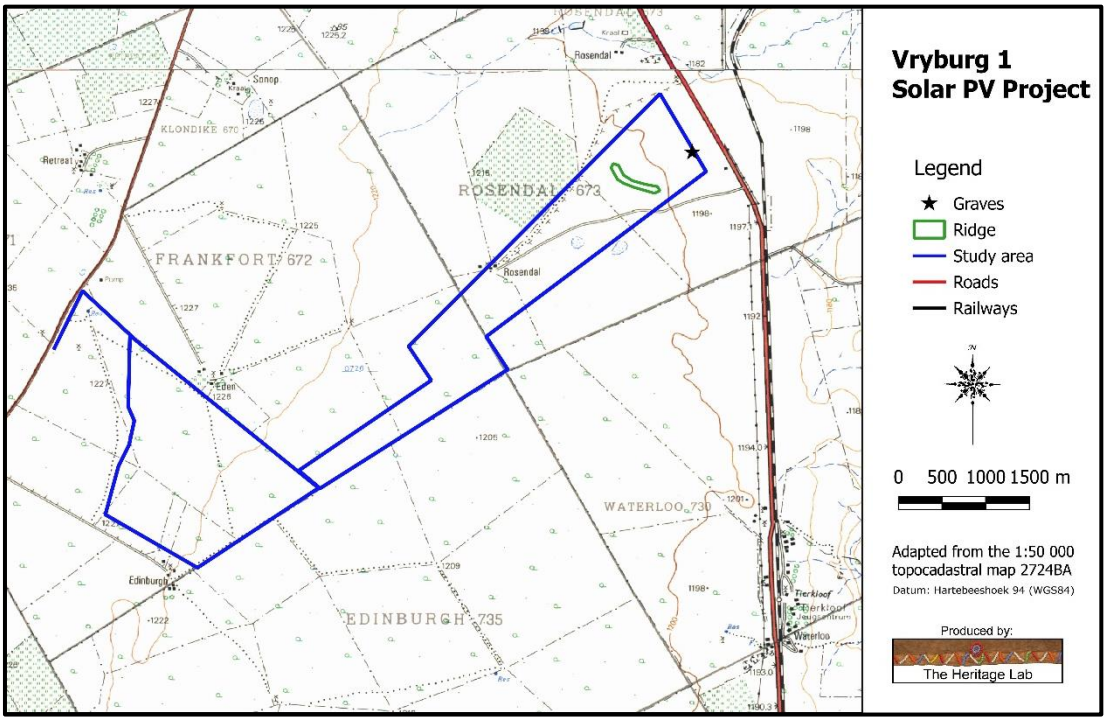

Figure D.7. Location of the identified cultural heritage sites (i.e a ridge and graves)

D.1.2.2.4 Heritage impacts

D.1.2.2.4.1 Impacts Identified for the Construction Phase

- Destruction of heritage sites due to the PV development taking place;
- Destruction of Stone Age site due to the construction of the distribution line: the power line will pass with limited impact over a small section of the site; and
- Destruction of graves due construction of the distribution line: the site is located outside of the planned high impact zone.

D.1.2.2.4.2 Cumulative impact

- Cumulative impact to the cultural heritage due the development of multiple renewable energy projects

D.1.2.2.5 Impact Assessment Summary

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CONSTRUCTION PHASE			
Destruction of heritage sites due to the PV development taking place	None (no sites identified)	**Low**	**Low**
Destruction of Stone Age site due to the construction of the distribution line: the power line will pass with limited impact over a small section of the site	• The ridge should be avoided • The site should be clearly marked in order that they can be avoided during construction activities	**Low**	**Low**
Destruction of graves due construction of the distribution line: the site is located outside of the planned high impact zone	None (the site is located outside of the planned high impact zone)	**Low**	**Low**
CUMULATIVE IMPACT			
Cumulative impact to the cultural heritage due the development of multiple renewable energy projects	None (this is a region of low heritage occurrence)	**Low**	**Low**

D.1.2.2.6 Concluding statement

From a heritage point of view, it is recommended that the development be allowed to continue on acceptance of the measures proposed in this section. Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

D.1.2.3 Palaeontological Assessment[6]

D.1.2.3.1 Approach and methodology

The National Heritage Resources Act (No. 25 of 1999) of South Africa stipulates that fossils and fossil sites may not be altered or destroyed. Relevant literature and geological maps for the region in which the development is proposed to take place, have been studied and a site visit was undertaken to assess the potential palaeontological concerns that will arise during development.

D.1.2.3.2 Project aspects relevant to palaeontological impacts

The key aspects of the Solar PV project that are relevant to palaeontological impacts are:

[6] Durand, 2018

- Excavations on the Solar PV site for foundations for the panel arrays, burying of 33 kV lines (to 1 m depth maximum), building foundations and shallowly buried services could affect fossil-bearing rock formations;
- Excavations in the distribution line corridor for foundations for pylons could affect fossil-bearing rock formations; and
- Clearing, levelling and scraping of the surface could affect underlying fossil-bearing rock formations.

D.1.2.3.3 Sensitivity of the site in relation to the proposed activity

The sites demarcated for the solar PV developments are in areas considered to be of High Palaeontological Sensitivity. The proposed Power Corridor is situated in areas that are considered to range from Very High Palaeontological Sensitivity to Moderate Palaeontological Sensitivity (Figure D.8).

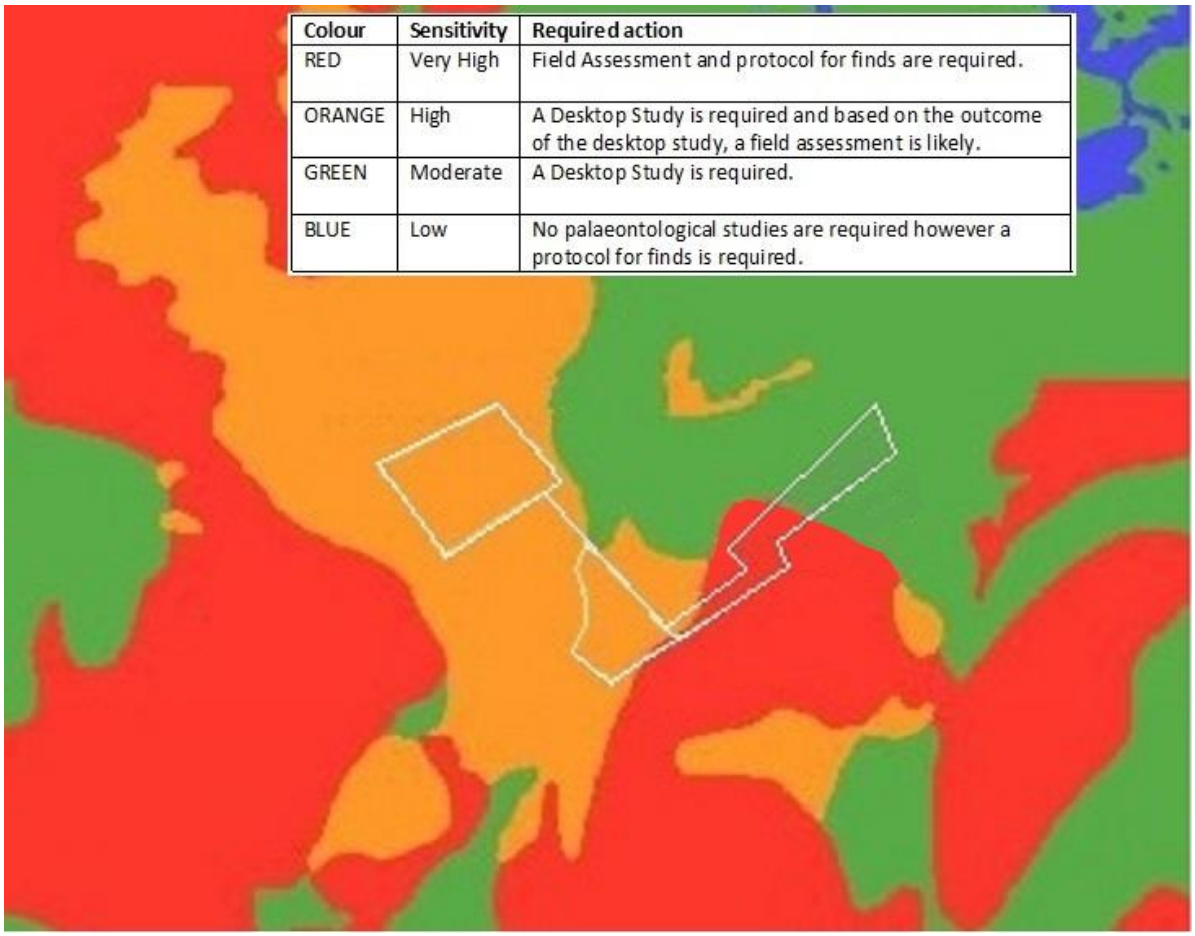

Figure D.8. Palaeontological sensitivity of the region. (The study area is indicated with the white polygon) (SAHRA, 2018)

During the field assessment special attention was given to the areas demarcated as having a high palaeontological sensitivity (red) (Figure D.8). These areas are underlain by dolomite and chert. Sections that are demarcated as having a high palaeontological sensitivity (orange) were also visited. These areas are underlain mostly by Quaternary aged calcrete, gravel, sand and soil.

The sections of the study area which are demarcated as having a High Palaeontological Sensitivity are underlain by calcrete (Figure D.8). Calcrete underlies the areas for the proposed Solar 1, 2 and 3 solar panels. There are rare occurrences of fossils in Tertiary calcrete and Quaternary soil, sand and alluvium reported from other localities.

Parts of the proposed Power Corridor is underlain by rocks of the Schmidtsdrif Formation which is considered to have a Very High Palaeontological Sensitivity due to the probability of finding stromatolites (Figure D.8). The southern margin of the Power Corridor also touches the Boomplaas Formation which has yielded many kinds and sizes of stromatolites on the neighbouring farm Waterloo.

The eastern sections of the proposed Power Corridor (which includes the power station) is situated on rocks of the Vryburg Formation which is considered to have a Moderate Palaeontological Sensitivity (Figure D.8). Microbial stromatolites have been reported form the Vryburg Formation some 40 km south of Vryburg.

D.1.2.3.4 Palaeontological impacts

D.1.2.3.4.1 Impacts Identified for all phases of the development

The proposed development will take place in areas which have been demarcated by SAHRA as having a Moderate, High to Very High Palaeontological Sensitivity as depicted in Figure D.8. During all phases the destruction of fossils is the key impact through the various activities to be undertaken as part of each phase.

D.1.2.3.4.2 Impacts Identified for the Construction Phase

- Site preparation and construction of the PV facility may have a negative impact on fossils which will be destroyed in the process. But on the other hand, new fresh fossiliferous material could be exposed after the removal of soil and eroded rock on the surface. Fossils in calcrete are exceptionally sparse and the chances of finding any at the study site are small.
- Site preparation and construction of the distribution lines may have a negative impact on fossils which will be destroyed in the process. But on the other hand, new fresh fossiliferous material could be exposed after the removal of soil and eroded rock on the surface. The chances of discovering stromatolites and new fossil sites are very big in this area and site preparation has to commence with care in this area.

D.1.2.3.4.3 Impacts Identified for the Operational Phase

- During the operational phase maintenance of the PV installation, power line and underground cables may have an effect on the underlying rocky, potentially fossiliferous surface.

D.1.2.3.4.4 Impacts Identified for the Decommissioning Phase

- No impacts are foreseen, however the decommissioning will still occur in areas with high palaeontological sensitivity.

D.1.2.3.4.5 Cumulative Impacts

- No impacts are foreseen, however some of the projects authorised occur within areas with high palaeontological sensitivity.

D.1.2.3.5 Impact Assessment Summary

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CONSTRUCTION PHASE			
PV Area: Site preparation and construction may have a negative impact on fossils which will be destroyed in the process. But on the other hand, new fresh fossiliferous material could be exposed after the removal of soil and eroded rock on the surface. Fossils in calcrete are exceptionally sparse and the chances of finding any at the study site are small.	The ECO should follow the Chance Find Procedure	**Low**	**Very low**
Western and central part of the power corridor: Site preparation and construction may have a negative impact on fossils which will be destroyed in the process. But on the other hand, new fresh fossiliferous material could be exposed after the removal of soil and eroded rock on the surface. The chances of discovering stromatolites and new fossil sites are very big in this area and site preparation has to commence with care in this area.	The ECO should follow the Chance Find Procedure	**Very high**	**Low**
Eastern part of the corridor: The fossils in this area are small and difficult to collect and conserve. The fossils are not unique to the study site and hundreds of cubic kilometres of the geological layer in which they occur exist elsewhere.	The ECO should follow the Chance Find Procedure	**Low**	**Very low**
OPERATIONAL PHASE			
PV Area: Maintenance of the PV installation may have some moderate effect on the underlying rocky, potentially fossiliferous surface but no major problem is foreseen.	Fossiliferous areas may be enclosed to prevent people from damaging them.	**Low**	**Very low**
Western and central part of the power corridor: Maintenance of the power lines and underground cables, if any, may have some moderate effect on the underlying rocky, potentially fossiliferous surface but no major problem is foreseen.	Fossiliferous areas may be enclosed to prevent people from damaging them.	**Moderate**	**Low**
Eastern part of the corridor: Maintenance of the power lines and underground cables, if any, may have some moderate effect on the underlying rocky, potentially fossiliferous surface but no major problem is foreseen.	Fossiliferous areas may be enclosed to prevent people from damaging them.	**Very low**	**Very low**
DECOMMISSIONING PHASE			
PV Area: destruction of fossils	Fossiliferous areas may be enclosed to prevent people from damaging them.	**Low**	**Very low**
Western and central part of the power corridor: destruction of fossils	Fossiliferous areas may be enclosed to prevent people from damaging them.	**Moderate**	**Low**
Eastern part of the corridor: destruction of fossils	Fossiliferous areas may be enclosed to prevent people from damaging them.	**Very low**	**Very low**

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CUMULATIVE IMPACT			
PV Area: destruction of fossils	Follow Chance Find Procedures and salvage fossils	**Low**	**Very low**
Western and central part of the power corridor: destruction of fossils	Follow Chance Find Procedures and conserve stromatolite formations in situ.	**Very high**	**Moderate**
Eastern part of the corridor: destruction of fossils	Follow Chance find Procedures and report any new fossil site finds.	**Very low**	**Very low**

D.1.2.3.6 Concluding statement

The proposed development of the photovoltaic facility will take place in an area which is considered to have mostly a High Palaeontological Sensitivity for the PV facility, and areas of Medium, High and Very High Palaeontological Sensitivity within the corridor for the distribution power lines.

The areas where the proposed PV facilities is to be installed fall in the High Palaeontological Sensitivity category because of the underlying Tertiary calcrete and Quaternary alluvium, sand and soils. The Chance Find Procedure should also be followed if fossils are uncovered during construction in this section.

The central and western sections of the proposed Power Corridor fall in the Very High Palaeontological Sensitivity category due to the probability of stromatolites occurring in this region. The chances of exposing stromatolites during construction are good and for this reason a Chance Find Procedure (see EMPr included in Appendix G). Even though it is not essential to salvage every piece of stromatolite exposed because of its ubiquitous distribution in the dolomites of South Africa, it will be prudent not to destroy a major stromatolite find for scientific and heritage reasons.

The eastern sections of the Power Corridor are situated on rocks with a Medium Palaeontological Sensitivity. The chances of finding fossils in the High to Medium Sensitivity sections are low however and the protocol that should be followed in the unlikely case of the discovery of fossils in this section is covered in the Chance Find Procedure.

D.1.2.4 Soils and Agriculture[7]

D.1.2.4.1 Approach and methodology

The pre-fieldwork assessment was based on existing information for the. The existing data was supplemented by a field soil survey undertaken October 2016. This was aimed at ground-proofing the data and achieving an understanding of specific soil and agricultural conditions, and the variation of these across the site. The field investigation utilised existing soil exposures where possible and supplemented these with auger samples. Soils were classified according to Soil Classification Working Group (1991). The ratings of impacts are based on the specialist's knowledge and experience of the field conditions and the impact of disturbances on those.

Information sources

All data on land types, land capability, grazing capacity etc. was sourced from the online Agricultural Geo-Referenced Information System (AGIS), produced by the Institute of Soil, Climate and Water (Agricultural Research Council, 2007). Current and historical satellite imagery was all sourced from Google Earth. Rainfall and temperature data was sourced from The World Bank Climate Change Knowledge Portal (2015).

Soil data on AGIS originates from the land type survey that was conducted from the 1970's until 2002. It is the most reliable and comprehensive national database of soil information in South Africa and although the data was collected some time ago, it is still entirely relevant as the soil characteristics included in the land type data do not change within time scales of hundreds of years.

[7] Lanz, 2018

Land capability data was sourced from DAFF (2017).

D.1.2.4.2 Project aspects relevant to soil and agricultural impacts

The components of the project that can impact on soils, agricultural resources and productivity are:

- Occupation of the land by the total physical footprint of the proposed project.
- Construction activities that may disturb the below surface soil profile, for example for levelling, excavations, etc.

The facility will comprise the normal infrastructure that makes up a solar PV facility including solar arrays with foundations, internal roads, buildings, a substation, and 132 kV overhead transmission line to connect to the existing Eskom Mookodi substation. For agricultural impacts, the exact nature of the different infrastructure within the facility has very little bearing on the significance of impacts. What is of most relevance is simply the occupation of the land, and whether it is being occupied by a solar panel, a building or a substation makes no difference. What is of relevance therefore is simply the total footprint of the facility. The total maximum footprint including the PV facility and infrastructure such as roads will be 250 hectares. The overhead transmission line has a much lower impact on agriculture than the infrastructure within the facility because the agricultural land is not occupied by a transmission line, and all agricultural activities that are viable within the project area (mainly grazing) can continue unhindered underneath it.

D.1.2.4.3 Sensitivity of the site in relation to the proposed activity

Agricultural sensitivity is directly related to the capability of the land for agricultural production. This is because a negative impact on land of higher agricultural capability is more detrimental to agriculture than the same impact on land of low agricultural capability. Also, arable land is a scarce resource in South Africa and is therefore preservation worthy, and as a result has a high sensitivity. Land that is only suitable as grazing land however is not a particularly scarce resource and therefore has a low sensitivity. Because the land is not suitable for cultivation, it has a low agricultural sensitivity to development. In terms of the sensitivity categories used in the REDZ sensitivity analysis, this site was assessed as low sensitivity.

Agricultural conditions and potential are uniform across the site and the choice of placement of infrastructure therefore has no influence on the significance of agricultural impacts. No agriculturally sensitive areas occur within the investigated site and no parts of it therefore need to be avoided by the development. There are no required buffers.

D.1.2.4.4 Soils and agriculture impacts

D.1.2.4.4.1 Impacts Identified for the Construction Phase

- Loss of agricultural land use;
- Soil degradation.

D.1.2.4.4.2 Impacts Identified for the Operational Phase

- Loss of agricultural land use;
- Generation of alternative land use income.

D.1.2.4.4.3 Impacts Identified for the Decommissioning Phase

- Loss of agricultural land use;
- Soil degradation.

D.1.2.4.4.4 Cumulative Impacts

- Regional loss of agricultural land.

D.1.2.4.5 Impact Assessment Summary

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CONSTRUCTION PHASE			
Loss of agricultural land use. Agricultural grazing land directly occupied by all of the development infrastructure will be unavailable for agricultural use	None	**Low**	**Low**
Soil degradation resulting from erosion and topsoil loss. Erosion may be by wind or water. It can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including PV panels and roads. Loss of topsoil can result from poor topsoil management during construction related soil profile disturbance.	• Implement an effective system of storm water run-off control. • Maintain, where possible, all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize the soil against erosion. • Strip, stockpile and re-spread topsoil during rehabilitation.	**Very low**	**Very low**
OPERATIONAL PHASE			
Loss of agricultural land use. Agricultural grazing land directly occupied by all of the development infrastructure will be unavailable for agricultural use.	None	**Low**	**Low**
Additional land use income will be generated by the farming enterprise through the lease of the land to the energy facility. This will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve its financial sustainability.	None	**Low (+)**	**Low (+)**
DECOMMISSIONING PHASE			
Loss of agricultural land use. Agricultural grazing land directly occupied by all of the development infrastructure will be unavailable for agricultural use	None	**Low**	**Low**
Soil degradation resulting from erosion and topsoil loss. Erosion may be by wind or water. It can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including PV panels and roads. Loss of topsoil can result from poor topsoil management during construction related soil profile disturbance.	• Implement an effective system of storm water run-off control. • Maintain, where possible, all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize the soil against erosion. • Strip, stockpile and re-spread topsoil during rehabilitation.	**Very low**	**Very low**
CUMULATIVE IMPACT			
Cumulative impacts are likely to occur as a result of the regional loss of agricultural land and production because of other developments on agricultural land in the region.	None	**Very Low**	**Very Low**

D.1.2.4.6 Concluding statement

Due to the low agricultural potential of the site, and the consequent low to very low agricultural impact, there are no restrictions relating to agriculture which preclude authorisation of the proposed development and therefore, from an agricultural impact point of view, the development should be authorised.

D.1.2.5 Ecology[8]

D.1.2.5.1 Approach and methodology

A desktop study comprised not only an initial phase, but also it was used throughout the study to accommodate and integrate all the data which became available during the field observations.

Site visits by R.F. Terblanche were conducted on 17 September 2016, 7 October 2016, 28-30 June 2018 and 7, 18 July 2018. Notes and experience from earlier surveys at the larger study area of the Taung-Vryburg area by R.F. Terblanche that had taken place such as in July 2011, November 2011, January 2012, February 2012, August 2013, December 2013, January 2014, November 2014, November 2015 and January 2016 were also taken into account where applicable. Experience from visits or research at areas where Camel Thorn forests are find such as Kathu and Witsand Nature Reserve are also taken into account. The main purpose of the site visits was ultimately to serve as habitat surveys that concentrated on the possible presence or not of threatened species and other species of high conservation priority.

The following sections highlight the materials and methods applicable to different aspects that were observed.

Habitat Characteristics and Vegetation

The habitat was investigated by noting habitat structure (rockiness, slope, plant structure/ physiognymy) as well as floristic composition. Voucher specimens of plant species were only taken where the taxonomy was in doubt and where the plant specimens were of significant relevance for invertebrate conservation. In this case no plant specimens were needed to be collected as voucher specimens or to be send to a herbarium for identification. A wealth of guides and detailed works of plant identifications, ecology and conservation is fortunately available and very useful. Field guides, biogeographic works, species lists, diagnostic outlines, conservation statuses and detail on specific plant groups were sourced from Court (2010), Germishuizen (2003), Germishuizen, Meyer & Steenkamp (2006), Goldblatt (1986), Goldblatt & Manning (1998), Jacobsen (1983), Manning (2003), Manning (2009), McMurtry, Grobler, Grobler & Burns (2008), Pooley (1998), Retief & Herman (1997), Smit (2008), Van Ginkel, Glen, Gordon-Gray, Cilliers, Muasya & Van Deventer (2011), Van Jaarsveld (2006), Van Oudtshoorn (1999), Van Wyk (2000), Van Wyk & Smith (2001), Van Wyk & Smith (2003), Van Wyk & Malan (1998) and Van Wyk & Van Wyk (2013). Lists of species, species names and the conservation status of species were mainly sourced from Raimondo, von Staden, Victor, Helme, Turner, Kamundi & Manyama (2009) and updated versions of red lists and species from the Threatened Species Programme of SANBI and the Red List of South African Plants (sanbi.org.za).

[8] Terblanche, 2018

Mammals

Mammals were noted as sight records by day. For the identification of species and observation of diagnostic characteristics Smithers (1986), Skinner & Chimimba (2005), Cillié, Oberprieler and Joubert (2004) and Apps (2000) are consulted. Sites have been walked, covering as many habitats as possible. Signs of the presence of mammal species, such as calls of animals, animal tracks (spoor), burrows, runways, nests and faeces were recorded. Walker (1996), Stuart & Stuart (2000) and Liebenberg (1990) were consulted for additional information and for the identification of tracks and signs. Because of the type of threatened mammals that are assessed in the local area such as the blackfooted cat and golden moles or rough-haired golden moles which are not to be trapped in normal way, the poor trapping records of species in question such as the White-tailed Mouse as well as the similarity of terrestrial habitats and lack of unique habitats at the sites, trapping was not done since it was not deemed necessary in the case of this study. The focus has been on signs and surveying habitat characteristics to note potential occurrences of mammals of particular conservation concern. Habitat characteristics were also surveyed to note potential occurrences of mammals. Many mammals can be identified from field sightings but, with a few exceptions bats, rodents and shrews can only be reliably identified in the hand, and even some species needs examination of skulls, or even chromosomes (Apps, 2000).

Reptiles

Reptiles were noted as sight records in the field. Binoculars (10x30) can also be used for identifying reptiles of which some are wary. For practical skills of noting diagnostic characteristics, the identification of species and observation techniques, Branch (1998), Marais (2004), Alexander & Marais (2007) and Cillié, Oberprieler and Joubert (2004) were followed. The Atlas and Red List of Reptiles of South Africa, Lesotho and South Africa (Bates, Branch, Bauer, Burger, Marais, Alexander & de Villiers, 2014) has been used as the main source to compile the list for assessment. Sites were walked, covering as many habitats as possible. Smaller reptiles are sometimes collected for identification, but this practice was not necessary in the case of this study. Habitat characteristics are surveyed to note potential occurrences of reptiles.

Amphibians

Frogs and toads are noted as sight records in the field or by their calls. For practical skills of noting diagnostic characteristics, the identification of species and observation techniques Carruthers (2001), Du Preez (1996), Conradie, Du Preez, Smith & Weldon (2006) and the recent complete guide by Du Preez & Carruthers (2009) are consulted. CD's with frog calls by Carruthers (2001) and Du Preez & Carruthers (2009) are used to identify species by their calls when applicable. Sites are walked, covering as many habitats as possible. Smaller frogs are often collected by pitfall traps put out for epigeal invertebrates (on the soil), but this practice falls beyond the scope of this survey. Habitat characteristics are also surveyed to note potential occurrences of amphibians.

Butterflies

Butterflies were noted as sight records or voucher specimens. Voucher specimens are mostly taken of those species of which the taxa warrant collecting due to taxonomic difficulties or in the cases where species can look similar in the veldt. Many butterflies use only one species or a limited number of plant species as host plants for their larvae. Myrmecophilous (ant-loving) butterflies such

as the Aloeides, Chrysoritis, Erikssonia, Lepidochrysops and Orachrysops species (Lepidoptera: Lycaenidae), which live in association with a specific ant species, require a unique ecosystem for their survival (Deutschländer & Bredenkamp, 1999; Terblanche, Morgenthal & Cilliers, 2003; Edge, Cilliers & Terblanche, 2008; Gardiner & Terblanche, 2010). Known food plants of butterflies were therefore also recorded. After the visits to the site and the identification of the butterflies found there, a list was also compiled of butterflies that will most probably be found in the area in all the other seasons because of suitable habitat. The emphasis of this study remains a habitat survey that focuses on the likelihood of occurrence of threatened, near threatened or rare butterfly species.

Fruit chafer beetles

Different habitat types in the areas were explored for any sensitive or special fruit chafer species. Selection of methods to find fruit chafers depends on the different types of habitat present and the species that may be present. Fruit bait traps would probably not be successful for capturing Ichnestoma species in a grassland patch (Holm & Marais 1992). Possible chafer beetles of high conservation priority were noted as sight records accompanied by the collecting of voucher specimens with grass nets or containers where deemed necessary.

Rock scorpions

Relatively homogenous habitat / vegetation areas were identified and explored to identify any sensitive or special species. Selected stones that were lifted to search for Arachnids were put back very carefully resulting in the least disturbance possible. All the above actions were accompanied by the least disturbance possible.

Wetland Assessment

A desktop study comprised not only an initial phase, but also it was used throughout the study to accommodate and integrate all the data that became available during the field observations.

Classification of any inland wetland systems that could be present at the site is according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis *et al.*, 2013). One of the major advantages of the Classification System for South Africa (Ollis *et al.*, 2013) is that the functional aspects of wetlands are the focal point of the classification. Wetlands are very dynamic systems and their functionality weighs high against the rapid changes in their appearance often witnessed (Terblanche In prep). In this document the main guideline for the delineation and identification of wetlands where present is the practical field procedure for identification and delineation of wetlands by DWAF (2005).

The following sections highlight the materials and methods applicable to different aspects that were observed.

- Classification of wetlands (SANBI: Ollis *et al.*, 2013)

  - *System, regional setting and landscape unit (Levels 1, 2 and 3)*

Three broad types of Inlands Systems are dealt with in the Classification System namely rivers, open waterbodies and wetlands. These Inland Systems are then classified according to a six-tiered structure that includes six levels.

At the systems level (Level 1) of wetland classification, a distinction is made between Marine, Estuarine and Inland ecosystems using the level of connectivity to the open ocean as discriminator of the biophysical character of each (Ollis *et al.*, 2013). Inland wetland systems are aquatic ecosystems with no existing connection to the ocean (i.e. characterised by the complete absence of marine exchange and/ or tidal influence (Ollis *et al.*, 2013). In this case if any wetland is present it obviously qualifies as an Inland wetland system.

At Level 2 the regional setting is a spatial framework that is preferred by the investigator to allow for gaining an understanding of the broad ecological context within which an aquatic system occurs (Ollis *et al.*, 2013). A regional setting can be identified according to the DWA ecoregion classification of Kleynhans *et al*. (2005).

A distinction is made between four landscape units at Level 3 of the Classification System for Inland Systems on the basis of the landscape setting (i.e. topographical position) (Ollis *et al.*, 2013). Four landscape units are recognized: slope, valley floor, plain and bench.

- *Hydrogeomorphic units (Level 4)*

Seven primary hydrogeomorphic (HGM) units are recognised for Inland Systems at Level 4A of the Classification System for Wetlands and other Aquatic Ecosystems in South Africa, on the basis of hydrology and geomorphology (Ollis *et al.*, 2013). These are a River, Channeled valley-bottom wetland, Unchannelled valley-bottom wetland, Floodplain wetland, Depression, Seep and Wetland flat.

- *Hydrological regime (Level 5)*

While the hydrogeomorphic unit (HGM) is influenced by the source of water and how it moves into, through and out of an Inland System, the hydrological regime (as catergorised by the Classification System) describes the behaviour fo the water within the system and, for wetlands, in the underlying soil (Ollis *et al.*, 2013). Together with the hydrogeomorphology the hydrological regime are used to describe the wetland as a functional unit (Ollis *et al.*, 2013). In the case of Inland wetlands which are classified as rivers, perenniality is an important characteristic to describe the hydrological regime. For Inland Systems other than rivers, five categories relating to the frequency and duration of inundation have been provided: Permanently inundated, Seasonally inundated, Intermittently inundated, Never inundated/ rarely inundated and unknown (Ollis *et al.*, 2013). Period of saturation within the upper 0.5 m of the soil is a very important discriminator that also links to the wetland delineation system of DWAF (2005). The following categories for saturation of wetland soils are recognised: Permanently saturated, Seasonally saturated, Intermittently saturated and unknown. These categories of period of saturation correspond to the permanent, seasonal and temporary zones of wetlands respectively.

- *Wetland descriptors (Level 6)*

At Level 6 several “descriptors” are included for the structural/ chemical/ biological characterisation of Inland Systems (Ollis *et al.*, 2013). These descriptors are non-hierarchical to one another and can be applied in any order depending on the purpose of a study and the availability of information. Descriptors include natural vs. artificial, salinity, substratum type, pH, geology and vegetation cover (Ollis *et al.*, 2013). Various definitions are given for the descriptors which are likely to increase the consistency and use of the system.

- *Delineation of wetland*

Together with terrain unit, indirect indicators of prolonged saturation by water: wetland plants (hydrophytes) and wetland (hydromorphic) soils are identified and used to delineate the wetland (DWAF 2005). Three zones, which may not all three be present in all wetlands, namely the permanent zone of wetness, the seasonal zone and the temporary zone are identified. The temporary zone is the outer zone and is saturated for only a short period of the year that is sufficient, under normal circumstances, for the formation of hydromorphic soils and the growth of wetland vegetation (DWAF 2005). Hydromorphic soils must display signs of wetness within 50cm of the soil to qualify as wetland soil that can support hydrophytic vegetation. Grid references and altitudes are taken on site with a GPS Garmin E-trex 20 ® instrument. Map information are analysed and depicted on Google images with the aid of Google Earth Pro (US Dept. of State Geographer, MapLink/ Tele Atlas, Google, 2018).

D.1.2.5.2 Project aspects relevant to ecological impacts

The development of the solar PV facility and associated electrical infrastructure will potentially impact on the following:

- Loss of habitat owing to the removal of vegetation;
- Loss of sensitive species (Threatened, Near-Threatened, Rare, Declining or Protected species);
- Loss of connectivity and conservation corridor networks in the landscape;
- An increased infestation of exotic or alien invasive plant species owing to disturbance; and
- Contamination of soil during construction.

D.1.2.5.3 Sensitivity of the site in relation to the proposed activity

Footprint at the site proposed for the photovoltaic facility as well as the largest part of distribution line corridor is situated at Other Natural Areas (ONAs). This means that the proposed photovoltaic footprint and most of the distribution line corridor are in fair ecological condition but fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017). At the eastern extension of the distribution line corridor there is a part that extends into an Ecological Support Area 1. This means that this eastern section of the distribution line corridor is currently either good or in fair ecological condition, for which the objective is to retain them in at least fair ecological condition (SANBI, 2017). This eastern section of the distribution line area should and would be kept as a functional ecosystem in fair ecological condition.

Terrestrial ecosystems

There are no distinct indications of any terrestrial ecosystems of particular conservation concern at the site. The vegetation type that represents the Savanna Biome at the site, Ghaap Plateau Vaalbosveld (SVk 7), is not listed as threatened ecosystem according to the National List of Threatened Ecosystems (2011). According to North West Biodiversity Sector Plan (2015) the site is part of other natural areas and is not part of any Critical Biodiversity Area. A small section of the proposed powerline infrastructure reaches an Ecological Support Area 1 and not any Critical Biodiversity Area.

Aquatic ecosystems

The pan depression (0,22 ha) at the site is localised, small and unlikely to be a habitat of particular significance for a rare or localised plant/ animal species. Site is part of the Lower Vaal Water Management Area (WMA 10). The site is not part of a Freshwater Ecosystem Priority Area (FEPA) or wetland cluster (Nel *et al.*, 2011a; Nel *et al.*, 2011b). By no means could the small depression at the site be classified or regarded as anything similar in scale to Southern Kalahari Salt Pans or Southern Kalahari Mekgacha (see Mucina & Rutherford, 2006).

Sensitive species

Presence of Threatened or Near-Threatened Mammals, Reptiles, Amphibians and Invertebrates at the site appear to be unlikely. The Protected tree species found at the site, *Vachellia erioloba* (Camel Thorn), is listed as a Declining (not Threatened) plant species. *Vachellia erioloba* occurs in low numbers at the site. A total of 23 individual *Vachellia erioloba* trees has been counted at the proposed footprint of the photovoltaic facility which amounts to an average of 0,08/ ha. Far less than 100 trees are present at the footprint proposed for the photovoltaic facility which is much lower than many areas around Vryburg and many other parts of the Eastern Kalahari Bushveld Bioregion (Terblanche pers. obs.). *Vachellia erioloba* individuals at the site are not particularly large (no tree taller than 10 m) and are not part of a camel thorn forest of note (Reference points: large camel thorn forest at Kathu and smaller Camel Thorn forest at Witsand Nature Reserve visited by R.F. Terblanche in the past).

It is recommended that a permit should be applied for at the relevant authorities in case any removal or damage of Camel Thorn trees. If *Vachellia erioloba* is impacted upon it is also recommended that new (nursery) Camel Thorn trees could be planted on site outside the present footprint.

Connectivity and corridors

The small restricted natural pan depression approximately 61 m in diameter is present at the site. No other wetlands are present at the site. This pan should be protected with a 100m buffer zone, with the pan and buffer regarded as high sensitivity and set aside as a no-go zone for any development. It is unlikely that a WUL application should be required as long as the recommended buffer zone is upheld at the site. Risks and possible impacts on the small wetland, if buffer zone is upheld, are not expected to be significant. The small wetland is at gentle slopes (flat) in a low rainfall area so that excessive or significant surface flow, erosion and loss of wetland habitat, are unlikely. Features such as interflow do not appear to play an important role at maintaining the wetland. Significant impact on the flow regime of the wetland depression at the site is unlikely to be altered. Proposed development implies no changes to the geomorphological setting of the small wetland depression. Small depression is conspicuously poor in wetland animal and plant species and unlikely to be a particular habitat for resident any wetland species of particular conservation concern.

D.1.2.5.4 Ecological impacts

D.1.2.5.4.1 Impacts Identified for the Construction Phase

- Loss of habitat owing to the removal of vegetation at the proposed photovoltaic facility;

- Loss of sensitive species (Threatened, Near-Threatened, Rare, Declining or Protected species) during the construction phase;
- Loss of connectivity and conservation corridor networks in the landscape;
- An increased infestation of exotic or alien invasive plant species owing to disturbance;
- Contamination of soil during construction in particular by hydrocarbon spills; and
- Killing of vertebrate fauna during the construction phase.

D.1.2.5.4.2 Impacts Identified for the Operational Phase

- Continued loss of indigenous vegetation to poor recovery of vegetation at the proposed photovoltaic facility; and
- An increased infestation of exotic or alien invasive plant species owing to disturbance.

D.1.2.5.4.3 Impacts Identified for the Decommissioning Phase

- Poor recovery of habitat owing to clearance of site;
- An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place; and
- Contamination of soil during decommissioning.

D.1.2.5.4.4 Cumulative Impacts

- Habitat loss owing to clearing of vegetation;
- Removal of sensitive species;
- Fragmentation of corridors of particular conservation concern; and
- Emissions and pollutants into air, water and soil.

D.1.2.5.5 Impact Assessment Summary

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CONSTRUCTION PHASE			
Loss of habitat owing to the removal of vegetation at the proposed photovoltaic facility	• Restrict stripping of existing vegetation for access roads. • Maximise use of existing farm roads/ tracks. • Rehabilitation and monitoring of vegetation following construction	**High**	**Moderate**
Loss of sensitive species (Threatened, Near-Threatened, Rare, Declining or Protected species) during the construction phase	• Planting of individual *Vachellia erioloba* trees at area which will not be affected and where practical. • Protected Tree species are listed under the National Forests Act No. 84 of 1998. In terms of a part of section 15(1) of Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister. A permit for the removal of these trees must be obtained from the Department of Forestry and Fisheries prior to any removal taking place.	**Moderate**	**Low**
Loss of connectivity and conservation corridor networks in the landscape	• Fence small pan and buffer zone of 100 m from the edge of the pan off with appropriate tape during construction phase and do not allow any activities at small wetland depression (pan).	**Moderate**	**Low**
An increased infestation of exotic or alien invasive plant species owing to disturbance	• A suitably qualified botanist/ ecologist should compile an alien invasive monitoring programme for the site. According to this alien invasive plant species monitoring programme, a qualified environmental officer should monitor alien invasive plant species at the site and manage the eradication of alien invasive plant species at the site.	**Moderate**	**Low**
Contamination of soil during construction in particular by hydrocarbon spills	• Rubble or waste that could accompany the construction effort, if the development is approved, should be removed during and after construction. • Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during construction phase.	**Moderate**	**Low**
Killing of vertebrate fauna during the construction phase	• If the development is approved, contractors must ensure that no animal species are disturbed, trapped, hunted or killed.	**Moderate**	**Low**
OPERATIONAL PHASE			
Continued loss of indigenous vegetation to poor recovery of vegetation at the proposed photovoltaic facility	A monitoring and rehabilitation plan for vegetation at the site are to be implemented to make sure that indigenous vegetation recover at hitherto cleared areas where possible.	**Moderate**	**Low**
An increased infestation of exotic or alien invasive plant species owing to disturbance	Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species such as *Prosopis glandulosa* (Honey Mesquite) that should not be allowed to establish.	**Moderate**	**Low**

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
DECOMMISSIONING PHASE			
Poor recovery of habitat owing to clearance of site	A monitoring and rehabilitation plan for vegetation at the site are to be implemented to make sure that indigenous vegetation recover at hitherto cleared areas where possible.	**Moderate**	**Low**
An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place	Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species such as *Prosopis glandulosa* (Honey Mesquite) that should not be allowed to establish.	**Moderate**	**Low**
Contamination of soil during decommissioning	• Rubble or waste that could accompany the construction effort, if the development is approved, should be removed during and after construction. • Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during construction phase.	**Moderate**	**Low**
CUMULATIVE IMPACT			
Habitat loss owing to clearing of vegetation	• Rehabilitation and monitoring of vegetation following construction are imperative.	**High**	**Moderate**
Removal of sensitive species	• Planting of individual *Vachellia erioloba* trees at area which will not be affected and where practical.	**Moderate**	**Low**
Fragmentation of corridors of particular conservation concern	• Fence small pan off with appropriate tape during construction phase and do not allow any activities at small wetland depression (pan). • Restrict impacts to proposed footprints and leave corridors with indigenous vegetation adjacent to the proposed footprints.	**Moderate**	**Low**
Emissions and pollutants into air, water and soil	• Rubble or waste that could accompany the construction effort, if the development is approved, should be removed during and after construction. • Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during construction phase.	**Moderate**	**Low**

D.1.2.5.6 Concluding statement

This ecological study shows that the ecological impacts can be reduced to low and moderate significance with effective mitigation measures being applied that have been specified. There is therefore no prohibitive distinct reason or objection from an ecological perspective for the project being granted EA.

D.1.2.6 Avifauna[9]

D.1.2.6.1 Approach and methodology

- Bird distribution data from the Southern African Bird Atlas Project 2 (SABAP 2) was obtained from the University of Cape Town, in order to ascertain which species occur in the pentads where the proposed development is located. A pentad grid cell covers 5 minutes of latitude by 5 minutes of longitude (5'× 5'). Each pentad is approximately 8 × 7.6 km. In order to get a more representative impression of the birdlife, a consolidated data set was obtained for a total of 9 pentads around the proposed development. From 6 November 2009 to 24 June 2018, 79 full protocol cards (i.e. surveys lasting a minimum of two hours or more each) have been completed for this area. An additional 27 ad hoc protocol cards (surveys lasting less than two hours but still yielding valuable data) and 70 incidental records were also completed for this area (see Figure D.9).

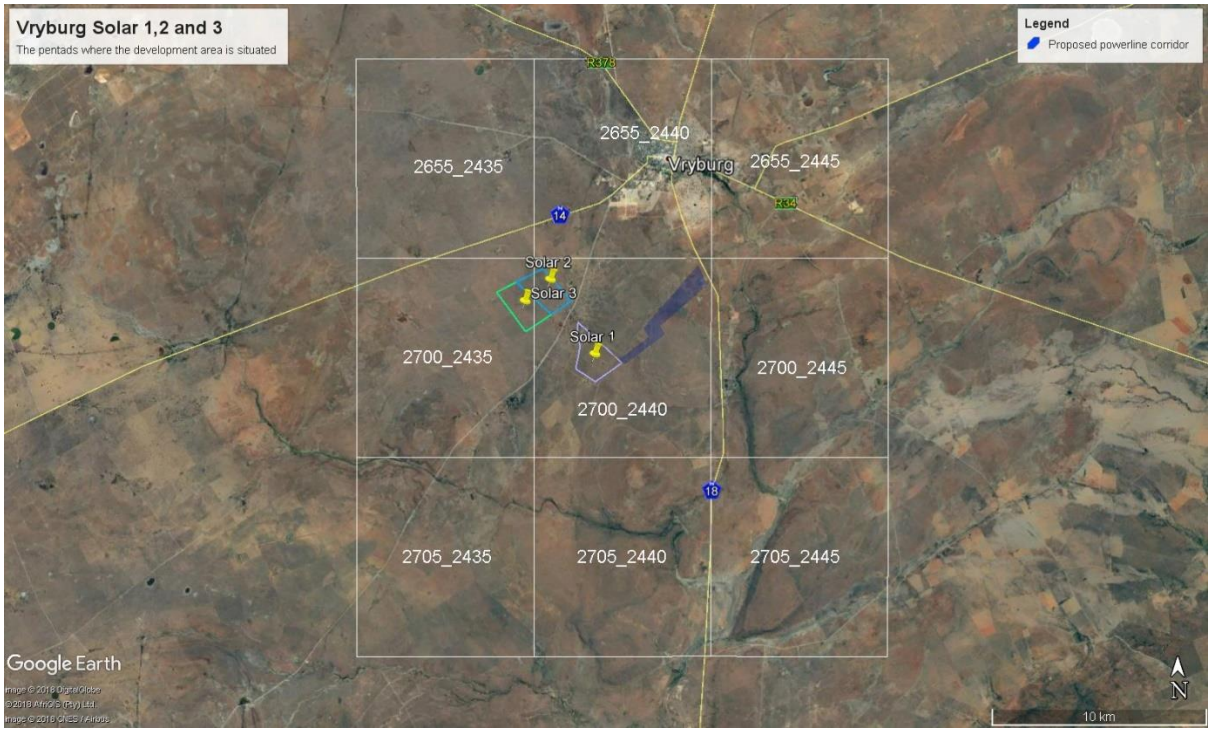

Figure D.9. The 9 pentads which comprises the greater study area.

[9] Van Rooyen, 2018

- A distinction was drawn between the greater study area i.e. the 9 pentads surrounding the proposed development footprint, the survey areas i.e. the land parcels where the bird surveys were conducted, and the development footprint i.e. the land parcel where the actual solar development will be situated (see Figure D.3).

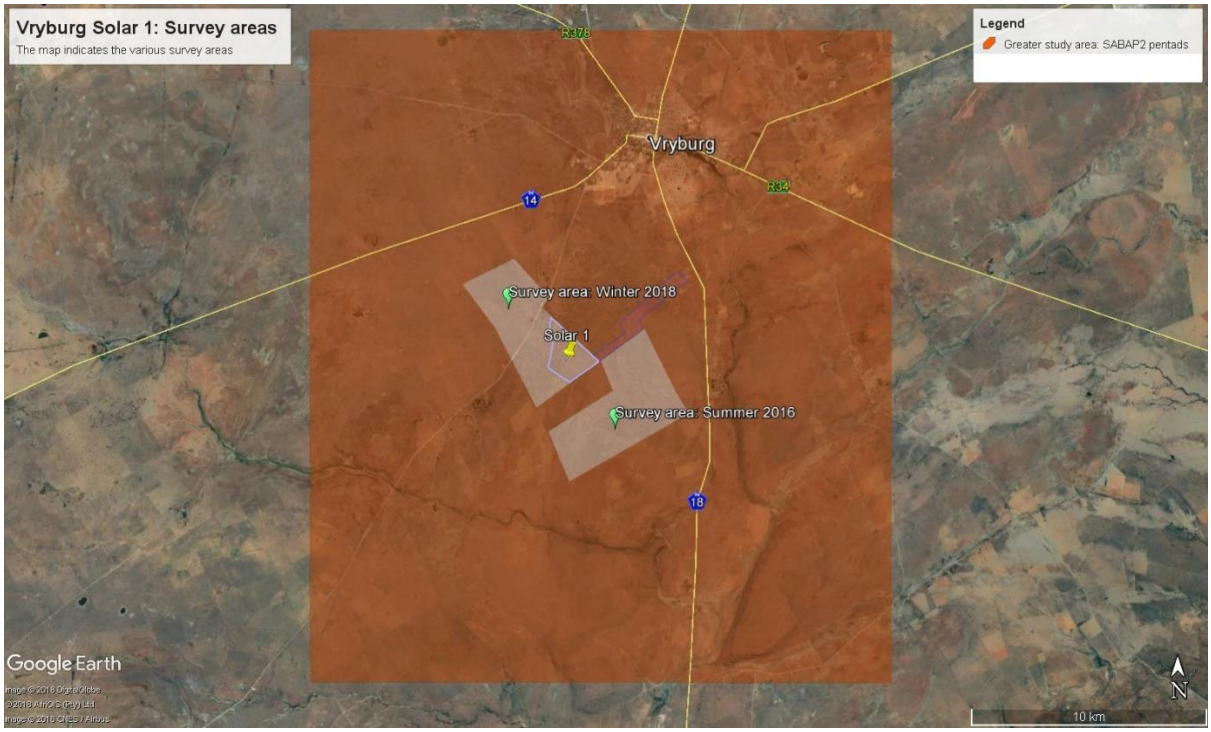

Figure D.10. The greater study area and survey areas relative to the development footprint

- A classification of the vegetation types in the greater study area was obtained from the Atlas of Southern African Birds 1 (SABAP1) and the National Vegetation Map compiled by the South African National Biodiversity Institute (Mucina & Rutherford 2006).
- The national threatened status of all priority species was determined with the use of the most recent edition of the Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor *et al*. 2015), and the latest authoritative summary of southern African bird biology (Hockey *et al*. 2005).
- The global threatened status of all priority species was determined by consulting the latest (2018.1) IUCN Red List of Threatened Species.
- The Important Bird and Biodiversity Areas of South Africa (Marnewick *et al*. 2015) was consulted for information on potentially relevant Important Bird Areas (IBAs).
- Google Earth satellite imagery was used in order to view the broader area on a landscape level and to help identify bird habitat on the ground.
- A desktop investigation was conducted to source information on the impacts of solar facilities on avifauna.
- A visit to the survey areas was conducted on 2 July 2018, followed up by on-site surveys from 3 - 5 July 2018. Surveys were conducted according to Regime 1 of Birdlife South Africa Best Practice Guidelines for assessing and monitoring the impact of solar energy facilities on birds in southern Africa, compiled by BirdLife South Africa (BLSA) in 2017 (Jenkins *et al*. 2017). Surveys were also previously conducted on the neighbouring properties in November 2015, January and February 2016 during the summer season, in accordance with Regime 2 of the draft version (November 2015) of the guidelines.

- The main source of information on avifaunal abundance and species diversity was the on-site surveys conducted in 2018, and the on-site surveys on the neighbouring properties conducted previously in 2015/16. Data was collected through a combination of drive transects, walk transects, point counts and focal point surveys (Please see Appendix 1 for a detailed exposition of the methodology used in the surveys).
- Several potential focal points of bird activity (all related to surface water e.g. boreholes and wetlands) were identified and monitored during both the summer and winter surveys. The Ferrum – Mercury 400kV powerline was also inspected for bird nests.
- All birds were recorded during both the summer and winter surveys to determine the variety and abundance of avifauna at the survey areas. Birds were classified as priority or non-priority species. Priority species were defined as South African Red Data species; South African endemics and near-endemics; waterbirds and raptors.

D.1.2.6.2 Project aspects relevant to avifaunal impacts

- Solar Field: Displacement due to habitat transformation and collisions with the solar panels;
- Building infrastructure: Displacement due to habitat transformation;
- Perimeter fences: Mortality due to entrapment between double fences;
- 132kV powerline: Displacement due to disturbance during the construction phase, and mortality due to collisions and electrocutions; and
- 33kV powerline: Displacement due to disturbance during the construction phase, and mortality due to collisions and electrocutions (if these lines are located above ground and not buried).

D.1.2.6.3 Sensitivity of the site in relation to the proposed activity

The following environmental sensitivities were identified at the proposed development footprint (see Figure D.11):

- Medium sensitivity: The natural savanna at the proposed development footprint and powerline corridor supports a moderate variety of the avifauna.
- High sensitivity: Drinking troughs at boreholes are a source of surface water and serves as focal points for avifauna. Large raptors descending to drink at troughs could be at risk of colliding with the proposed powerline.
- Very high sensitivity: Clusters of medium-sized to large trees are important in this landscape where trees are sparse. They serve as potential roosting and breeding habitat for a variety of birds, including raptors. These trees should be preserved if at all possible. Roads can be constructed in these areas provided the trees are not harmed, especially if there are already an existing road running through such an area.

Figure D.11: The identified sensitivities at Vryburg Solar 1, with yellow being savannah of medium sensitivity for birds, light brown circles being boreholes of high sensitivity for birds and the dark brown circle on the southern boundary being a patch of medium-sized to large trees with very high sensitivity for birds.

D.1.2.6.4 Avifaunal impacts

D.1.2.6.4.1 Impacts Identified for the Construction Phase

- Displacement due to disturbance caused by the construction activities associated with the solar panels and associated infrastructure (buildings, roads, internal powerlines and substation); and
- Displacement due to disturbance during the construction of the 132kV powerline

D.1.2.6.4.2 Impacts Identified for the Operational Phase

- Displacement due to habitat transformation caused by the solar panels and associated; infrastructure (buildings, roads, internal powerlines and substation);
- Mortality due to collisions with the solar panels;
- Mortality due to entrapment between perimeter fences;
- Mortality due to collisions with the 132kV powerline;
- Mortality due to electrocution on the 132kV powerline; and
- Mortality due to electrocution on the internal 33kV powerlines.

D.1.2.6.4.3 Impacts Identified for the Decommissioning Phase

- Displacement due to disturbance caused by the de-commissioning activities associated with the solar panels and associated infrastructure (buildings, roads, internal powerlines and substation).

D.1.2.6.4.4 Cumulative Impacts

- Displacement due to habitat transformation caused by the solar panels and associated infrastructure (buildings, roads, powerlines and substation); and
- Mortality due to electrocutions on and collisions with the 132kV powerlines.

D.1.2.6.5 Impact Assessment Summary

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CONSTRUCTION PHASE			
Displacement due to disturbance caused by the construction activities associated with the solar panels and associated infrastructure (buildings, roads, internal powerlines and substation)	• Construction activity should be restricted to the immediate footprint of the infrastructure. • Measures to control noise and dust should be applied according to current best practice in the industry. • Access to areas outside the construction footprint should be strictly controlled and limited as much as possible. • Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum as far as practical. • The recommendations of the ecological specialist study must be strictly implemented, especially as far as limitation of the construction footprint is concerned.	**Low**	**Very Low**
Displacement due to disturbance during the construction of the 132kV powerline	• No off-road driving; • Maximum use of existing roads; • Measures to control noise • Restricted access to the rest of the property; • Prior to construction, an avifaunal specialist should conduct a site walkthrough, covering the final power line route, to identify any nests/breeding/roosting activity of Red List species, the results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time where possible, scheduling activities around avian breeding and/or movement schedules where possible, and lowering levels of associated noise.	**Low**	**Very Low**
OPERATIONAL PHASE			
Displacement due to habitat transformation caused by the solar panels and associated; infrastructure (buildings, roads, internal powerlines and substation)	• The recommendations of the ecological specialist study must be strictly implemented, especially as far as limitation of the construction footprint, the retention of natural vegetation and rehabilitation of transformed areas is concerned. • Areas with large trees should be retained as much as possible as they serve as potential roosting and breeding habitat for a variety of birds, including raptors. In instances where the removal of trees cannot be avoided, e.g. in the powerline servitude, the minimum number of trees should be removed in order to meet the legal and safety requirements.	**Moderate**	**Moderate**
Mortality due to collisions with the solar panels	None	**Very low**	**Very low**
Mortality due to entrapment between	• The two fences should be placed far apart enough for birds to able to take off if they somehow	**Low**	**Very low**

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
perimeter fences	end up between the two fences. • Staff should be sensitised to not panic birds when they discover them trapped between the fences bit to approach them with caution to give them time to escape by taking off in a lengthwise direction.		
Mortality due to collisions with the 132kV powerline	• The 132kV powerline should be marked with Bird Flappers on the earthwire for the entire length of the line	**Moderate**	**Low**
Mortality due to electrocution on the 132kV powerline	• Vulture friendly structures (pylon or lattice) must be employed for the 132kV powerline. The structures (either single or double circuit) must be approved as vulture friendly by the Endangered Wildlife Trust's Wildlife and Energy Programme.	**Moderate**	**Very low**
Mortality due to electrocution on the internal 33kV powerlines	• Internal 33 kV lines must be placed underground, excluding sections where there may be geotechnical or other physical obstacles. The overhead 33 kV must utlise structures which have been approved as raptor friendly by the Endangered Wildlife Trust's Wildlife and Energy Programme.	**High**	**Very low**
DECOMMISSIONING PHASE			
Displacement due to disturbance caused by the de-commissioning activities associated with the solar panels and associated infrastructure (buildings, roads, internal powerlines and substation)	• No off-road driving; • Maximum use of existing roads; • Measures to control noise • Restricted access to the rest of the property; • Prior to the dismantling commencing, an avifaunal specialist should conduct a site walkthrough, covering the existing power line route, to identify any nests/breeding/roosting activity of Red List species, the results of which may inform the final work schedule in close proximity to that specific area, scheduling activities around avian breeding and/or movement schedules where possible, and lowering levels of associated noise.	**Low**	**Very low**
CUMULATIVE IMPACT			
Displacement due to habitat transformation caused by the solar panels and associated infrastructure (buildings, roads, powerlines and substation	• All the standard best practice measures as described in the impact assessment reports to restrict the habitat destruction should be diligently implemented e.g. the recommendations of the ecological specialist study must be strictly implemented, especially as far as limitation of the construction footprint, retention of natural vegetation and rehabilitation of transformed areas is concerned.	**Low**	**Very low**
Mortality due to electrocutions on and collisions with the 132kV powerlines	• Mark the 132kV powerline with Bird Flapper for its entire length • The 33kV internal powerlines must be placed underground	**Low**	**Very low**

D.1.2.6.6 Concluding statement

The proposed Vryburg Solar 1 facility should have a low to very low impact on avifauna, provided the management recommendations included in the Avifaunal report and the EMPr are strictly implemented. No fatal flaws were identified from an avifaunal perspective – it is therefore recommended that the project is authorised to go ahead.

D.1.2.7 Social[10]

D.1.2.7.1 Approach and methodology

D.1.2.7.1.1 Approach

The Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Social Impact Assessment (Barbour, 2007) is used to provide policy and quality control guidelines for the social assessment process used in this report. Table D.2 elaborates on the guideline's key activities, objectives and areas of particular interest for assessment.

Table D.2. DEA&DP Guideline for Social Impact Assessment: key activities, objectives and areas of interest (Source: Barbour, 2007)

1.	**Key Activities**
1.1.	Describe and obtain an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determine the need and scope of the SIA
1.2.	Collect baseline data on the current social environment and historical social trends
1.3.	Identify and collect data on the social impact assessment variables and social change processes related to the proposed intervention
1.4.	Assess and document the significance of social impacts associated with the proposed intervention
1.5.	Identify alternatives and mitigation measures.
2.	**Key Objectives**
2.1	Assess the proposed development in terms of its fit with the relevant legislative, policy and planning requirements
2.2	Identify and assess the factors that contribute to the overall quality of life (social wellbeing) of people not just their standard of living
2.3	Identify and assess the needs of vulnerable, at risk, groups and/or ethnic minorities or indigenous peoples
2.4	Clearly identify which individuals, groups, organisations and communities stand to benefit from the proposed intervention and those that stand to be negatively affected. In so doing the assessment must identify and emphasize vulnerable and underrepresented groups
2.5	Recognise that social, economic and biophysical systems and impacts are inextricably interconnected, and identify and understand the impact pathways created when changes in one domain trigger impacts across other domains
2.6	Acknowledge and incorporate local knowledge and experience into the assessment process
2.7	Identify and assess developmental opportunities and not merely the mitigation of negative or unintended outcomes.
3.	**Key Areas of Particular Interest**
3.1	Where vulnerable communities are present

[10] Du Toit, 2018

3.2	With high poverty and unemployment levels
3.3	Where access to services, mobility and community networks are affected
3.4	Where local livelihoods depend on access to and use of environmental resources and services
3.5	Of important tourism or recreation value
3.6	Where the existing character and "sense of place" will be altered.

D.1.2.7.1.2 Methodology

Data Collection

Data sources consulted to compile the socio-economic baseline include internet sources (e.g. Statistics South Africa website), provincial and local government reports and publications (e.g. IDPs and Spatial Development Plans (SDPs); as well as previously conducted Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs) (e.g. The Wind and Solar SEA (DEA, 2015) conducted in the study area. Where necessary, one-on-one conversation with selected informants were also used to obtain context-specific information.

Data Analysis

Data was analysed by consulting documents of various origins (government, academia and consultants) which dealt with similar aspects of the socio-economic environment, and which was published over different time-frames; thereby establishing a nuanced and longitudinal perspective of the receiving environment. Information thus obtained was evaluated to establish status quo socio-economic conditions, prevailing social structures, local demographic trends, and potential change processes present in the study area.

Impact Assessment

The relevant impact assessment methodology was provided by CSIR (the legally appointed EAP) so as to ensure uniformity of assessment across the entire suite of specialist studies commission as part of the EIA process undertaken for the proposed development.

Information sources

Various data sources were used in this SIA and are included in the full SIA report included in Appendix F of this report.

D.1.2.7.2 Project aspects relevant to social impacts

The main socio-economic aspects of the project that could have socio-economic effects for the local community are:

- Construction phase: estimated 40 to 50 skilled and 200 to 250 unskilled employment opportunities for the PV facility and transmission lines over 14 months, with associated socio-economic implications from the project development and investment.
- Operations phase: estimated 20 skilled and 40 unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility, as well as effects of the social investment program that is required as part of the Renewable Energy Independent Power Producer Programme (REI4P).
- Create a local community trust or similar (as required by REI4P) which has an equity share in the project life to benefit historically disadvantaged communities.
- Initiate a skills development and training strategy to facilitate future employment from the local community.
- Give preference to local suppliers for the construction of the facility.
- Support local community upliftment projects and entrepreneurship through socio-economic and enterprise development initiatives.

D.1.2.7.3 Sensitivity of the site in relation to the proposed activity

The primary environmental sensitivities appear to be:

- Preservation of the integrity of existing social structures:

Existing social structures provide a socio-economic safety net for vulnerable community members, while also serving to maintain social cohesion through the practice and implementation of local cultural norms, beliefs and values.

- Preservation and growth of physical and economic safety:

The asset classes, or capital, available to community members in the Naledi Local Municipality (NLM) (e.g. productive farms, infrastructure, and bulk services) must be protected, while asset classes currently in short supply need to be developed (e.g. income for the poor, improved education, and improved health). Such protection and development is vital in controlling and ultimately alleviating poverty and vulnerability. Moreover, jeopardizing physical and economic safety will serve to undermine existing social structures within the NLM.

- The wellbeing of the poor and vulnerable people groups:

The NLM has a Constitutional directive to care for its poor and vulnerable citizens. Moreover, any development which fails to consider and/or attempt to improve the plight of the poor and vulnerable; runs the risk of exacerbating local poverty and/or local animosity towards said development.

D.1.2.7.4 Social impacts

D.1.2.7.4.1 Impacts Identified for the Construction Phase

- Disruption of local social structures as a result of the construction work force and in-migration of job seekers for the 14 month construction period;
- Increased burden on existing social and bulk services as a result of workforce and job seeker influx;

- Temporary employment creation from the estimated 40 to 50 skilled jobs and 200 to 250 unskilled jobs over the 14 month construction period;
- Unrealistic expectations regarding local job creation, with associated discontent and potential negativity towards the proposed development;
- Development of locally-owned support industries to respond to construction-related activities;
- Increased risky social behaviour (including but not limited to sex work, transgenerational sex, and drug abuse) which is associated with increased levels of disposable income within a cash-poor, high unemployment area; and
- Damage to farm property/loss of livestock due to negligent and/or criminal behaviour by members of the construction work force.

D.1.2.7.4.2 Impacts Identified for the Operational Phase

- Establishment of a Community Trust;
- Employment creations;
- Development of locally-owned support industries to respond to operational activities; and
- Potential loss of farmland due to the construction of the proposed solar energy facility.

D.1.2.7.4.3 Impacts Identified for the Decommissioning Phase

- Loss of local employment and income as a result of the proposed project being decommissioned.

D.1.2.7.4.4 Cumulative Impacts

- Cumulative disruption of social structures as a result of the influx of large construction work forces from multiple renewable energy projects which serve to weaken existing social capital;
- Cumulative increase in HIV/AIDS infection rate as a result of disposable income being used to engage the services of sex workers and procure drugs; and
- Cumulative socio-economic benefit to the local community as a consequence of the combined temporary employment opportunities created by multiple renewable energy projects, as well as the combined effect of multiple community trust being established by said projects to benefit local communities.

D.1.2.7.5 Impact Assessment Summary

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CONSTRUCTION PHASE			
Disruption of local social structures as a result of the construction work force and in-migration of job seekers for the 14 month construction period	• Disruption of local social structures as a result of the presence of the construction work force and in-migration of job seekers	**Low**	**Low**
Increased burden on existing social and bulk services as a result of workforce and job seeker influx	None	**Low**	**Low**
Temporary employment creation from the estimated 40 to 50 skilled jobs and 200 to 250 unskilled jobs over the 14 month construction period	• The Contractor should establish an employment desk at the construction site to facilitate employment-related queries, and maintain a register of applicants which reflects their respective expertise, skill level and contact/residential details. Whenever planned or ad hoc employment is considered, the register should be consulted to identify appropriately qualified candidates. • The existence of the employment desk, and the relevant procedures associated with the selection and appointment of workers must be communicated to the local community. • It is strongly suggested that every effort should be made to employ local residents.	**Very low (+)**	**Low (+)**
Unrealistic expectations regarding local job creation, with associated discontent and potential negativity towards the proposed development	• The Applicant, or Contractor, must engage the local community (within the immediate project area) on the nature, duration, number and availability of employment opportunities well in advance of any construction activities taking place. It is recommended that existing social structures be utilised for such interaction, and that the process be commenced once environmental authorisations has been granted. • The Contractor should establish an employment desk at the construction site to facilitate employment-related queries, and maintain a register of applicants which reflects their respective expertise, skill level and contact/residential details. Whenever planned or ad hoc employment is considered, the register should be consulted to identify appropriately qualified candidates. • The existence of the employment desk, and the relevant procedures associated with the selection and appointment of workers must be communicated to the local community. • It is strongly suggested that every effort should be made to employ local residents.	**Moderate**	**Low**
Development of locally-owned support	• The proponent to make use of local services as far as practically possible.	**Low (+)**	**Low (+)**

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
industries to respond to construction-related activities	• Procure goods and services from variety of providers as far as possible and available to promote a wide distribution of project associated benefits.		
Increased risky social behaviour (including but not limited to sex work, transgenerational sex, and drug abuse) which is associated with increased levels of disposable income within a cash-poor, high unemployment area	• No construction workers should be allowed to sleep at the construction site. • The construction workforce should receive HIV awareness training prior to the commencement of construction. • HIV and TB testing and counselling should be made available to the construction workforce free of charge. This can be achieved in collaboration with the local clinic or treatment initiatives like Right to Care (http://www.righttocare.org) which provides HIV and TB testing on-site via mobile clinics. • Trends in local (within the immediate project area) HIV infection rates/ARV treatment loads must be monitored (annually) through close interaction with the local clinic. Should infections and treatment loads increase at a rate greater than the anticipated rate of increase; the Developer (or his appointed agent) must re-evaluate its HIV awareness training, take corrective action where necessary, and repeat said training. This mitigation is only required for the duration of the construction phase of the project.	**Moderate**	**Low**
Damage to farm property/loss of livestock due to negligent and/or criminal behaviour by members of the construction work force	• The proposed project site should be fenced off and movement of construction workers should be limited to the construction site only. • No staff may stay overnight at the project location, except security personnel. • A code of conduct, aligned with South African labour legislation, must be signed by all workers whereby workers are informed of risks on the property, and that they will be held liable for any damages or losses incurred by the property owner as a result of workers' actions not directly related to their employment. • Contractors must clearly stipulate the disciplinary procedures applicable to workers in the case of theft, damage to property and/or trespassing.	**Low**	**Low**
OPERATIONAL PHASE			
Establishment of a Community Trust	None	**Very low**	**Very low**
Employment creation	None	**Very low (+)**	**Very low (+)**
Development of locally-owned support industries to respond to operational activities	• The proponent to make use of local services as far as practically possible. • Procure goods and services from variety of providers as far as possible and available to promote a wide distribution of project associated benefits.	**Low (+)**	**Low (+)**

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
Potential loss of farmland due to the construction of the proposed solar energy facility	• Potential trustees to sit on the Community Trust need to be identified with the assistance of the local municipality. • Strict financial management controls need to be in place in order to manage the funds generated for the Community Trust from the proposed project. Financial management controls may also include an annual audit. All financial management controls id subject to the requirements of the REI4P. • The criteria for identifying and the funding of community projects should be clear in order to optimally benefit the local community.	**Moderate (+)**	**Moderate (+)**
DECOMMISSIONING PHASE			
Loss of local employment and income as a result of the proposed project being decommissioned	• The Applicant must consider retraining and redeployment of local employees in an attempt to keep them in its employ	**Low**	**Low**
CUMULATIVE IMPACT			
Cumulative disruption of social structures as a result of the influx of large construction work forces from multiple renewable energy projects which serve to weaken existing social capital	None	**Low**	**Low**
Cumulative increase in HIV/AIDS infection rate as a result of disposable income being used to engage the services of sex workers and procure drugs	• No construction workers should be allowed to sleep at the construction site. • The construction workforce should receive HIV awareness training prior to the commencement of construction. • HIV and TB testing and counselling should be made available to the construction workforce free of charge. This can be achieved in collaboration with the local clinic or treatment initiatives like Right to Care (http://www.righttocare.org) which provides HIV and TB testing on-site via mobile clinics. • Trends is local (within the immediate project area) HIV infection rates/ARV treatment loads must be monitored (annually) through close interaction with the local clinic. Should infections and treatment loads increase at a rate greater than the anticipated rate of increase; the Developer (or his appointed agent) must re-evaluate its HIV awareness training, take corrective action where necessary, and repeat said training. This is only	**Moderate**	**Moderate**

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
	required for the duration of the operational phase of the project.		
Cumulative socio-economic benefit to the local community as a consequence of the combined temporary employment opportunities created by multiple renewable energy projects, as well as the combined effect of multiple community trust being established by said projects to benefit local communities	None	**Moderate (+)**	**Moderate (+)**

D.1.2.7.6 Concluding statement

In light of the overall low significance (post mitigation) rating of identified negative impacts, and having regard to the nature of such impacts, and the status quo socio-economic conditions present in the NLM; the socio-economic benefits of the project appear to outweigh its impacts. Should the mitigation measures be implemented as prescribed in this assessment; it is recommended that the proposed development be awarded environmental authorisation.

D.1.2.8 Traffic[11]

D.1.2.8.1 Approach and methodology

Available desktop information, including the South African National Roads Agency (SANRAL) National traffic count information, google earth images and similar projects were reviewed to inform this TIS.

D.1.2.8.2 Project aspects relevant to traffic impacts

- Construction and maintenance vehicles coming and going from site; and
- Construction and decommissioning activities creating dust.

D.1.2.8.3 Traffic impacts

The traffic impacts have been identified to occur during the development are:

- Increase in traffic generation.
- Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.
- Impact on air quality due to dust generation and release of air pollutants from vehicles and construction equipment.
- Decrease in quality of surface condition of the roads.
- Cumulative impact of traffic generation.

[11] Laurie, 2018

D.1.2.8.4 Impact Assessment Summary

Impact	Mitigation measure	Significance before mitigation	Significance after mitigation
CONSTRUCTION AND DECOMMISSIONING PHASES			
Increase in traffic	• Abnormal vehicle routes and management plans may be required dependant on the type and route of the abnormal vehicle loads. Abnormal vehicles may require special permits and route plans from each relevant road authority. These permits are the responsibility of the developer and its logistics/freight companies. • Ensure that roadworthy and safety standards are implemented at all time for all construction vehicles. • Workers should carpool to work or buses should be exclusively used to transport workers to site. • Temporary construction phase road signage be provided at the Reivilo/N14 intersection. The planning and approval of this signage must be obtained from SANRAL.	**High**	**Low**
Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	• Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and a fence around the PV facility should be installed. • Adhere to all speed limits applicable to all roads used.	**Moderate**	**Low**
Noise impact and impact on air quality due to dust generation and release of air pollutants from vehicles and construction equipment	• Implement management strategies for dust generation e.g. apply dust suppressant on the Reivilo road, and gravel farm access 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 the vehicle safety standards implemented by the Developer.	**Moderate**	**Low**
Change in quality of surface condition of the roads	• 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; • Implement management strategies for dust generation e.g. apply dust suppressant on the Reivilo road, and gravel farm access road, exposed areas and stockpiles.	**Low**	**Low**

OPERATIONAL PHASE			
Increase in traffic	• Limit access to the site to personnel; and • Ensure that where possible, staff members carpool to site.	**Very low**	**Very low**
Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	• Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and a fence around the PV facility should be installed. • Adhere to all speed limits applicable to all roads used.	**Moderate**	**Low**
Noise impact and impact on air quality due to dust generation and release of air pollutants from vehicles and construction equipment	• Implement management strategies for dust generation e.g. apply dust suppressant on the Reivilo road, and gravel farm access road, exposed areas and stockpiles.	**Moderate**	**Low**
CUMULATIVE IMPACT			
Increase in traffic	n/a	**Moderate**	**Moderate**

D.1.2.8.5 Concluding statement

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 these projects, the overall impact from traffic generation is deemed to be low when implementing suitable mitigation measures. Therefore, the traffic impacts are not unacceptable and the project should receive EA from a traffic impact perspective.

D.1.2.9 Environmental sensitivity map

Based on the impact assessment undertaken and the relevant environmental sensitivities identified, the site layout of the solar PV facility and routing of the distribution line within the power line corridor have been identified and shown in Figure D.12. Based on the specialist studies, the key environmental features that have been avoided/care taken in terms of the layout of the facility and routing of the distribution line are listed below. No other features have been identified as part of the specialist studies that require avoidance.

- **Avifaunal sensitivity**: areas with large trees should be retained as much as possible as they serve as potential roosting and breeding habitat for a variety of birds, including raptors. In instances where the removal of trees cannot be avoided, e.g. in the powerline servitude, the minimum number of trees should be removed in order to meet the legal and safety requirements.

- **Heritage sensitivity**: two cultural significance finds were made within the distribution line corridor. Stone tools were identified to occur on a low ridge to the east of the substation. These features must be avoided by the proposed development.

- **Ecological sensitivity**: the small restricted natural pan depression approximately 61 m in diameter is present at the site. No other wetlands are present at the site. This pan should be protected with a 100m buffer zone, with the pan and buffer regarded as high sensitivity and set aside as a no-go zone for any development.

Figure D.12/...

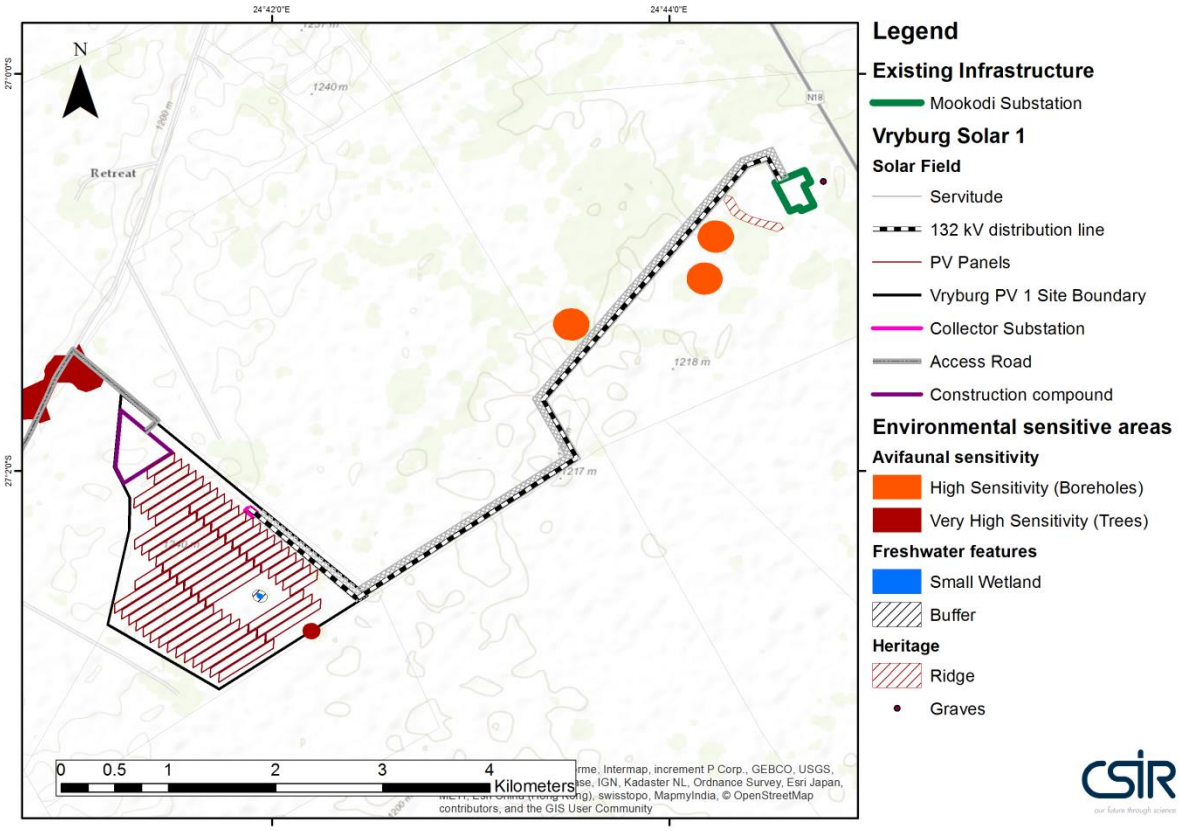

Figure D.12. Vryburg Solar 1 PV facility and distribution line routing overlain with the environmental features identified on site

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 **Vryburg Solar 1 project and associated electrical infrastructure**. No negative impacts have been identified within this BA that, in the opinion of the EAP 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.

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).

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.

Alternatives

As noted above, in Section A of this report, the preferred activity on site was determined to be the development of a renewable energy facility on site using solar PV as the preferred technology. In terms of the preferred location of the site, the farm portions Portion 2 of Frankfort Number Farm 672 , Portion 1 of Frankfort Number Farm 672 ("Edin") and the Remainder of Rosendal Farm 673 are preferred. Based on the specialist studies undertaken for this project, a preferred layout for the solar PV facility and distribution line was determined. This layout avoids the features on site that have been identified to be no-go areas. These include, a ridge that has a high heritage sensitivity rating, trees that have a very high avifaunal sensitivity rating and a pan that has a high aquatic ecology sensitivity rating.

Need and desirability of the project

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). This project is located in REDZ 6: Vryburg which is a geographical area that has been identified on a strategic planning level to have reduced negative environmental impacts but high commercial attractiveness (due to it proximity to, inter alia, the national grid) and socio economic benefit to the country. The development of solar energy is therefore 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 supports the objectives of the Naledi Local Municipality's Integrated Development Plan (IDP) (2017-2022) which identifies renewable energy as a key economic sector within its Local Economic Development (LED) plan.

Impact assessment findings

Based on the findings of the specialist studies, the proposed project is considered to have an overall low negative environmental impact and an overall low 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 if the recommended mitigation measures are implemented. 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 Vryburg region. 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.

Conditions to be include in the EA

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):

- **Visual**
    - Lighting plan should be prepared which will minimise impacts on the nightscape
- **Heritage**
    - Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made; and
    - A Chance Find Procedure must be followed if fossils are uncovered in the areas marked as High and Medium Palaeontological Sensitivity during the construction phase.
- **Ecology**
    - A Protected Tree species, *Vachellia erioloba* (also listed as Declining) is found at the site. Protected Tree species are listed under the National Forests Act No. 84 of 1998. In terms of a part of section 15(1) of Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister. Such a permit should be applied for if the development is approved; and
    - A small wetland depression (pan) at the site should be regarded as a no-go zone for any activity or development during the construction and operational phases.
- **Avifauna**
    - Prior to construction, an avifaunal specialist should conduct a site walkthrough, covering the final power line route, to identify any nests/breeding/roosting activity

of Red List species, the results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time where possible, scheduling activities around avian breeding and/or movement schedules where possible, and lowering levels of associated noise.

- Areas with large trees, as identified on site, should be retained as much as possible as they serve as potential roosting and breeding habitat for a variety of birds, including raptors. In instances where the removal of trees cannot be avoided, e.g. in the powerline servitude, the minimum number of trees should be removed in order to meet the legal and safety requirements.

- The 132kV powerline should be marked with Bird Flappers on the earthwire for the entire length of the line.

- Vulture friendly structures (pylon or lattice) must be employed for the 132kV powerline. The structures (either single or double circuit) must be approved as vulture friendly by the Endangered Wildlife Trust's Wildlife and Energy Programme.

- Internal 33 kV lines must be placed underground, excluding sections where there may be geotechnical or other physical obstacles. The overhead 33 kV must utilise structures which have been approved as raptor friendly by the Endangered Wildlife Trust's Wildlife and Energy Programme.

- **Traffic**

  - Temporary construction phase road signage be provided at the Reivilo/N14 intersection. The planning and approval of this signage must be obtained from SANRAL.

Surina Laurie

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NAME OF EAP

10 August 2018

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SIGNATURE OF EAP DATE

Basic Assessment for the proposed development of a 115 MW Solar Photovoltaic Facility (Vryburg Solar 1) and associated electrical infrastructure near Vryburg in the North West Province: DRAFT BASIC ASSESSMENT REPORT

SECTION F: APPENDICES

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